Functional Projections and Adverbial Expressions in Chinese*

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Academia Sinica

With addition to the number and type of functional categories, several new claims have been made with respect to the licensing and generation of adverbs/adverbials. In particular, these expressions have been argued to be treated as specifiers of functional categories and/or complements of verbs, the former of which need to agree with their respective heads in semantic features. Alexiadou's (1997) and Cinque's (1999) approaches, for instance, are of this kind. By comparing the syntactic and semantic behavior of adverbs/adverbials between Chinese-type and English-type languages, it is shown in this paper that a nonspecifier analysis of adverbs/adverbials as given in Chomsky (1986, 1995), Travis (1988), and Tang (1990), among others, seem to better account for the distribution of adjuncts. In addition, we demonstrate that conditions on adjunct-distribution have to do with both the hierarchical structure of functional categories and the semantic rules of the scope of modification.

Key words: adverbs/adverbials, X'-theory, specifiers, nonspecifiers, complements

1. Introduction

In the notation of X'-theory every phrasal category is assumed to be a projection of a zero-level category in terms of the following schema (cf. Jackendoff 1977, Fukui 1986, Kayne 1994, and Chomsky 1995, among others):

(1) a. X' = X X"*
     b. X" = X"* X'

By convention, X" (XP) in (1a) is referred to as the complement of X and X" in (1b) as the specifier (Spec) of X. X itself is called the head of XP.

According to Chomsky (1986), the system of projection in (1) applies to both lexical and functional categories. The clausal categories conventionally labelled S and S', for example, may now be I" (IP) and C" (CP), respectively, as in (2):
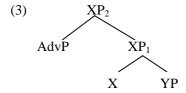
(2) a. S = I" = [NP [$_{I'}$ I VP]]
     b. S' = C" = [. . . [$_{C'}$ C I"]]

The extension of X'-theory to functional categories Complementizer (C) and Inflection (I) has provided new possibilities for the analysis of sentences. For instance, a contrastive study done by Pollock (1989) between English and French indicates that other functional categories like Tense (T) and Agreement (Agr) ought to head their own projections, in contrast to the long-held assumption that both are subsumed under I. In addition to the postulation of a number of new clausal and nominal functional projections, it has also been posited in Ouhalla (1991), among others, that functional categories should be lexically specified for categorial selection (c-selection), morphological selection (m-selection) and grammatical features (cf. Chomsky 1995 and Cinque 1999).

This paper studies the relation between clausal functional projections and adverbs/adverbials in Chinese. Section 2 presents Chomsky's (1995) claims about the generation of adverbials and Tang's (1990) analysis of Chinese adverbials, in which adverbials are not treated as specifiers of functional heads. Section 3 sketches the discussion of a specifier approach to adverbs as given in Alexiadou (1997) and Cinque (1999). In section 4 we examine the arguments of both Alexiadou and Cinque against the syntactic and semantic behavior of Chinese adverbials. It is pointed out that languages like Chinese, in which the number and type of postverbal elements are very restricted, seem to raise problems for the postulation of locating adverbials in the Spec positions of functional categories. We suggest in section 5 that facts about Chinese preverbal adverbials may be better accounted for under a nonspecifier theory of adjunct licensing. In addition, various kinds of relation are found between functional heads and preverbal adverbials; their generation sites do not seem to be universally the same. Section 6 is concerned with the conditions on the distribution of Chinese postverbal adverbials. It is shown that in Chinese there seem to appear at least two rules governing the (im)possibility of projecting oblique adverbials as V-complements in the sense of Larson (1988). We also demonstrate that, in Chinese, postverbal adverbials are not all generated as complements of V. Section 7 concludes this paper.

2. Adverbials as nonspecifiers

Within the framework of the Minimalist Program, Chomsky (1995) suggests that adjuncts cannot be adjoined by Merge to phrasal categories that have semantic roles at LF.[1] As an example, an adverbial construction like (3) is barred if XP is a theta-related argument or predicate:

(3)

XP_2

AdvP XP_1

X   YP

In other words, adverbs can be base-adjoined only to recursive X' or maximal projections headed by the light verb or functional categories.[2]

In Chomsky's (1995) analysis adverbial structures like (3) cannot be derived by Move. This possibility is ruled out in principle because under the theory of Checking adverbs seem to have no morphological properties that require XP-adjunction. In addition, as pointed out by Chomsky, cases like (4) also suggest that adverbs do not form chains by XP-adjunction:

(4)   a.   Carefully, John told me to fix the car.
      b.   John told me to [fix the car carefully].

