Left Periphery and *How-Why* Alternations[*]

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This article concerns the "topography" of the Left Periphery, in particular, the syntactic distribution of *how*-questions across languages and their corresponding semantic interpretations. Causal *wh* and reason *wh* are analyzed as sentential operators in the left periphery, which scope over the entire IP and take the corresponding event/state as their complements. By contrast, manner and instrumental *wh's* are both analyzed as *v*P-modifiers, which translate into restrictive predicates of the underlying event argument associated with the peripheral area of *v*P. These *wh*-expressions differ dramatically with respect to their behavior towards locality principles. On the one hand, only instrumental *wh*, but not manner *wh*, may escape from strong island effects and weak intervention effects. On the other, they both observe strong intervention effects, triggered by negation and A-not-A questions. It is suggested that this apparent paradox can be solved by a generalized version of Relativized Minimality proposed in Rizzi (2004).

Keywords: left periphery, *wh*-adverbs, *how-why* alternations, syntax-semantics interface
intervention effects, Relativized Minimality, Cartographic Approach

0. *How-Why* Alternations

In many languages, interrogative elements with the meaning 'how' often alternate with those with the meaning 'why' in the highest layer of a sentence, typically expressing causal or reason questions. A good example is *how come* vs. *why* in English. There is also a group of languages where *why* is simply built upon *how* morpho-syntactically. In other words, they are cognates in these languages. I will give these two clusters of phenomena a cover term "*how-why* alternations". We will start with a rundown of the basic facts, and provide a descriptive generalization across languages.

First consider English *how*-questions such as (1). The answers could be either manner, instrumental, or resultative, as illustrated in (1a-c) respectively.

(1)   A: How did John handle this matter?
      B: a.   Quite skillfully, I think.   [manner]
           b.   By pulling quite a few strings.   [instrumental]
           c.   Rather successfully, I would say.   [resultative]

By contrast, both (2a) and (2b) question the cause of the event "John arrived so late". On the

other hand, (2c) allows either an interrogative construal or a denial construal: The former elicits the information about the cause that makes the event possible. The latter denies the possibility of the event, expressing something like "John shouldn't do this to me":

(2) a. How come John arrived so late?   [causal]
    b. How is it that John arrived so late?   [causal]
    c. How could John do this to me?   [causal/denial]

Japanese constructs *how*-questions with *doo*, a simplex form of *how*. There are again three types of answers, corresponding to their English counterparts, as illustrated in (3a-c) respectively (Japanese data from Naomi Harada and Kazue Takeda, p.c.):[1]

(3) A: John-wa kabin-o   doo kowasita-no?
       John-top vase-acc how broke-Q
       'How did John break the vase?'

    B: a. nan-no   tamerai-mo   naku.   [manner]
         any-gen hesitation   NEG
         'With no hesitation.'

       b. hanmaa-de   tatai-te.   [instrumental]
         hammer-with hitting
         'By hitting with a hammer.'

       c. konagona-ni.   [resultative]
         pieces-into
         'Into pieces.'

Japanese also builds a complex *how*-form with *doo* in gerunds: *doo-yat-te* is construed as an instrumental *wh* element, as in (4a), while *doo-si-te* is construed as a causal interrogative, as in (4b):

(4) a. Taroo-wa   doo-yat-te   syuppatu-suru-no? [instrumental]
       Taroo-Top   how-do-Ger   leave-Pres-Q
       'How will Taroo leave?'

    b. Taroo-wa   doo-si-te   syuppatu-sita-no? [causal]
       Taroo-Top   how-do-Ger   leave-Past-Q
       'How come Taroo left?'

Chinese presents an interesting comparison in this picture. As an SVO language and a "hard-core" *wh*-in-situ language, one finds *wh*-adverbials scattered throughout the syntactic projections. First consider the contrast between (5a) and (5b):

(5) a. Akiu   zenme   qu   Taipei?   [irrealis: instrumental]
       Akiu   how   go   Taipei

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[1] The abbreviations used in this paper are glossed as follows: 3S: third person singular; AV: actor voice; Cl: classifier; Exp: experiential aspect; Fin: finiteness head; Ger: gerundive marker; Inc: inchoative aspect; Int: interrogative head; Mod: modifier; Nom: nominative case; Obl: oblique case; Prf: perfective aspect; Q: question particle; Rea: realis mood; Res: resultative aspect; Top: topic marker.

'How will Akiu go to Taipei?'

b. Akiu   zenme   qu-le   Taipei?   [realis/past: causal]
   Akiu   how   go-Prf   Taipei
   'How come Akiu went to Taipei?'

Zenme, which is a simplex form of *how*, gets an instrumental reading with a bare tense clause, which is typically associated with irrealis mood. By contrast, it gets a causal reading in the presence of a perfective aspect marker, which has a strong tendency to be interpreted as past tense (cf. Tsai 1999b). Furthermore, the contrast between (6a,b) shows that a lexical modal can also separate instrumental *how* from causal *how*:

(6) a. Akiu   keyi zenme(-yang)   qu   Taipei?   [instrumental]
       Akiu   can how(-manner)   go   Taipei
       'How can Akiu go to Taipei?'

    b. Akiu   zenme(*-yang) keyi   qu   Taipei?   [causal/denial]
       Akiu   how(-manner) can   go   Taipei
       'How come Akiu could go to Taipei?'
       'Akiu can't/shouldn't go to Taipei.'

Premodal *zenme* forms a causal question, while postmodal *zenme* forms an instrumental question. There is also a morphological difference between the two: Postmodal *how* can alternate with a complex form *zenme-yang* 'how-manner', while premodal *how* cannot.

On the other hand, when Chinese *how* is introduced by the resultative aspect *-de* after the main verb, as in (7), we get resultative or descriptive questions, as indicated by their respective answers in (8a,b):

(7) zhe-jian shi,   Akiu chuli-de   zenme*(-yang)?
    this-Cl matter   Akiu handle-Res   how-manner
    'How did Akiu handle this matter?'

(8) a. chuli-de   hen chenggong.   [resultative]
       handle-Res   very successful
       'He handled this matter such that it is successful.'
    b. chuli-de   hen piaoliang.   [descriptive]
       handle-Res   very beautiful
       'He handled this matter beautifully.'

This syntax-semantics correspondence of Chinese *how*-questions is summarized in the following table:

Table 1.

	premodal	in-between	postverbal
zenme 'how'	causal	instrumental	*
		manner	
zenme-yang 'how-manner'	*	instrumental	resultative
		manner	descriptive

A "hard-core" *wh*-in-situ language such as Chinese provides a window to peek through the surface distortion created by scrambling and *wh*-movement in other languages, and provides an opportunity to map out accurately the base-position of *wh*-adverbials (cf. Huang 1982a,b). In turn, this allows for the possibility of exploring how syntax, semantics, and pragmatics work hand in hand to shape the "topography" of the left periphery. In the present study of *how-why* alternations, I will assume the following typology:

a.   English constructs *wh*-phrases within the morphological component: a Q-operator and a choice function variable combine to form a morphological unit (Reinhart 1998), which is pied-piped to [Spec, CP] through *wh*-movement.

b.   Japanese constructs *wh*-phrases within syntax, at the DP level: a Q-operator occupies D (Watanabe 1992), binding a choice function variable in its NP complement. The Q-operator then raises to C (cf. Alexiadou & Anagnostopoulou 1998, Hagstrom 1998, Chomsky 2000, Miyagawa 2001).

c.   Chinese constructs *wh*-phrases within syntax at the sentential level: a Q-operator occupies C and patterns with other types of sentential operator in licensing choice function variables introduced by *wh's*-in-situ (cf. Cheng 1991, Li 1992, Tsai 1994, 1999a, Simpson 1995, 2000 for various versions of this view).

In section 1 and 2, we look into the core properties of *how-why* alternations across languages, and present a cause-effect account of relevant phenomena under the Neo-Davidsonian approach à la Parsons (1990). In section 3, it is argued quite extensively that the semantics of *how-why* alternations is linked to their syntax in a non-trivial way. The "topography" of *how*-questions and *why*-questions will be put under close examination with help from a number of "landmarks", which give us a clear idea as to how the various interpretations of *wh*-adverbials (e.g., causal vs. instrumental) correspond to their structural positions (e.g., sentential operators vs. VP-adjuncts). Furthermore, it is shown that the syntax-semantics mapping involved is responsible for a cluster of properties that separate *wh*-adverbials in the left periphery from others, in the spirit of Collins (1991). Section 4 concludes the article by comparing the CP layer of Chinese sentences with its Italian counterpart. The resemblance is unmistakable, which lends cross-linguistic support to the cartographic approach developed in Rizzi (1997) and Cinque (1999). Finally, it is argued that a rather mysterious asymmetry of intervention effects can be solved if manner *how* is classified as an operator/quantifier, and instrumental *how* as a modifier. The locality issues involved can be given a straightforward account by means of a "generalized" version of Relativized Minimality along the line of Rizzi (2004).

1. The Whys of *How*
1.1. Causal Questions vs. Instrumental Questions

We will start with the "whys" of *how*-questions. Tsou, an Austronesian language spoken in the southern part of Taiwan, presents a good illustration of the structural diversity of *how*-questions noted above. A curious thing about this language is that instrumental *how* and manner *how* are realized as conjuncts of the main predicate (Tsai & Chang 2003), as in (9a):

(9) a.   m-i-ta   m-ainenu ho m-i-ta   eobak-o ta-Mo'o   'e-Pasuya?
           AV-Rea-3S   AV-how   Lnk AV-Rea-3S   hit-AV   Obl-Mo'o Nom-Pasuya

'How did Pasuya hit Mo'o?'   [manner/instrumental/resultative]
(Lit.) 'Pasuya hit Mo'o and how?'

   b.   m-i-ta   m-ainenu [ci   m-i-ta   eobak-o ta-Mo'o] 'e-Pasuya?
       AV-Rea-3S   AV-how such.that AV-Rea-3S hit-AV Obl-Mo'o Nom-Pasuya
       'How come Pasuya hit Mo'o?'   [causal]
       (Lit.) 'How was Pasuya such that he hit Mo'o?'

The literal translation for this question is 'Pasuya hit Mo'o and how?'. Here I would like to entertain the possibility that manner and instrumental *how's* involve a comitative relation between an event on the one hand, and an individual or a property on the other. So when we say *John killed Bill with a knife*, the comitative relation is between the instrument *knife* and a killing event. The knife is therefore the instrument of the killing event. By contrast, when we say *John cheated Bill with ease*, the comitative relation is between the property *easiness* and a cheating event. The easiness is therefore the manner of the cheating event. Such an intuition closely matches the Neo-Davidsonian view of adjunct association. Hence the easiness in such a sentence is the manner of the cheating event. As formulated in (10a), we may analyze the instrumental expression in (9a) as a comitative conjunct which encodes the relation "x is with the underlying event e" in the spirit of Parsons (1990, 1995). Or to put it in theta-theoretical terms, we may characterize the relation as "x is an instrument of the underlying event e", as in (10b) ("?" represents a question operator, and "∃" an existential operator):

(10) *instrumental/manner questions:*
    a.   ?x ∃e (hitting(e) & Agent(e, Pasuya) & Theme(e, Mo'o) & with(e, x))
    b.   ?x ∃e (hitting(e) & Agent(e, Pasuya) & Theme(e, Mo'o) & Instrument(e, x))

In a sense, we have here in Tsou a case where a Neo-Davidsonian conjunct surfaces in syntax, not as an adjunct, but as a predicate bearing full-fledged voice morphology (cf. Tsai & Chang 2003).

    (9b), on the other hand, expresses a causal question, where *mainenu* 'how' is syntactically realized as a matrix predicate, which takes a clausal complement introduced by *ci*, meaning 'such that'. The literal translation for (9b) is accordingly 'How was Pasuya such that he hit Mo'o?'. Then how about its English counterpart? On the intuitive level, we may say a causal question such as (11) literally means 'How does the hitting event come about?':

(11) How come Pasuya hit Mo'o?
    Presupposition: Pasuya hit Mo'o, and something caused Pasuya to hit Mo'o.
               →   Pasuya shouldn't hit Mo'o.
    Speech Act: The speaker wants to know what caused Pasuya to hit Mo'o.

With the causality semantics we just introduced, we can say that when (11) is uttered, the speaker wants to know what caused Pasuya to hit Mo'o. This is the speech act part of the causal question. Moreover, when (11) is uttered, it has to be true that Pasuya hit Mo'o, and something caused Pasuya to hit Mo'o. This is the presupposition part of the causal question. From this presupposition, there is also a counter-expectation of some sort, i.e., 'Pasuya shouldn't hit Mo'o', which may well be part of the pragmatics of the causal question.[2]

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[2] In the spirit of Hamblin (1973) and Karttunen (1977), we take a question operator to represent a combination of existential quantification and a speech act of eliciting information concerning the cause event. This semantics-pragmatics split opens the possibility of changing the speech act to denial without affecting the basic

To sharpen our intuition further, we may combine *how come* with a stative predicate, as in (13). There is clearly a pragmatic side to the question, which presents a sharp contrast to an epistemic question such as (14) (cf. Bromberger 1992):

(13) How come the sky is blue? (It was cloudy just this morning.)

Presupposition:	The sky is blue, and something caused the sky to become blue.
	→ The sky shouldn't be blue.
Speech Act:	The speaker wants to know what caused the sky to become blue.
Answer:	Because the clouds just all blew away.

(14) Why is the sky blue? (I am not aware of any scientific explanation.)

Presupposition:	The sky is blue.
Speech Act:	The speaker wants to know the reason the sky is blue.

Again we have a counter-expectation for the causal question (13) as part of its pragmatics, that is, "The sky shouldn't be blue".[3] By contrast, there is no such construal for the following epistemic question: It may well be the case that there is no cause at all for the phenomenon "The sky is blue". So the causal answer *Because the clouds just all blew away* is only appropriate for (13), but not for (14).

This pattern of contrasts can be found in Chinese, Tsou, and Squliq Atayal. It's causal *how* vs. the genuine *why* in Chinese, as in (15):

(15) a.   tiankong   zenme   shi lande?   (Chinese)
          sky   how   be   blue
          'How come the sky is blue?'

     b.   tiankong weishenme   shi lande?
          sky   why   be   blue
          'Why is the sky blue?'

(16) a.   m-ainenu ci   m-o   enghova 'e-engʉca?   (Tsou)
          AV-how Comp   AV-Rea blue   Nom-sky
          'How come the sky is blue?'

     b.   m-ainci m-o   enghova 'e-engʉca?
          AV-why AV-Rea blue   Nom-sky
          'Why is the sky blue?'

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existential construal. We thus have an explanation for the question-denial alternation of causal *how* across languages.

[3] As noted by Andrew Simpson (p.c.), (13) can be taken to convey either a permanent state property or a temporary state property of the sky. The following minimal pair illustrates a related difference in interpretation:

(i)   a.   How come the snow is white?
        b.   How come snow is white?

In (ia), *the snow* can only be interpreted as specific, and there is a change of state from non-whiteness to whiteness. By contrast, when the generic subject *snow* in (ib), the change-of-state flavor disappears. What the two construals shares is expectation of a state of affairs. The pragmatic difference between *why* and *how come* can thus be characterized as follows: *Why* involves no special expectation about whether or not a state of affairs should hold, whereas *how come* expresses surprise that a particular state should hold.

(17) a.   swa   mtasiq   qu-kayal?   (Squliq Atayal)
        how   blue   Nom-sky
        'How come the sky is blue?'

    b.   h-m-swa   mtasiq   qu-kayal?
        H-AV-how   blue   Nom-sky
        'Why is the sky blue?'

Tsou, on the other hand, builds a reason question on a contraction between *mainenu* and *ci* 'how such that'. The result is *mainci* 'why', as in (16b). In another Formosan language, Squliq Atayal, *why* is built upon *how* by morphological means. So we have *swa* for a causal question, as in (17a), but *h-m-swa* for a reason question, as in (17b).

1.2. Causal Questions vs. Epistemic Questions

    Now we are in a position to spell out the semantics for causal questions, as illustrated in (18a), where the last conjunct expresses a causation between two events, the cause event *e* and the effect event *e'*:

(18) *causal questions:*
    a.   ?e ∃e' (hitting(e') & Agent(e', Pasuya) & Theme(e', Mo'o) & CAUSE(e, e'))
    b.   ?e ∃s (being-white(s) & Theme(s, the snow) & CAUSE(e, s))

It is the cause event that is subject to question here, as represented by the question operator at the beginning of the formula. For a causal question such as *How come the snow is white?*, we just replace the effect event *e'* with a resultant state *s*, as in (18b).
    But the question remains as to the origin of reason questions. I would like to adopt a fine-grained semantics of causal relations advocated by Shen (1985) and Reinhart (2003), as stated in (19a-c):

(19) a.   Enable: One event is a necessary condition for the other.
                  (e.g., Pasuya entered the pool, and then he drowned.)

    b.   Cause: One event is a sufficient condition for the other.
                  (e.g., It just snowed outside, so the snow is white.)

    c.   Motivate: One event either enables or causes the other, mediated by a mental state.
                  (e.g., Pasuya wanted to eat, so he started to cook.)

Reinhart distinguishes three types of causal relation between two events: The first one is the Enable relation, where one event is a necessary condition for the other. For example, *Pasuya entered the pool* is a necessary condition for the eventuality *Pasuya drowned*. Here the term "necessary condition" is not used in the strict logical sense, but based on our understanding of how causality works in the real world. In other words, we are not saying that Pasuya's entering the pool is the only possible cause for Pasuya's drowning. Instead, we are saying that Pasuya's entering the pool allows the possibility of Pasuya's drowning. This, in a way, matches our intuition about reason and epistemic questions. So when we utter *Why is the snow white?*, we are asking 'what enables the snow's being white?' or 'what makes the snow's being white possible?'. This semantics of reason and epistemic questions are given in (20a) and (20b) respectively, based upon the distinction made in (21a,b):

(20) *reason/epistemic questions:*
    a.   ?e ∃e' (hitting(e') & Agent(e', Pasuya) & Theme(e', Mo'o) & ENABLE(e, e'))
    b.   ?e ∃s (being-white(s) & Theme(s, the snow) & ENABLE(e, s))

(21) a.   ENABLE(e, e') ↔ e is a necessary condition for e'
    b.   CAUSE(e, e') ↔ e is a sufficient condition for e'

       The second type of causal relation is causality of the familiar sort, where one event is a sufficient condition for the other. For instance, *It just snowed outside* is a sufficient condition for *The snow is white*. Making use of this conception of causality, we may propose that a resultative question such as (22) has a very similar semantics to a causal question, except that it is the effect event that is subject to question instead, as in (23):

(22) A: How did Pasuya hit Mo'o?
      B: Rather badly, I am afraid.