Of the sentences (4a-b), (4a) would be given the interpretation of (4b) if *carefully* in (4a) had been moved from the D-structure position of *carefully* in (4b). This prediction,

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[1]   According to Chomsky (1995), Merge refers to an operation that forms larger units out of those already constructed.

[2]   Note, however, that Chomsky (1995) also mentions that the grammaticality contrast among sentences like (i)-(iii) might suggest a Larsonian (1988) solution:

(i)   a.   John reads often to his children.
       b.   *John reads often books.
(ii)   a.   John reads every day to his children.
       b.   *John reads every day books.
(iii) a.   John made a decision (last night, suddenly) to leave town.
       b.   John felt an obligation (last night, suddenly) to leave town.

however, is not borne out. Thus, Chomsky states that an adverb in pre-IP position cannot be interpreted as if it had raised from some lower position.[3]

Based on four-level sentence structure CP-IP-PrP-VP and the assumptions about binary branching and V-movement, Tang (1990) studies both preverbal and postverbal adverbials in Chinese.[4] She suggests that the theory of adjunct licensing needs to be defined in terms of heads coupled with features as well as in accordance with the possible domains of modification of adjuncts (cf. Travis 1988). Some of her claims about Chinese preverbal adjuncts are given in (5) below:[5]

(5) a. Adjuncts are hierarchically rather than linearly ordered.
     b. XP and X' may be recursive to generate adjuncts. An
         adjunct licensed by X may be projected under recursive XP or X'.[6]
     c. Reason and condition clauses are generated under the
         projection of C, sentential adverbs under I, temporal and
         locative expressions under I and Pr, manner adverbs
         under Pr, and different PPs under different heads.
     d. For different distributions exhibited by adjuncts, they do
         not result from the movement of adjuncts.

Two more things need to be pointed out here concerning the theory of adjunct licensing. First, as argued in Fukui (1986), adjuncts are generated under recursive V', the order of which is irrelevant.[7] Tang (1990), however, indicates that with respect to grammaticality and scope interpretation, it is not true that the order among adjuncts can be free. It is also not the case that adjuncts of various sorts are all licensed by V. For instance, in Chinese while manner adverbs and locative expressions may interchange, as in (6), manner adverbs and sentential adverbs cannot, as in (7):

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[3] Chomsky (1995) suggests that operator movement is the only kind of movement that adjunct phrases are subject to. For instance, in the case of Wh-movement of adverbials it is the Wh-feature that raises for checking, carrying the operator phrases formed from adverbials by pied-piping.

[4] For a discussion of the postulation of functional projection Predicate Phrase (PrP), see Bowers (1993).

[5] Among others, see Tang (1990, 1993a, 1993b, 1994, 1996) for a discussion of postverbal adjuncts in Chinese.

[6] As stated in Tang (1990), the XP-X' distinction is determined by the morphological properties and possible domains of modification of adjuncts.

[7] Although Fukui (1986) claims that the exact distribution of adjuncts is subject to some semantic interpretation rules, he does not yet explain what these rules are.

(6)   a. ta zai nali   jingjing-de kanshu.
           he at   there quiet-DE   read-book
           'Over there he is reading books quietly.'
      b. ta jingjing-de zai nali   kanshu.
           he quiet-DE   at there read-book
           'Quietly he is reading books over there.'
(7)   a. ta jianjian-de   renzhen-de   kaolu   na-yi-jian   shi.
           he gradual-DE serious-DE   consider that-one-Cl   thing
           'Gradually he seriously considers that matter.'
      b. *ta renzhen-de   jianjian-de   kaolu   na-yi-jian shi.
            he serious-DE   gradual-DE   consider that-one-Cl thing

As suggested by Tang, the distinction between (6) and (7) in well-formedness may be attributed to the different positions in which manner adverbs, locative expressions and sentential adverbs are licensed, in addition to the conditions on the scope of modification.[8] That is, while manner adverbs and locative expressions may be licensed by Pr, sentential adverbs cannot. By contrast, sentences like (8) are grammatical in that both sentential adverbs and temporal expressions may be generated under the projection of I:

(8)   a. ta xianran mingtian   neng   lai.
           he obvious tomorrow   can   come
           'Obviously he can come tomorrow.'
      b. ta   mingtian   xianran   neng   lai.
           he   tomorrow   obvious   can   come
           'Tomorrow he obviously can come.'