(23) *resultative questions:*
    ?e' ∃e (hitting(e) & Agent(e, Pasuya) & Theme(e, Mo'o) & CAUSE(e, e'))

       The last type is a Motivate relation, where one event either enables or causes the other, mediated by a mental state. For example, Pasuya's desire to eat motivates Pasuya's cooking. In other words, Pasuya's eating is the goal or purpose of Pasuya's starting to cook. We will return to this type of causal relation later.

1.3. Agentivity Restriction

Another important property of *how-why* alternations has to do with the fact that in constructions where the subject is not an agent, instrumental questions are not allowed, as evidenced by the contrasts of (24-28), where we have passive, unaccusative, locative-existential, and sentient verbs constructions:

(24) *passives:*
    na-ge   xuesheng zenme bei pian-le, hai xiang   pian bieren?
    that-Cl   student   how   BEI cheat-Inc still want   cheat others
    a.   'How come that student himself was cheated, and he still wants to cheat others?'
    b.# 'By what means was that student cheated, and he still wants to cheat others?'

(25) *unaccusatives:*
    na-ben   shu   zenme   chu-xian-le?
    that-Cl   book   how   show-up-Prf
    a.   'How come that book showed up?'
    b.# 'By what means did that book show up?'

(26) *locative-existential predicates:*
    cong faguo   zenme   lai-le   san-ge   gongchengshi?
    from France how   come-Prf   three-Cl   engineer
    a.   'How come three engineers came from France?'
    b.# 'By what means did three engineers come from France?'

(27) *transitive sentient verbs:*
  Akiu   zenme xihuan   hua,   jiu guli   dajia   zhong?
  Akiu   how   like   flower   then encourage people plant
  a.   'How come Akiu likes flowers, and then encouraged people to plant them?'
  b.# 'In what manner does Akiu likes flowers, and then encouraged people to
        plant them?'

(28) *unergative sentient verbs:*
  Akiu   zenme   ku-le?
  Akiu   how   cry-Inc
  a.   'How come Akiu started to cry?'
  b.# 'In what manner did Akiu start to cry?'

All these constructions share the feature of not allowing an agent subject. As a result, only causal questions are possible, and the instrumental reading is uniformly blocked from (24-28). Here we draw our answer from an observation made by Reinhart, which goes as follows: "In standard agent verbs ..... an instrument is always allowed optionally, but it is not directly selected by the verb." It follows that the instrumental role is licensed by the agent role, as sketched in (29):

(29) a.   By what means did Pasuya hit Mo'o?
     b.   ?x ∃e (hitting(e) & Agent(e, Pasuya) & Theme(e, Mo'o) & Instrument(x, e))

By contrast, if there is no agent role in a given sentence, as in (24), then there would be no optional instrument role. This accounts for the absence of instrumental questions throughout (24-28). Take (24) for example. We may spell out its semantics with the instrumental reading in (24'b):

(24')a.   ?e ∃e' (being-cheated(e') & Theme(e', that student) & CAUSE(e, e'))
     b. # ?x ∃e (being-cheated(e) & Theme(e, that student) & Instrument(e, x))

On the other hand, there is always a causal relation underpinning every eventuality, so a causal question is available by default, as in (24'a).

2. The Hows of *Why*

Having considered the "whys" of *how*-questions, we now examine the "hows" of *why*-questions. When we ask *Why did Pasuya hit Mo'o?*, there are also two kinds of appropriate answer: one is reason, as in (30a), the other purpose, as in (30b):

(30) A: Why did Pasuya hit Mo'o?
     B: a.   Because he was drunk.   [reason]
          b.   To get his attention, I guess.   [purpose]

Again in Chinese, we can distinguish the two types of *why*-question in terms of linear order with the inclusion of a future modal. As shown in (31a,b), *weishenme* 'why' can appear only before the future modal (">" marks a linear precedence relation):

(31) a.　Akiu　　　weishenme　　hui　zou?　　　　(reason > modal)
　　　　　Akiu　　　why　　　　　will　leave
　　　　　'Why would Akiu leave?'

　　　b.*　Akiu　　　hui　weishenme　　zou?　　　(*modal > reason)
　　　　　Akiu　　　will　why　　　　　leave

(32) a.　Akiu　　　hui　wei(-le) shenme　cizhi?　　(modal > purpose)
　　　　　Akiu　　　will　for(-Prf) what　　resign
　　　　　'For what purpose would Akiu resign?'

　　　b. ??　Akiu　　wei(-le) shenme　hui　cizhi?　　(??purpose > modal)
　　　　　Akiu　　　for(-Prf) what　　will　resign

By contrast, *wei(-le) shenme* 'for/because of what' has a strong tendency to stay in the scope of the future modal, and the result is a purpose question such as (32a). A point of interest here is that reason *weishenme* in (31) is a contraction of *wei shenme* 'for what' in Mandarin Chinese, and has evolved into a reason adverb. By contrast, *wei(-le) shenme* in (32) remains a PP (i.e., with *wei* being a preposition), expressing a purpose question. Drawing a line along delimitators such as modals, we may call causal *how* and reason *why* outer *wh*-adverbials, and instrumental *how* and purpose *why* inner *wh*-adverbials.

　　　A similar pattern is found in Squliq Atayal. If *h-m-swa* 'why' appears before the realis modal *wal*, as in (33a), this results in a reason question. If, however, *h-m-swa* follows the realis modal, as in (33b), then a purpose question is formed instead:

(33) a. ? h-m-swa　　wal　　musa　　Bnka　　qu-Tali?　　　(Squliq Atayal)
　　　　　AV-how　　Rea　　go　　　Taipei　　Nom-Tali
　　　　　'Why did Tali go to Taipei?' (Rea: realis modal)

　　　b.　wal　h-m-swa　　musa　　Bnka　　qu-Tali?
　　　　　Rea　H-AV-how　　go　　　Taipei　　Nom-Tali
　　　　　'For what purpose did Tali go to Taipei?'

　　　Furthermore, subject agentivity in Squlic Atayal also plays an important role in dictating the interpretation of *why*-questions in a way similar to Mandarin Chinese (see section 1.3 above). Specifically, purpose questions are blocked in constructions where the subject is not an agent. (34-38) show that *weishenme* is allowed in passive, unaccusative, locative-existential, and sentient-verb constructions, but *wei(-le) shenme* 'for what' is not:

(34) *passives:*
　　　na-ge　　xuesheng　weishenme/*wei(-le) shenme　　bei　pian-le?
　　　that-Cl　student　　why/for(-Prf) what　　　　　BEI　cheat-Prf
　　　'Why/*For what purpose was that student cheated?'

(35) *unaccusatives:*
　　　na-ben　shu　　　weishenme/*wei(-le) shenme　　chu-xian　le?
　　　that-Cl　book　　　why/for(-Prf) what　　　　　show-up　Inc
　　　'Why/*For what purpose did that book show up?'

(36) *locative-existential predicates:*

cong   faguo   weishenme/*wei(-le) shenme lai-le   san-ge gongchengshi?
from   France   why/for(-Prf) what   come-Prf three-Cl engineer
'Why/*For what purpose are there three engineers coming from France?'

(37) *transitive sentient verbs:*
     Akiu   weishenme/*wei(-le) shenme   xihuan   hua?
     Akiu   why/for(-Prf) what   like   flower
     'Why/*For what purpose does Akiu like flowers?'

(38) *unergative sentient verbs:*
     Akiu   weishenme/*wei(-le) shenme   ku   le?
     Akiu   why/for(-Prf) what   cry   Inc
     'Why/*For what purpose did Akiu start to cry?'

Here I would like to entertain the possibility that purpose questions involve the third type of causal relation "Motivate" noted in (19c), as formulated in (39b):

(39) a.   For what purpose will Akiu leave?
     b.   ?e ∃e' (leaving(e') & Agent(e', Akiu) & MOTIVATE(e, e'))
     c.   MOTIVATE(e, e') ↔ e either enables or causes e', mediated by a mental state

Now suppose that an agent role licenses not only an optional instrument, but also an optional Motivate relation, as stated in (39c). For its part, the Motivate relation requires mediation of a mental state or consciousness, which is possible only with an agent subject. Take (34) for example. The purpose question is blocked since the subject is not an agent, as in (40a):

(40) a. # ?e ∃e' (being-cheated(e') & Theme(e', that student) & MOTIVATE (e, e'))
     b.   ?e ∃e' (being-cheated(e') & Theme(e', that student) & CAUSE(e, e'))

In comparison, a causal question is available by default, which typically does not observe subject agentivity, as in (40b).

3.   The Delimitation Factors
3.1. Sentential Operators vs. Event Predicates

Now one may wonder how the semantics developed so far is related to the syntactic distribution of *wh*-adverbials in question. As we have seen in (18) and (21), causal *how* and reason *why* take the underlying event as its internal argument, very much like a generalized quantifier. As a result, they surface in syntax as operators with a sentential scope. On the opposite side of this story, resultative *how* itself is the internal argument of a causative predicate, as in (23), where the underlying event becomes the external argument for a change. Consequently, resultative *how* surfaces as a syntactic complement to the main predicate.
      By contrast, instrumental *how* and manner *how* function as predicates of an underlying event argument, relating an individual or a property to that event. Therefore, they serve as VP-modifiers. Instrumental *how* must stay in the scope of an agent subject, so that its agent-dependent interpretation can be licensed. As for purpose *why*, the ambiguous status of this element calls for some careful consideration. If it indeed expresses a Motivate relation, as in (39b), then it should be able to take a sentential scope. However, just like instrumental *how*, it observes a subject agentivity restriction. This may explain why, for some Chinese speakers,

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wei(-le) shenme 'for what' may appear before a modal. Perhaps we can suggest that a motivator may be either an individual or a property. When we say *John did this for Mary*, the motivator is an individual, which is typically realized as a PP in syntax with a VP scope in semantics. When we say *John did this to please Mary*, the motivator is a property, which is typically realized as an infinitival adjunct in syntax, with an IP scope in semantics.