In view of sentences like (6)-(8) and other relevant observations, Tang thus argues that the facts about Chinese adverbials may be better captured by four-level sentence stuctures like CP-IP-PrP-VP than three-level ones like CP-IP-VP.[9]

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[8] For more discussion of the distribution and scope of adjuncts, see Tai (1973), Teng (1974), T.-C. Tang (1977, to appear), Huang (1982), Ernst (1989) and Tang (1990), among others.

[9] Although Tang (1990) did not examine the relation between Pollock's (1989) split-infl hypothesis and the licensing of adjuncts in Chinese, her main point is that the extension of X'-theory to clausal functional categories may shed light on the syntactic and semantic behavior of Chinese adverbials. See section 5 for a discussion of Chinese adverbials licensed by split-infl.

Second, Larson (1988) claims that adjuncts may be projected as innermost complements of V according to a principle of argument realization coupled with a condition on Thematic Hierarchy as in (9):

(9)   Thematic Hierarchy
       Agent > Theme > Goal > Obliques (manner, location, time, . . .)

However, as shown in Tang (1990), in Chinese manner adverbs, locatives and temporals cannot appear in sentence-final position:[10]

(10)   a. *ta   da-le   wo henhen-de.
              he   beat-LE I   fierce-DE
        b. *wo chifan zai ta-de   jia.
              I   eat-rice at   he-DE home
        c. *ta kanjian ni   zuotian.
              he see   you yesterday

The problems arising from (10) indicate that oblique adjuncts that may occur as innermost complements of V do not remain constant across languages. One stipulation is that some language-specific condition is imposed so that in Chinese not all oblique adjuncts may occur as V-complements. Although this stipulation is yet to be derived, a condition of a similar sort seems to be unavoidable if Larson's principle is taken to be universal or obligatory.

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[10] As pointed out in Tang (1990), in Chinese, the postverbal manner-like adverbials are in the form of the so-called descriptive expressions, as shown in (i) below. As for postverbal locatives and temporals, they are either subcategorized or secondary-predicate elements, as in (ii) and (iii):

(i) ta xie-de   hen hao.
    he write-DE very good
    'He writes very well.'

(ii) a. ta zhu zai taiwan.
        he live at Taiwan
        'He lives in Taiwan.'
     b. wo gua-le   yi-fu hua   zai qiang-shang.
        I   hang-LE one-Cl painting at   wall-top
        'I hung a picture on the wall.'

(iii) ta sheng yu 1987   nian.
     he born   in 1987   year
     'He was born in 1987.'

See section 6 for more discussion of such adverbials.

Note also that, as pointed out in Tang (1990), if the general theory of adjunct licensing is correct, i.e., they are projected under recursive X' or XP, then some kind of stipulation must also be posited to explain why (9) may or must override this generation. If neither theory should override the other, then another way to approach this issue is to allow adjuncts licensed by X to appear freely either under recursive X'/XP or as inner complements. Some other general principles or language-dependent conditions, then, may be drawn upon to determine which structure is the right one.

We will take up these and other related issues again in the course of discussion. It will be shown that while the extension of X'-theory to clausal functional categories may shed light on the occurrence of adjuncts, the latter need not be projected as complements, nor as specifiers. Furthermore, universal grammar (UG) should allow variation in the distribution of adverbials cross-linguistically. A proper account of the syntactic and semantic behavior of adjuncts requires a hierarchically ordered syntactic structure as well as semantic interpretation rules. It will also be pointed out that in Chinese two things interact with (9), in addition to the subcategorization of verbs. That is, the morphological properties of adverbial expressions and the theory of predication. In Chinese oblique adverbials that may and, in fact, need to occur postverbally as V-complements are those that are introduced by bound morphemes or interpreted as secondary predicates. Chinese postverbal adverbials, nevertheless, are not all projected as complements. An analysis along this line of thought may capture in a principled way the similarities and differences in distribution of Chinese-type vs. English-type obliques.

3. Adverbials as specifiers

With addition to the number and type of functional categories, several new claims have been made with respect to the licensing and generation of adverbs/adverbials. In particular, these expressions have been argued to be treated as specifiers of functional categories and/or complements of verbs, the former of which need to agree with their respective heads in semantic features. Two such approaches are mentioned here: Alexiadou (1997) and Cinque (1999). As will be demonstrated in the following discussion, while they both analyze adverbials as specifiers, they differ in the number, type and hierarchy of clausal functional projections, in addition to the generation site and nonoperator movement of adverbials.

3.1 Alexiadou (1997)

Taking up Kayne's (1994) Antisymmetry hypothesis, Alexiadou (1997) classifies adverbs into two types in accordance with their generation sites. The first type is the so-

called specifier-type adverbs, which include sentence adverbs, as in (11), and aspectual VP-adverbs, as in (12):

(11) Sentence adverbs
    a. evaluative adverbs like *fortunately*
    b. conjunctive adverbs like *finally*
    c. speaker-oriented adverbs like *frankly*
    d. modal adverbs like *probably*
    e. domain adverbs like *logically*
    f. subject-oriented adverbs like *courageously*

(12) Aspectual VP-adverbs
    a. durative indefinite frequency VP-adverbs like Greek *sinithos* 'usually', *kapu-kapu* 'every now and then', *kathimerina* 'daily' and *taktika* 'regularly'
    b. cardinal count/definite frequency point VP-adverbs like Greek *molis* 'just', *amesos* 'immediately', *mja fora* 'once' and *djo fores* 'twice'

Time, frequency and location adverbs like (13), which have been analyzed as sentential adverbs, are treated by Alexiadou as VP-modifiers:

(13) a. time adverbs like *yesterday*
    b. frequency adverbs like *frequently*
    c. location adverbs like *here*

According to Alexiadou (1997), while adverbs may occur as specifiers of functional categories, their appearance may be by Merge or by Move. They, however, are all licensed by their respective heads by means of semantic features.[11] For instance, English aspectual adverbs like *always*, *once*, *twice* and *just* could be argued to occupy the Spec of AspP by Merge, for these adverbs cannot be generated postverbally and cannot satisfy the subcategorization frame of verbs that do take adverbial complements. Ungrammatical cases like (14), taken from Alexiadou, illustrate this point:

(14) a. *John left always.
    b. *John behaved twice.

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[11] The relevant semantic features postulated in Alexiadou (1997) are Durative, Point, etc.

By contrast, Alexiadou (1997) claims that English time and manner adverbs, for example, are first generated as V-complements and may then respectively occupy the Spec of TP and that of VoiceP by Move. Adverbs that may appear as V-complements in Alexiadou's analysis are given in (15) below:

(15)   Complement-type adverbs
     a.   manner adverbs like *correctly*
     b.   completion or resultative adverbs like *entirely* and *completely*
     c.   time adverbs like *yesterday*
     d.   frequency adverbs like *frequently*
     e.   location adverbs like *here*

Note that, as argued by Alexiadou, of these V-complements only those that are phrasal and noncomplex may undergo the operation of movement to the Spec positions of functional projections. [12] As a result, it is posited that adverbs are not located as specifiers when they can take complements, be modified or have comparative forms. Instead, such adverbs are projected as complements of verbs. [13]

In Alexiadou's (1997) specifier approach to adverbs, positions needed for checking purposes of noun phrases are not accessible to adjunct licensing. Hence, adverbs are not found in the Spec positions of AgroP and AgrsP. [14] The order and positions that adverbs occupy are assumed to be the same across languages, in addition to the structure of clausal functional projections.

According to Alexiadou (1997), the above-mentioned claims may account for the following two facts. One fact concerns the limited number and rigid order of adverbs, while the other deals with concord between verb and adverb, the one-to-one relation between them, and the adverbial position after V-movement.

3.2 Cinque (1999)

While Cinque (1999) also licenses adverbs as specifiers of functional categories, his approach differs from Alexiadou's (1997) in several important aspects.