In the following discussion, I will verify this syntax-semantics correlation by looking at intervention effects, scopal interaction, clausal complements, and multiple *wh*-questions. First note that there are at least five classes of sentential elements whose positioning can distinguish the two types of *wh*-adverbial in terms of linear order. They are modals in (41), adverbs of quantification in (42), control verbs in (43), negation in (44), and A-not-A questions in (45):

(41) *Modals:*
    a.   tamen   zenme(*-yang) **hui/keyi** chuli   zhe-jian shi?
        they   how(-manner) will/can handle this-Cl matter
        'How come they will handle this matter?'

    b.   tamen   **hui/keyi** zenme(-yang)   chuli   zhe-jian shi?
        they   will/can how(-manner)   handle   this-Cl matter
        'By what means will/can they handle this matter?'
      # 'In what manner will/can they handle this matter?'

(42) *Adverbs of Quantification:*
    a.   tamen   zenme(*-yang) **changchang/zongshi** chuli   zhe-zhong shi?
        they   how(-manner)   often/always handle   this-kind matter
        'How come they often/always handled this kind of matter?'

    b.   tamen   **changchang/zongshi** zenme(-yang) chuli   zhe-zhong shi.
        they   often/always   how(-manner) handle this-kind matter
        'By what means did they often/always handle this kind of matter?'
      # 'In what manner did they often/always handle this kind of matter?'

(43) *Control Verbs:*
    a.   Akiu   zenme(*-yang) **dasuan/jihua**   qu   Taibei?
        Akiu   how(-manner) intend/plan   go   Taipei
        'How come Akiu intends/plans to go to Taipei?'

    b.   Akiu   **dasuan/jihua** zenme(-yang)   qu   Taibei?
        Akiu   intend/plan how(-manner)   go   Taipei
        'By what means does Akiu intend/plan to go to Taipei?'
      # 'In what manner does Akiu intend/plan to go to Taipei?'

(44) *Negation:*
    a.   Akiu   zenme(*-yang) **bu** xi   che?
        Akiu   how(-manner)   not wash car
        'How come Akiu won't wash the car?'

    b. * Akiu   **bu**   zenme-yang xi   che?
        Akiu   not   how-manner wash car
        '*How will Akiu not wash the car?'

   c.   Akiu   **bu** zenme(*-yang) (chang) xi   che.
        Akiu   not   how(-manner) often   wash car
        'Akiu didn't wash the car very often.'

(45) *A-not-A Questions:*
    Akiu **shi-bu-shi** zenme(-yang) dezui-le   bieren?
    Akiu be-not-be how(-manner) offend-Prf   others
    a.   'Is it true or not that Akiu somehow offended others?'
    b. # 'What is the way x such that it is true or not that Akiu offended others in x?'
    c. # 'What is the manner x such that it is true or not that Akiu offended others in x?'

The descriptive generalization here seems to be that negation and A-not-A questions block both instrumental and manner questions, where only indefinite *wh's* are allowed, as evidenced by (44c) and (45a). By contrast, modals, adverbs of quantification, and control verbs block only manner questions, as illustrated by the contrasts of (41-43). Casting these observations in terms of intervention effects on *wh*-adverbials, it can be said that strong intervention effects are induced by negation and A-not-A questions, and weak intervention effects are induced by modals, adverbs of quantification, and control verbs.

3.2. Intervention Effects

Before going any further, let's reflect for a moment on the assumed origin of intervention effects, illustrated in the schema below, which states that a *wh*-dependency cannot be established by covert movement across a scope-bearing element (cf. Beck & Kim 1997):

Intervention effects: $*wh_i \ldots X \ldots wh_i \ldots$, where X is a scope-bearing element, and
                       the *wh*-dependency is created by LF movement.

In Tsai (1994, 1999a), it is proposed that Chinese *wh*-nominals are licensed through unselective binding by an implicit question operator in [Spec, CP], whereas *wh*-adverbs must undergo covert XP movement. Under this approach, instrumental *how*, resultative *how*, and purpose *why* are treated as either DPs or PPs, and allow for the introduction of choice function variables in-situ, in virtue of containing a nominal head inside the DP/PP. By contrast, causal *how*, manner *how*, degree *how*, and reason *why* are genuine adverbs, and hence undergo movement to create an operator-variable pair. Otherwise, the derivation will crash due to vacuous quantification.

Building on this difference between *wh*-elements in Chinese, Cheng & Rooryck (2002) suggest that *wh*-nominals are licensed by a question particle in C, through unselective binding, whereas *wh*-adverbs involve feature movement in LF. One piece of evidence they offer for such a proposal comes from the intervention effect found in (46b), where the occurrence of *henshao-ren* 'few people' disallows a reason question (">" marks a linear precedence relation in all instances below):

(46) a.   weishenme   henshaoren   hui qu?   (why > few)
         why   few.people   will go
         'Why will few people go?'

    b. * henshaoren   weishenme   hui qu?   (*few > why)
         few.people   why   will go

With regard to the expected occurrence of intervention effects in Chinese, Ko (2005) points out a curious fact about *wh* and quantifier interaction: perhaps rather surprisingly, the presence of a universal quantifier does not seem to interfere with a reason question, as illustrated in (47a,b):

(47) a.　weishenme　　meigeren dou hui　qu?　　　　(why > every)
　　　　why　　　　　　everyone all　　will　go
　　　　'Why does everyone need to handle this matter?'

　　　b.　meigeren　weishenme　dou hui　qu?　　　　(every > why)
　　　　everyone　why　　　　　all　will　go
　　　　'Why does everyone need to handle this matter?'

Ko's solution is based on another interesting observation. In Chinese, *meigeren* 'everyone' can undergo long-distance topicalization, but *henshoaren* 'few people' cannot, as evidenced by the contrast between (48a) and (48b):

(48) a. * henshaoren$_i$,　　wo　renwei　　[t$_i$　hui　qu].
　　　　few.people　　I　　think　　　　　will　go
　　　　'Few people, I think will go.'

　　　b.　meigeren$_i$,　　wo　renwei　　[t$_i$　dou hui　qu].
　　　　everyone　　　I　　think　　　　　all　will　go
　　　　'Everyone, I think will go.'

The same pattern obtains for causal questions as well, as in (49) and (50):

(49) a.　zenme　　henshaoren　　hui　qu?　　　　　　(how come > few)
　　　　how　　　few.people　　will　go
　　　　'How come few people will go?'

　　　b. * henshaoren$_i$,　　zenme t$_i$　hui　qu?　　　　(*few > how come)
　　　　few.people　　　how　　　will　go

(50) a.　zenme　　meigeren dou hui　qu?　　　　　　(how come > every)
　　　　how　　　everyone all　　will　go
　　　　'How come everyone will go?'

　　　b.　meigeren$_i$, zenme t$_i$ dou hui　qu?　　　　(every > how come)
　　　　everyone　how　　all　will　go
　　　　'How come everyone will go?'

　　　Interestingly enough, if causal *how* and reason *why* are placed behind the entire complex universal quantifier *meigeren ... dou* 'everyone ... all', then an intervention effect does occur, as evidenced by the deviance of (51a,b):

(51) a. * meigeren **dou**　weishenme hui　qu?　　　　(*every ... all > why)
　　　　everyone　all　　why　　　　will　go
　　　　'Why will everyone go?'

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b. * meigeren **dou** zenme hui qu? (*every ... all > how come)
   everyone all how will go
   'How come everyone will go?'

This shows that both *henshaoren* 'few people' and *meigeren ... dou* 'everyone ... all' qualify as interveners, and we can make use of them for testing our inner-outer dichotomy of *wh*-adverbials (or the dichotomy between sentential operators and event predicates to the same effect). Namely, our theory predicts that event predicates, in contrast to the sentential operators in (51a,b), should be able to appear in the scope of the two subject quantifiers. This prediction is indeed borne out except for manner *wh's*, which are essentially adverbs, hence not subject to unselective binding, as shown in (52-57):

(52) (zheli,) henshaoren hui zenme(-yang) chuli zhe-jian shi?
   here few.people will how(-manner) handle this-Cl matter
   a. 'By what means will few people here handle this matter?' [instrumental]
   b. # 'In what manner will few people here handle this matter?' [*manner]

(53)?zhe-shou ge, henshaoren chang-de zenme-yang? [resultative]
   this-Cl song few.people sing-Res how-manner
   '$^?$To what effect do few people sing?'

(54) (zheli,) henshaoren hui wei(-le) shenme xisheng? [purpose]
   here few.people will for(-Prf) what sacrifice
   'For what purpose will few people here sacrifice?'

(55) (zheli,) meigeren dou hui zenme(-yang) chuli zhe-jian shi?
   here everyone all will how(-manner) handle this-Cl matter
   a. 'By what means will everyone here handle this matter?' [instrumental]
   b. # 'In what manner will everyone here handle this matter?' [*manner]

(56) zhe-shou ge, meigeren dou chang-de zenme-yang? [resultative]
   this-Cl song everyone all sing-Res how-manner
   'To what effect did everyone sing?'