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[12] Alexiadou (1997) claims that a noncomplex adverb in V-complement position may also trigger the operation of Incorporation.

[13] Following Kayne (1994), Alexiadou (1997) assumes that specifiers are universally on a left branch whereas complements are on a right branch.

[14] Agro and Agrs respectively refer to object agreement and subject agreement. The Spec of VP is also not available for it is reserved for subjects.

First, he claims that the specifier-type adverbs in non-operator positions are base-generated as specifiers; they are not moved from a postverbal complement position. Thus, unlike Alexiadou, Cinque indicates that a restrictive theory should force a one-to-one relation between position and interpretation. In his analysis, when one adverb seems to have the same interpretation in distinct positions, either it occupies the same position and something else has moved around it, as in (16), or it has undergone an operator movement, as in (17), or it deceptively has exactly the same interpretation in two positions, as in (18):

(16)   a.   John probably has been sick.
           b.   John has probably been sick.
(17)   a.   John has worded the letter cleverly.
           b.   How cleverly has John worded the letter?
(18)   a.   Texans often drink beer.
           b.   Texans drink beer often.

In all instances of (16)-(18) the adverbs themselves do not move to non-operator positions.[15]

Second, he distinguishes the specifier-type adverbs from the so-called circumstantial adverbials, which follow the complements of the verb within the VP domain. They include expressions of time, manner, means, company, reason, purpose, etc. According to Cinque (1999), one difference between circumstantial adverbials and the specifier-type adverbs is that only circumstantial adverbials are not rigidly ordered with one another. For example, (19a) and (19b), with circumstantial adverbials, are both grammatical, but the same does not hold for sentences like (20), with the specifier-type adverbs:

(19)   a.   He attended classes every day of the week in a different university.
           b.   He attended classes in each university on a different day of the week.
(20)   a.   Honestly I am unfortunately unable to help you.
           b.   *Unfortunately I am honestly unable to help you.

Another difference between them is that circumstantial adverbials cannot appear in any of the pre-VP positions open to the specifier-type adverbs. Such a contrast is exemplified in (21) and (22) below, taken from Jackendoff (1977):

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[15] Cinque (1999) indicates that such alternations as (16a) and (16b) cannot involve multiple base-generations of adverbs (cf. Travis (1988), Alexiadou (1997) and the discussion around (23)).

(21)   *John will tomorrow/here attend classes.[16]

(22)   Bill quickly/*with a crash dropped the bananas.

The only exception is the absolute initial position of the so-called adverbs of setting, which is a topic-like position.

Based on these and other distinctions, Cinque (1999) argues that circumstantial adverbials are not projected as specifiers of functional projections above VP. He suggests several structures for the generation of multiple occurrences of circumstantial adverbials, one of which is the Larsonian (1988) structure.

Third, while Cinque (1999) and Alexiadou (1997) both argue for an invariant order of functional categories and adverbs, they differ, on the one hand, in the number, type and hierarchy of functional heads and, on the other hand, in semantic features and Spec positions relevant to the licensing of adjuncts. (23), for example, is Cinque's universal hierarchies of clausal functional projections and adverbs:

(23)   [*frankly* Mood speech act [*fortunately* Mood evaluative
        [*allegedly* Mood evidential [*probably* Mod epistemic [*once* T
        (past) [*then* T (future) [*perhaps* Mood irrealis [*necessarily* Mod
        necessity [*possibly* Mod possibility [*usually* Asp habitual [*again*
        Asp repetitive (I) [*often* Asp frequentative (I) [*intentionally* Mod
        volitional [*quickly* Asp celerative (I) [*already* T (anterior) [*no
        longer* Asp terminative [*still* Asp continuative [*always* Asp
        perfect (?) [*just* Asp retrospective [*soon* Asp proximative [*briefly*
        Asp durative [*characteristically* (?) Asp generic/progressive
        [*almost* Asp prospective [*completely* Asp sg completive (I) [*tutto*
        Asp pl completive [*well* Voice [*fast/early* Asp celerative (II)
        [*again* Asp repetitive (II) [*often* Asp frequentative (II) [*completely*
        Asp sg completive (II)

(23) is claimed to be cross-linguistically available even where there is no overt morphology corresponding to the heads. It is alo considered universal and UG allows no variation (cf. Ouhalla 1991). Three other things are worth mentioning here concerning (23). It allows multiple projections of an identical type of functional category marked with distinct semantic features. The same type of adverb may be licensed by the same head located in a different hierarchy (cf. Travis 1988 and

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[16] Cinque (1999) states that, as pointed out by Liliane Haegeman (personal communication), time adverbs appear possible in journalistic prose.