(57) (zheli,) meigeren dou hui wei(-le) shenme xisheng? [purpose]
   here everyone all will for(-Prf) what sacrifice
   'For what purpose will everyone here sacrifice?'

As shown above, instrumental, resultative, and purpose *wh's* are licensed in the scope of the subject quantifiers, whereas causal, reason, and manner *wh's* are not. The former group patterns with argument *wh's*, which are not affected by the presence of the subject quantifiers, as evidenced by (58a,b):

(58) a. (zheli,) henshaoren xihuan chi shenme? [argument]
      here few.people like eat what
      'What is the thing that few people here like to eat?'

    b. (zheli,) meigeren dou xihuan chi shenme? [argument]
      here everyone all like eat what

'What is the thing that everyone here likes to eat?'

In sum, subject quantifiers induce intervention effects for causal, reason, and manner *wh's*, but not for argument, instrumental, purpose, and resultative *wh's*. Our findings thus seem to support to Cheng & Rooryck's (2002) proposal that unselective binding is not subject to intervention effects, although something still needs to be said about interveners such as negation and A-not-A questions, which block instrumental and manner *wh's* alike. We will postpone the relevant discussion until the end of Section 4.

3.3. Scopal Interaction

Next let's turn to scopal interaction. Collins (1991) points out that there is an asymmetry between causal *how* and reason *why*. Reason *why* interacts with the subject quantifier *everyone*, as in (59a), but causal *how* does not, as in (59b), and *how come* can only take wide scope:

(59) a.   Why does everyone hate John?   (ambiguous)
     b.   How come everyone hates John?   (*wh* wide scope)

The solution, as Collins suggests, is that *why* is raised to Spec-CP from a sentential adjunct position c-commanded by *everyone*, whereas *how come* is base-generated in C and never in the scope of the subject quantifier.

(60) and (61) shows that, in Chinese, causal *how*, unlike reason *why* in (62) and (63), always takes wide scope. Furthermore, being a functional category in the left periphery, causal *how* never interacts with the subject quantifier regardless of word order (">" marks a linear precedence relation):

(60) (nimen,) zenme   meigeren hui dai   yi-ben shu?
     you guys how   everyone will bring one-Cl book
     'How come everyone would bring one book?'   (how come > every: *wh* wide scope)

(61) (nimen,) meigeren zenme   hui dai   yi-ben shu?
     you guys everyone   how   will bring one-Cl book
     'How come everyone would bring one book?'   (every > how come: *wh* wide scope)

(62) (nimen,) weishenme   meigeren hui dai   yi-ben shu?
     you guys why   everyone will bring one-Cl book
     'Why would everyone bring one book?'   (why > every: *wh* wide scope)

(63) (nimen,) meigeren weishenme   hui dai   yi-ben shu?
     you guys everyone   why   will bring one-Cl book
     'Why would everyone bring one book?'   (every > why: ambiguous)

This suggests that although these elements may be grouped together as sentential operators, causal *how* may well occupy a higher position in the left periphery, while reason *why* remains as an IP-modifier.[4] In the case of (63), reason *why* may well undergo covert movement across

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[4] As noted by a reviewer, it is not clear why the subject quantifier does not scope over causal *how* in (61). As we have shown in the previous discussion, *meigeren* 'everyone' can be a topic extracted from the subject position. As a result, its trace is c-commanded by *zenme*, and the narrow scope reading is available for the subject quantifier. On the other hand, we will have to assume that *zenme* occupies the head of Int(errogative) Phrase in

the subject quantifier, leaving a trace behind, resulting in the ambiguity. By contrast, (64a,b) show that instrumental *how* and resultative *how* always take narrow scope with respect to the subject quantifier, which is expected since they are even predicates, and never appear higher than the modal *hui* 'will':

(64) a.   (nimen,) meigeren hui zenme(-yang) xuan yi-ben shu? [instrumental]
           you guys everyone will how(-manner) select one-Cl book
           'By what means will everyone select one book?'
           (every > how: ∀ wide scope)

     b.   zhe-jian shi,   meigeren jinxing-de   zenme-yang?   [resultative]
           this-Cl matter everyone   proceed-Res how-manner
           'To what effect did everyone proceed with this matter?'
           (every > how: ∀ wide scope)

3.4. *No-matter* Constructions

This causal-reason asymmetry can also be found in *no-matter* constructions such as (65-69). As the examples (65-68) show, reason *why* can occur in the 'no matter *wh*' construction, like resultative *how* and purpose *why*. However, causal *how* alone cannot occur, as shown in (69):

(65) Wu-lun   Akiu hui zenme(-yang) qu Taibei, wo dou bu zaihu.   [instrumental]
     no-matter Akiu will how(-manner) go Taipei I   all   not care
     'No matter by what means Akiu will go to Taipei, I don't care.'

(66) Wu-lun   Akiu chang-de zenmeyang, wo   dou bu   zaihu.   [resultative]
     no-matter Akiu sing-Res how   I   all   not care
     'No matter to what effect Akiu would sing, I don't care.'

(67) Wu-lun   Akiu hui wei(-le) shenme   qu Taibei, wo   dou bu zaihu. [purpose]
     no-matter Akiu will for(-Prf) what   go Taipei I   all   not care
     'No matter for what purpose Akiu will go to Taipei, I don't care.'

(68) a.   Wu-lun   Akiu weishenme   qu Taibei, wo dou bu zaihu.   [reason]
           no-matter Akiu why   go Taipei I   all   not care
           'No matter why Akiu will go to Taipei, I don't care.'

     b.   Wu-lun   weishenme   Akiu qu Taibei,   wo   dou bu zaihu. [reason]
           no-matter why   Akiu go Taipei I   all   not care
           'No matter why Akiu will go to Taipei, I don't care.'

(69) a. * Wu-lun   Akiu zenme   hui qu Taibei, wo dou bu zaihu.   [*causal]
           no-matter Akiu how   will go Taipei I   all   not care
           '*No matter how come Akiu will go to Taipei, I don't care.'

     b. * Wu-lun   zenme Akiu   hui qu Taibei, wo dou bu zaihu.   [*causal]

the sense of Rizzi (1999) (cf. section 4.1 and section 4.2), which always takes wide scope, and does not interact with the topic in question in terms of scope.

no-matter how Akiu will go Taipei I all not care
'*No matter how come Akiu will go to Taipei, I don't care.'

The same contrast seems to hold for their English counterparts as well. This asymmetry receives a natural account if we assume that premodal *zenme*, just like *how come* in English, occupies a head position in the CP layer, which *wulun* 'no matter' also occupies. In other words, it is quite likely that *how come* and *no matter* are in complementary distribution, English and Chinese alike.

3.5. Clausal Complements

Another phenomenon explored by Collins (1991) is that reason *why* can undergo long-distance movement, while *how come* cannot, as shown in (70):

(70) a.   Why did John say [Mary left]?   [ambiguous]
     b.   How come John said [Many left]?   [matrix scope only]

Chinese, as a *wh*-in-situ language, provides further evidence for the reason *why* – causal *how* distinction, of a similar type. In contrast to reason *why* in (71), causal *how* can never occur in a clausal complement, as seen in (72):

(71) a.   Akiu   renwei [Xiaodi   weishenme   hui cizhi]?   [narrow scope only]
          Akiu   think Xiaodi   why   will resign
          'Why does Akiu think [Xiaodi will resign t]?'

     b.   Akiu   renwei [weishenme   Xiaodi   hui cizhi]?   [narrow scope only]
          Akiu   think why   Xiaodi   will resign
          'Why does Akiu think [Xiaodi will resign t]?'

(72) a. * Akiu   renwei [Xiaodi   zenme   hui chuli   zhe-jian shi]?
          Akiu   think Xiaodi   how   will handle this-Cl   matter
          '*How come Akiu thinks [t [Xiaodi will handle this matter]]?'

     b. * Akiu   renwei [zenme   Xiaodi   hui chuli   zhe-jian shi]?
          Akiu   think how   Xiaodi   will handle this-Cl   matter
          '*How come Akiu thinks [t [Xiaodi will handle this matter]]?'

The reason may well be that causal *how* must take the whole sentence as its argument to instantiate causation on the eventuality level. Even if causal *how* is merged in the embedded CP, it will not be able to raise owing to the head movement constraint.

3.6. Multiple *Wh*-questions

Our last case has to do with multiple *wh*-questions: As shown by the contrast between (75a) and (75b), *why* shares the same scope with an object *wh*, while *how come* cannot (cf. Collins 1991):

(75) a.   Why did John eat what?
     b. * How come John ate what?

The picture, however, becomes more complicated once we take Chinese cases into consideration. The contrast of (76a,b) shows that object *wh's* are compatible with subject *wh's*, but reason *wh's* are not (see Cheng & Rooryck 2002; ">" marks a linear precedence relation in all instances below):

(76) a.   shei   mai-le   shenme?   (who > what)
          who   buy-Prf   what
          'Who bought what?'

     b. * shei   weishenme   likai?   (*who > reason)
        who   why   leave
        '*Who left why?'

Once we use a modal like *hui* 'will' as a delimitator, the inner-outer asymmetry duly shows up: As shown in (77a-c), purpose, instrumental, and resultative *wh's* can enter into multiple *wh*-construals with a subject *wh*-phrase, since they all contain a nominal of some sort, hence subject to unselective binding from a Q-operator in C (cf. Stepanov and Tsai (to appear)):

(77) a.   (nimen,) shei hui wei(-le) shenme cizhi?   (who > purpose)
         you guys who   will for(-Prf) what   resign
         'Who will resign for what purpose?'

     b.   (nimen,) shei hui zenme(-yang) chuli zhe-jian shi? (who > instrumental)
         you guys who   will how(-manner)   handle this-Cl matter
         'Who will handle this matter by what means?'

     c.   na-shou ge,   shei chang-de zenme-yang?   (who > resultative)
         that-Cl song   who sing-Res how-manner
         'Who sang that song to what effect?'

Reason *wh's*, on the other hand, are not compatible with a subject *wh*, as shown in (78a) and (78b), the deviance of which calls for a more elaborate account: Specifically, reason *why* is merged to IP as an adjunct, and is blocked from subsequent raising by the subject *wh*, as in (78a):

(78) a. [??] (nimen,) shei weishenme hui cizhi?   ([??]who > reason)
         you guys who   why   will resign
         '*Who would resign why?'

     b. * (nimen,) weishenme   shei hui cizhi?   (*reason > who)
        you guys why   who will resign
        '*Who would resign why?'

As we have seen in previous discussion, causal *how* occupies C, and can never be construed as an IP-adjunct. As a result, (79a,b) are ruled out simply because causal *how* and the Q-operator compete for the same position; i.e., once causal *how* is merged into C, there will be no unselective binder available for licensing the subject *wh*-phrase:

(79) a. * (nimen,) shei zenme hui chuli   zhe-jian shi? (*who > causal)
          you guys who how   will handle   this-Cl matter

'*How come who will handle this matter?'

b. * (nimen,) zenme   shei hui chuli   zhe-jian shi? (*causal > who)
  you guys how   who will handle   this-Cl matter
  '*How come who will handle this matter?'

It is quite possible that reason *why* also has the option of merging into C, resulting in the ungrammaticality of (78b).

The same contrasting pattern emerges when we pair a purpose or instrumental *wh*-phrase with an object *wh*-phrase, as illustrated by the well-formedness of (80a,b):

(80) a.   ni hui wei(-le) shenme mai na-zhong   jiu?   (purpose > which)
  you will for(-Prf) what   buy which-kind wine
  'For what purpose will you drink which kind of wine?'

b.   ni hui zenme(-yang) he   na-zhong   jiu?   (instrumental > which)
  you will how(-manner) drink which-kind   wine
  'By what means will you drink which kind of wine?'

On the other hand, reason *why* and causal *how* are incompatible with object *wh's*, as evidenced by the ungrammaticality of (81a,b) and (82a,b):

(81) a. * ni   weishenme   hui mai na-zhong   jiu?   (*Subj > reason > which)
  you why   will buy which-kind wine
  'Why will you drink which kind of wine?'

b. * weishenme   ni hui mai na-zhong   jiu?   (*reason > Subj > which)
  why   you will buy which-kind wine
  'Why will you drink which kind of wine?'

(82) a. * ni   zenme   hui he   na-zhong   jiu?   (*Top > causal > which)
  you how   will drink   which-kind wine
  '*How come you will drink which kind of wine?'

b. * zenme   ni hui he   na-zhong   jiu?   (*causal > Subj > which)
  how   you will drink   which-kind wine
  '*How come you will drink which kind of wine?'

Finally, we test the Chinese *wh*-adverbials in pairs. The result again confirms our inner-outer dichotomy: Namely, event predicates such as purpose, instrumental, and resultative *wh's* are not compatible with sentential operators such as reason and causal *wh's*, as illustrated in (83a-c) and (84a-c):

(83) a. * ni   weishenme hui wei(-le) shenme   he   jiu?   (*reason > purpose)
  you why   will for(-Prf) what   drink wine
  '*Why will you drink wine for what purpose?'

b. * ni   weishenme hui zenme(-yang)   he   jiu?   (*reason > instrumental)
  you why   will how(-manner)   drink wine
  '*Why will you drink wine by what means?'

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c. * na-shou ge, ni weishenme hui chang-de zenme-yang?
    that-Cl song you why will sing-Res how-manner
    'Why will you sing that song to what effect?'   (*reason > resultative)

(84) a. * ni zenme hui wei(-le) shenme he jiu?   (*causal > purpose)
    you how will for(-Prf) what drink wine
    '*How come you will drink wine for what purpose?'

b. * ni zenme hui zenme(-yang) he jiu?   (*causal > instrumental)
    you how will how(-manner) drink wine
    '*How come you will drink wine by what means?'

c. * na-shou ge, ni zenme hui chang-de zenme-yang?
    that-Cl song you how will sing-Res how-manner
    'How come you will sing that song to what effect?'   (*causal > resultative)

On the other hand, event predicates are marginally compatible with each other, as evidenced by (85) and (86a):

(85) ? na-shou ge, ni hui wei(-le) shenme chang-de zenme-yang?
    that-Cl song you will for(Prf) what sing-Res how-manner
    'For what purpose will you sing that song to what effect?'
                               ($^?$purpose > resultative)

(86) ? na-shou ge, ni hui zenme(-yang) chang-de zenme-yang?
    that-Cl song you will how(-manner) sing-Res how-manner
    a. 'By what means will you sing that song to what effect?'
                                 ($^?$instrumental > resultative)
    b. # 'In what manner will you sing that song to what effect?'
                               (*manner > resultative)

This is because they are nominal by nature, and subject to unselective binding from the same Q-operator. The only exception is manner *how*, which is actually an adverb, hence patterning with causal *how* and reason *why* in multiple *wh*-construals, as in (86b).

    Having probed into the interaction among Chinese *wh*-adverbials, we reach the conclusion that the inner-outer distinction is largely maintained, and there are four types of multiple *wh*-construals which are of particular interest in this context: The first type is schematized in (87): *Wh*-nominals share the same scope through multiple unselective binding from the Q-operator in C.

(87)   [$_{CP}$ Q$_{x,y}$ [. . . wh(x) . . . wh(y) . . .]]

This dependency is established in the long tradition of Baker (1970), Heim (1982), Nishigauchi (1986), Pesetsky (1987), Tsai (1994), and Reinhart (1998), which accounts for all the well-formed cases where event predicates and/or argument *wh's* cooccur. Schema (88) represents the type of situation where the Q-operator is edged out by causal *how*, and thus becomes unavailable for licensing nominal *wh's*. All the ill-formed cases with causal *how* fall into this category:

(88)   * [$_{CP}$ how [. . . wh(x) . . .]]

The third type has to do with reason *why*, which can be merged to IP, and subsequently undergoes LF movement to check operator features in the left periphery. Specifically, when reason *why* is LF-moved over the subject *wh*, as in (89a), a minor intervention effect is induced (cf. the deviance of (78a)):

(89) a. $^{??}$ [$_{CP}$ <why> Q$_x$ [. . . wh(x) . . . <why> . . .]]

   b. * [$_{CP}$ why [. . . wh(x) . . .]]

Alternatively, just like causal *how*, reason *why* may merge directly to C, as in (89b), which deprives the nominal *wh* any chance of getting licensing from a Q-operator, resulting in a much stronger violation due to vacuous quantification (cf. the contrast of (78a,b)).

4. The Topography of *Wh*-adverbials in Left Periphery
4.1. The Cartographic Approach

Armed with all the knowledge we have acquired, we can now attempt to sort out the syntax-semantics correspondence of Chinese *wh*-adverbials under the so-called cartographic approach championed by Cinque (1999) and Rizzi (1997, 1999, 2004). According to Cinque and Rizzi, there is a functional category for each type of adverbial, and CP should be "split" into various types of functional projection, hosting Mood, Focus, Topic, and elements with speech act force or clause-typing properties. One recent version of this topography of the CP layer is given by Rizzi (1999) as follows:

(90) **Force** Top* **Int** Top* **Focus** Mod* Top* **Fin** IP

A particular interest in the context of the investigation here concerns the interrogative head (Int). According to Rizzi, Int is the merge site for the Italian yes-no question particle *se* 'if'. The head position is also argued to host causal *how* and reason *why* in Italian. (91a-d) show that Int must appear higher than a focus projection:

(91) a.   **Perché** QUESTO avremmo dovuto   dirgli,   non qualcos'altro?
          why   this   should have   say.him not something.else
          Lit. 'Why THIS we should have said to him, not something else?'

   b.   **Come mai** IL MIO LIBRO gli   ha dato,   non il tuo?
        how come   the my book   him have given   not the your
        Lit. 'How come MY BOOK you gave to him, not yours?'

   c. * QUESTO **perché** avremmo dovuto   dirgli,   non qualcos'altro?
        this   why   should have   say.him   not something.else
        Lit. 'THIS why we should have said to him, not something else?'

   d. * IL MIO LIBRO   **come mai** gli hai dato,   non il tuo?
        the my book   how come himhave given   not the your
        Lit. 'MY BOOK how come you gave to him, not yours?'

Furthermore, (92a,b) show that a Topic can either precede or follow Int:

(92) a.   Mi domando **se** questi problemi,   potremo   mai affrontarli
            me   ask   if   these problems   will.be.able   ever address.them
            Lit. 'I wonder if these problems, we will ever be able to address them.'

     b.   Mi domando, questi problemi, **se** potremo   mai affrontarli
            me   ask   these problems   if   will.be.able   ever address.them
            Lit. 'I wonder, these problems, if we will ever be able to address them.'