Alexiadou 1997). An identical type of projection with distinct features may bear a different hierarchical relation to another type of projection.

By comparison, in her study of Greek, Alexiadou (1997) argues that the CP layer includes the functional categories as in (24) and that simple tenses have the structural representation as in (25), both of which are claimed to be universal:

(24)   [RelativeP *pou* [TopicP [FocusP [WhP/Sub.TypeP *oti* [TopicP [IP]]]]]]

(25)   [DomainP *financially/ikonomikos*] [RelP *fortunately/eftihos pu* [WhP *fortunately/eftihos* [MoodP *probably/pithanos* [?AgrsP *cleverly/eksipna* [Neg2P *anymore/pja* [Asp1P *usually/sinithos* [?Asp2P *completely/entelos* [VoiceP well/*kala*]]]]]]]]]

As shown in (25), Alexiadou allows the same type of adverb to be licensed by distinct heads. Another difference between Alexiadou and Cinque is that different heads are posited for the licensing of the same type of adverb. For instance, while in (23) evaluative adverbs like *fortunately* are projected as specifiers of MoodP, in (25) they are analyzed as those of RelP and WhP. This contrast is not surprising since they have assumed distinct clausal functional projections. The licensing semantic features associated with various kinds of heads are also not the same. In (25) Asp1P refers to viewpoint aspect and Asp2P to situation aspect. In (23) Cinque proposes a rather different way of classifying aspectual elements. For Cinque Voice is marked with the nonsementic features [active] and [passive], whereas for Alexiadou it bears the semantic feature [manner].

To sum up, it should be clear from the discussions given so far that the theory of adverb licensing in Alexiadou (1997) is, in fact, rather different from that in Cinque (1999), though both claim that clausal functional projections are universal and that adverbs may be treated as specifiers.[17] We will show in the following section that languages like Chinese might raise problems for their analyses, in which the number and type of postverbal elements are very restricted.

4. Remarks on Alexiadou's (1997) and Cinque's (1999) analyses

It has been pointed out in cases like (10), repeated below as (26), that certain types of adverbials cannot appear postverbally in Chinese:

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[17] Cinque (1999) indicates that if adverbs are specifiers of functional projections, there might appear other type of functional categories that are Determiner Phrase (DP)-related.

(26)   a. *ta   da-le   wo henhen-de.
            he   beat-LE I   fierce-DE
       b. *wo chifan   zai ta-de   jia.
            I   eat-rice at   he-DE home
       c. *ta   kanjian ni   zuotian.
            he   see   you   yesterday

The same constraint, however, does not hold for languages like English, as (27) illustrates:

(27)   a. He beat me fiercely.
       b. I ate at her house.
       c. He saw you yesterday.

This conrast in grammaticality between (26) and (27), thus, is problematic to Alexiadou's (1997) and Cinque's (1999) respective claims about the complement-type adverbs and circumstantial adverbials, in addition to Larson's (1988) Thematic Hierarchy. In other words, the occurrence of postverbal adverbials does not seem to be the same cross-linguistically.

    Note further that, as shown in (21), repeated as (28), Cinque (1999) indicates that circumstantial adverbials cannot appear in any preverbal position unless they are in the so-called absolute initial position of the sentence:

(28)   *John will tomorrow/here attend classes.

This, again, is not true for languages like Chinese. Consider, for instance, the following sentences:

(29)   (mingtian) ta (mingtian) keyi (mingtian) lai.
      tomorrow he tomorrow can tomorrow come
      '(Tomorrow) He can come (tomorrow).'
(30)   (zai jia-li)   ni (zai jia-li)   neng (zai   jia-li)
xiuxi ma?
      at home-inside you at home-inside can   at home-inside rest MA
      '(At home) Can you take a rest (at home)?'