4.2. The Topography of Chinese *wh*-adverbials

As a first approximation, we may present something like (93) as the topography of Chinese *wh*-adverbials in the left periphery:

(93) **Force** Top* **Int** Top* **Focus** Mod* Top* **Fin** [$_{TP}$ **Tense**   Mod*   [$_{vP}$
     zenme   *zenme*   *weishenme*   modal   *wei(-le)shenme*
               weishenme   *zenme(-yang)*

                  left periphery   *v*P periphery

There are a number of proposals which deal with the distribution of causal *how* and reason *why* across languages. In addition to Rizzi's analysis, Collins (1991) proposes that *why* is a sentential adjunct, while *how come* serves as the head of CP. Ko (2005, 2006) treats a reason adverb as a CP-modifier, externally-merged into [Spec, CP]. Ochi (2004), on the other hand, suggests that *how come* bears a strong feature which must be checked off as soon as possible. As a result, it must merge directly to C. Based on the evidence presented in section 3, we can definitely place causal *zenme* at Int. For its denial construal, the locus of *zenme* is placed at the head of ForceP to reflect the change of illocutionary force: Namely, the speech act involved has shifted from eliciting information to denial (cf. (6b)). Reason *why*, on the other hand, has the option of merging either as an IP adjunct or as the head of IntP, as sketched in the above diagram. All these outer *wh*-adverbials cluster in the left periphery, whereas inner *wh*-adverbials such as instrumental *how* and purpose *why* remain in the *v*P periphery à la Belletti (2004).
    Moreover, our vision of the topography of Chinese *wh*-adverbials also enjoys solid empirical support from the locus of contrastive foci in Chinese. Firstly, there is a clear contrast between Chinese topics and contrastive foci in terms of their distribution: As shown by (94a,b) and (95a-c), the distribution of topics is quite free in relation to the yes-no question morpheme *shifou* 'if', which presumably occupies the Int position (">" marks a linear precedence relation in all instances below):

(94) a.   wo xiangzhidao [shifuo   ni   bu chi zhurou].
          I   wonder   if   you not eat pork
          'I wonder if you don't eat pork.'   (Int > Subj)

     b.   wo xiangzhidao [ni shifuo   bu chi zhurou].
          I   wonder   you if   not eat pork
          'I wonder if you don't eat pork.'   (Top > Int)

(95) a.   wo xiangzhidao [shifuo   ni   bu   chi zhurou].

        I   wonder   if   you not eat pork
        'I wonder if you don't eat pork.'   (Int > Subj > Obj)

   b. wo xiangzhidao [shifuo zhurou ni bu chi].
      I   wonder   if   pork   you not eat
      'I wonder if you don't eat pork.'   (Int > Top > Subj)

   c. wo xiangzhidao [zhurou shifuo ni bu chi].
      I   wonder   pork   if   you not eat
      'I wonder if you don't eat pork.'   (Top > Int > Subj)

On the other hand, a contrastive focus can appear in a preverbal position, as in (96a-c), but never higher than Int, as evidenced by the deviance of (97a,b):

(96) a. wo xiangzhidao [shifuo ni **zhurou** chi, **niurou** bu chi].
      I   wonder   if   you pork   eat beef   not eat
      'I wonder if you eat pork, but not beef.'   (Int > Top > Focus)

   b. wo xiangzhidao [shifuo **zhurou** ni chi, **niurou** bu chi].
      I   wonder   if   pork   you eat beef   not eat
      'I wonder if you eat pork, but not beef.'   (Int > Focus > Subj)

   c. wo xiangzhidao [ni shifuo **zhurou** chi, **niurou** bu chi].
      I   wonder   you if   pork   eat beef   not eat
      'I wonder if you eat pork, but not beef.'   (Top > Int > Focus)

(97) a. * wo xiangzhidao [**zhurou** shifuo ni chi, **niurou** bu chi].
        I   wonder   pork   if   you eat beef   not eat
        'I wonder if you eat pork, but not beef.'   (*Focus > Int > Subj)

   b. * wo xiangzhidao [**zhurou** ni   shifuo chi, **niurou** bu chi].
       I   wonder   pork   you   if   eat beef   not eat
       'I wonder if you eat pork, but not beef.'   (*Focus > Top > Int)

We thus establish that the Int head *shifuo* always stands higher than contrastive foci, just like its Italian counterpart *se*. All these observations are just what we would expect from the topography laid out in (93).

     The next step is to test our inner-outer dichotomy with the height restriction on Chinese foci. The result is encouraging: As shown by the contrast of (98a,b), causal *how* typically appears higher than Focus:

(98)   ni zenme   **zhurou** chi, **niurou** bu chi?
        you how   pork   eat beef   not eat
      a.   'How come you eat pork, but not beef?'   (causal > Focus)
      b. # 'By what means do you eat pork, but not beef?' (*instrumental > Focus)

By contrast, instrumental *how* is located lower than Focus, which position is impossible for causal *how*, as evidenced by the contrast of (99a,b). The same observation applies to resultative *how* in (100):

(99) ni **zhurou** zenme(-yang) chi, **niurou** zenme(-yang) chi?
      you pork   how(-manner) eat beef   how(-manner) eat
      a. # 'How come you eat pork, and how come you eat beef?'
                                                     (*Focus > causal)
      b. 'By what means will you eat pork, and by what means
          will you eat beef?'   (Focus > instrumental)

(100) ni **zhurou** zuo-de   zenme-yang, **niurou** you zuo-de   zenme-yang?
       you pork   cook-Res how-manner beef   again cook-Res how-manner
       'To what effect do you cook pork, and to what effect do
       you cook beef?'   (Focus > resultative)

Furthermore, as predicted by our theory, reason *why* should be able to appear either higher than Focus (i.e., when occupying Int), or lower than Focus (i.e., when merging to IP). This prediction is indeed borne out, as illustrated in (101) and (102). In addition, we also correctly predict that purpose *why* appears after the contrastive foci in (103):

(101) ni weishenme **zhe-ben shu** mai, **na-ben shu** bu   mai?
       you why   this-Cl book   buy that-Cl book   not   buy
       'Why did you buy this book, but not that book?'   (reason > Focus)

(102) ni **zhe-ben shu** weishenme mai, **na-ben shu** weishenme bu   mai?
       you this-Cl book   why   buy that-Cl book   why   not buy
       'Why did you buy this book, but not that book?'   (Focus > reason)

(103) ni **zhe-ben shu**   wei(-le) shenme   mai,
       you this-Cl book   for(-Prf) what   buy
       na-ben shu   you   wei(-le)shenme   bu   mai?
       that-Cl book   again   for(-Prf) what   not buy
       'For what purpose did you buy this book, and for what purpose did
       you not buy that book?'   (Focus > purpose)

In sum, we have explored the full range of patterns displayed by the interaction between contrastive foci and *wh*-adverbials, which in turn lends support to our inner-outer dichotomy encoded by the two peripheries in the topography (93).

4.3. Relativized Minimality and Intervention Effects

Returning to the issue of intervention effects on Chinese *wh*-adverbials, we now consider how to relate the somewhat complex patterns in Chinese to a recent proposal by Rizzi (2004), where Relativized Minimality (RM) is further refined to the effect that the relevant factors have shifted from the classic A/A'-distinction to the following four types of dependency, as detailed in (104a-d):

(104) a. *Argumental:* person, number, gender, case
       b. *Quantificational:* Wh, Neg, measure, focus, etc.
       c. *Modifier:* evaluative, epistemic, Neg, frequentative, measure, manner ...
       d. *Topic*

The consequence of this proposal is far-reaching and well beyond the scope of this article.

For our purpose here, we only need to concentrate on two specific areas: That is, the interaction between quantificational elements and *wh*-adverbs, and that between negation and inner *wh*-adverbials. Recall that the dilemma we encounter in section 3.1 is that modals, adverbs of quantification, and control verbs block only manner questions (i.e., weak intervention effects), whereas negation and A-not-A questions block both instrumental and manner questions (i.e., strong intervention effects). Here I would like to entertain the possibility that the intervention effects on Chinese *wh*-adverbials actually follow from the refinement of RM in Rizzi (2004), which might be called "Generalized Relativized Minmality".

First consider a suggestive case in French: Based upon the "selective" locality effect of certain adverbials, Rizzi argues that not all intervening A'-specifiers trigger a minimality effect on A'-dependencies. Specifically, extraction of a DP specifier such as *combien* 'how many' is blocked only by a quantificational adverb like *beaucoup* 'a lot', as in (105a), but not by a manner adverb like *attentivement* 'carefully', as in (105b) (cf. Obenauer 1994, Laenzlinger 1996):

(105) a. * combien a-t-il **beaucoup** consulté [___ de livres]?
               how.many has.3S a.lot   consulted   of book
               'How many books has he consulted a lot?'

       b.   combien a-t-il **attentivement** consulté [___ de livres]?
               how.many has.3S carefully   consulted   of book
               'How many books has he consulted carefully?'

This is reminiscent of the intervention effects on Chinese *wh*-adverbials, where instrumental questions are blocked by negation and A-not-A questions, but not by modals, adverbs of quantification, and control verbs. We may sample the asymmetries by comparing (106) ((41b) repeated here) with (107) ((44b) repeated here):

(106) tamen **hui/keyi** zenme-yang chuli zhe-jian shi?
         they   will/can   how-manner   handle this-Cl matter
         a. 'By what means will/can they handle this matter?'   [instrumental]
         b. # 'In what manner will/can they handle this matter?'   [*manner]

(107) * Akiu **bu** zenme-yang xi che?
         Akiu   not   how-manner wash car
         '*How will Akiu not wash the car?'   [*instrumental/*manner]

One way to think of this issue along the lines of Generalized Relativized Minimality is to suggest that instrumental *how* does not fall under the same category as modal operators, quantificational adverbs, and subjunctive operators introduced by control verbs. As we have demonstrated throughout the article, Chinese instrumental *wh's* are event predicates, which certainly qualify as pure modifiers (cf. Parsons 1990). By contrast, manner *how* is an adverb and operator by nature. Since only dependencies of the same type will interfere with each other, it follows that a sentential operator like the modal in (106) only blocks the *wh*-dependency involving manner *how*, but not that involving its instrumental counterpart.

Now the issue is reduced to why negation blocks both manner and instrumental questions. First, we examine a relevant case in Italian adverb preposing (cf. Rizzi 2004). As illustrated by the contrast of (108a,b), an intervening adverb (i.e., *probabilmente* 'probably') typically blocks simple preposing of a manner adverb (i.e., *rapidamente* 'rapidly') to the left

periphery:

(108)   a.   Rapidamente, i tecnici   hanno risolto ___ il problema.
                rapidly   the technicians have resolved   the problem'
                'Rapidly, the technicians have resolved the problem.'

            b. * Rapidamente, i tecnici hanno   **probabilmente** risolto ___ il problema.
                rapidly   the technicians have   probably   resolved   the problem'
                'Rapidly, the technicians have probably resolved the problem.'

Interestingly, such an intervention effect does not occur when the manner adverb undergoes focus movement, as in (109). This is because the focus dependency is quantificational, which will not be interfered by a modifier:

(109)   RAPIDAMENTE, i tecnici   hanno probabilmente   risolto ___ il problema.
                rapidly   the technicians have probably   resolved   the problem
                'Rapidly, the technicians have probably resolved the problem.'

Nevertheless, this focalization strategy does not work in the presence of negation: Once *non* 'not' is inserted, neither simple preposing nor focus movement can repair the Relativized Minimality violation, as evidenced by (110a,b):

(110)   a. * Rapidamente, i tecnici **non**   hanno   risolto ___ il problema.
                rapidly   the technicians not   have   resolved   the problem'
                'Rapidly, the technicians have not resolved the problem.'

            b. * RAPIDAMENTE, i tecnici **non** hanno   risolto ___ il problema.
                rapidly   the technicians not have   resolved   the problem
                'Rapidly, the technicians have probably resolved the problem.'

The reason for this, as offered by Rizzi, is that negation cuts across two types of A'-dependency. Namely, it can be either quantificational or modificational. Both construals are attested cross-linguistically. It thus becomes clear why both manner and instrumental interpretations are blocked in (107): Just as our operator-predicate distinction of *wh*-adverbials predicts, the dual status of *bu* 'not' enables it to interfere with both the quantificational chain created by LF raising of manner *how* and the modificational dependency that licenses instrumental *how*. The LF representations of (106) and (107) are summarized in the following schemata:

(111)   a. $[_{CP}$ Q_x [. . . Modal . . . how(x) . . .]]   [instrumental]

            b. * $[_{CP}$ <how> [. . . Modal . . . <how> . . .]]   [*manner]

            c. * $[_{CP}$ Q_x [. . . Neg . . . how(x) . . .]]   [*instrumental]

            d. * $[_{CP}$ <how> [. . . Neg . . . <how> . . .]]   [*manner]
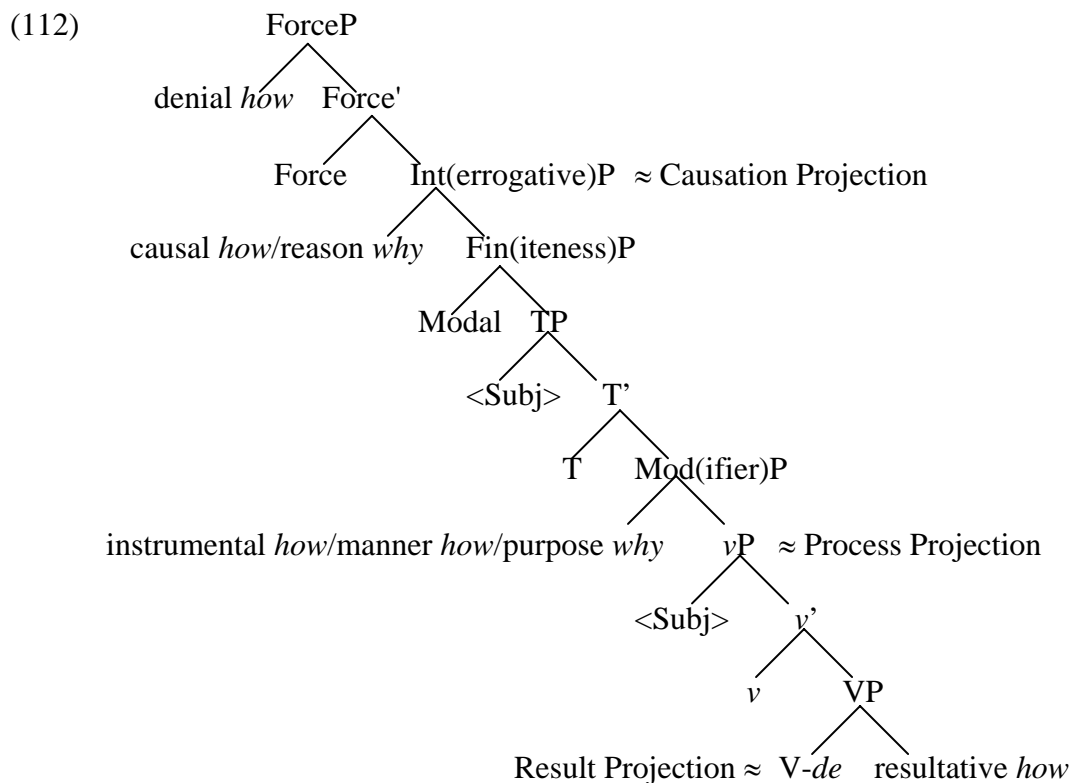
It thus seems that unselective binding is sensitive to some form of intervention effects after all: The type of dependency it creates is determined by the type of *wh*-in-situ it licenses; namely, while it is true that the modificational dependency (Q_x, how(x)) in (111a) is

insensitive to the intervention of the modal operator, the same dependency is blocked by Neg(ation), which doubles as a modifier in (111c).

5. Concluding Remarks

By studying the syntax-semantics correspondence of *how-why* alternations across languages, it becomes possible to spell out the inner working behind adverbial distribution and interpretation. Drawing on evidence from word order, subject sensitivity, intervention effects, scopal interaction, *no-matter* constructions, clausal complements, and multiple *wh*-construals, we have shown that, to understand the alternations in question, it is imperative to separate sentential adverbs from *v*P-modifiers. Semantically, the former occur as quantificational operators, while the latter are event predicates.

In addition, the close resemblance between Italian and Chinese in terms of the organization of elements in the left periphery provides a solid ground for developing a cross-linguistic account of the syntax and semantics of *wh*-adverbials. The result of this study can be taken to provide an additional rationale for Cinque's (1999) adverbial hierarchy, perhaps not in its strictest form, but more in line with Rizzi's (1997) three-way distinction among the complementizer, inflectional, and lexical layers. Specifically, denial *how*, causal *how* and reason *why* merge into the left periphery; manner *how*, instrumental *how*, and purposes *why* appear in the *v*P periphery; resultative *how* is merged within the VP domain as a complement. The three-tier hierarchy further corresponds to the three subevent projections of Ramchand (2003) in a nontrivial way, as visualized in the following tree diagram:

(112)

```
                    ForceP
                   /      \
          denial how      Force'
                         /      \
                     Force      Int(errogative)P  ≈ Causation Projection
                               /            \
          causal how/reason why            Fin(iteness)P
                                          /           \
                                     Modal            TP
                                                    /    \
                                              <Subj>      T'
                                                        /    \
                                                       T      Mod(ifier)P
                                                             /          \
       instrumental how/manner how/purpose why             vP   ≈ Process Projection
                                                          /    \
                                                    <Subj>      v'
                                                              /    \
                                                             v      VP
                                                                   /    \
                            Result Projection ≈  V-de            resultative how
```

To derive the "selective" intervention effects on instrumental *how* and manner *how* in Chinese, we take instrumental *wh's* to be nominal modifiers (hence predicates of an underlying event à la Parsons (1990)), while analyzing manner *wh's* as adverbial operators (hence subject to subsequent LF raising). As a result, the latter can never cross over elements

of a quantificational type, whereas the former are blocked only by negation, which may double as a modifier (cf. Rizzi 2004). It also becomes clear why a causal *wh* never interacts with other scope-bearing elements either in overt syntax or in LF: Such an element merges directly to Int. As a result, it competes with the Q-operator for the same head position, and thus blocks all sorts of *wh*-construals involving either unselective binding or operator feature checking. Finally, we are able to explain away the mystery that reason *wh's*, but not causal *wh's*, are blocked by preceding subject quantifiers: That is, when construed as an IP-adjunct, reason *why* must cross over the subject quantifier in LF as an adverbial operator, inducing the Generalized Relativized Minimality effect.

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