In (29) and (30), adverbials like temporals and locatives may occur sentence-initially, between the subject and the modal, and between the modal and the verb.[18] These two well-formed postsubject, preverbal distributions of Chinese temporals and locatives, again, seem to suggest that the preverbal occurrence of circumstantial adverbials is also not universal.

Alexiadou (1997) argues that as Chinese has no overt tense morphology, temporals must move to the Spec of TP to identify T. Several problems arise for such an account.

For example, it has been claimed in Chiu (1993), among others, that Chinese -*le* and *hui* respectively mark past tense and future tense, in a way like English -*ed* and *will*. [19] In cases with such morphemes, however, postverbal temporals are still disallowed:

(31) a. *ta da-le   wo   zuotian.
           he beat-LE I   yesterday
      b. *wo hui   lai   mingtian.
           I   will   come tomorrow

In addition, as demonstrated in (32), in Chinese temporals are not required for the interpretation of tense:

(32) a. ta   qu-guo   meiguo.
           he go-GUO America
           'He has been to the States.'
      b. wo gang lai.
           I   just   come
           'I just came.'

This is not surprising for tense distinctions may be surrogated by aspectual distinctions, as discussed in Comrie (1976). Cases like (32), however, still do not permit postverbal temporals.

Second, if in Chinese T indeed needs to be identified by a temporal in the Spec of T, why is it that there appear two other preverbal positions possible for the location of

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[18] For a discussion of the categorial, syntactic and semantic properties of Chinese modals, see T.-C. Tang (1979, to appear), Huang (1988a), Lin and Tang (1995), Chiu (1993), Shyu (1995), Cheng and Tang (1996) and section 5, among others.

[19] See Cheng and Tang (1996), among others, for a different discussion of the tense structure in Chinese.

Chinese temporals? Note that in Alexiadou's (1997) analysis sentence-initial temporals are base-generated rather than related to a final position via movement. In order words, when temporals occupy sentence-initial positions, the Spec of TP has nothing to identify T. Note further that for languages like Greek and Spanish the posited temporal-adverb movement to the Spec of TP is optional.[20] To account for this contrast between them and Chinese, Alexiadou suggests that in languages with tense morphology temporal expressions move overtly when they are not focal. This distinction is illustrated by an observation that only in (33b) can Greek temporals like *kthes* 'yesterday' be interpreted as focus:

(33) a. Tilefonise kthes o Janis.
     called yesterday the-John-NOM
   b. Tilefonise o Janis   kthes
     called the-John-NOM yesterday

In Chinese, however, syntactically focused elements, arguments or adverbials, occur preverbally but not postverbally, as shown in (34) below:[21]

(34) a. wo zhe-yi-ben shu kan-guo, (na-yi-ben mei kan-guo.)
     I this-one-Cl book read-GUO that-one-Cl not read-GUO
     'I have read this book, not that one.'
   b. ta jintian hui lai, (mingtian bu hui.)
     he today will come tomorrow not will
     'He will come today, not tomorrow.'

   Third, as (26b) and (30) exemplify, in Chinese, locatives exhibit similar distributions to temporals, the former of which have nothing to do with the interpretation of tense. Why is it so and where are the locatives located? In fact, Alexiadou (1997) suggests that locatives might behave like temporals and manner adverbs in that they could all be generated as V-complements and then move to the Spec of a functional category projected higher than VP. This prediction, nevertheless, is not borne out in Chinese.

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[20] According to Alexiadou (1997), the Spec of TP is parametrized across languages with respect to its ability of admitting a temporal adverb.

[21] For a discussion of the phrase structure of the focus construcion in Chinese, see Chiu (1993), Shyu (1995) and Lin (1996), among others.

As pointed out in footnote 15, Cinque (1999) claims that such alternations as (16a) and (16b), repeated as (35a-b), cannot involve movement nor multiple base-generations of adverbs:

(35) a. John probably has been sick.
      b. John has probably been sick.

In other words, the observed distributional variation of *probably* may be attributed to the movement of the auxiliary *has*. He, nevertheless, does not explain what triggers such movement and why it is optional.

Note also that grammatical sentences like (36) and (37) from Tang (1990) suggest that, in Chinese, temporals and locatives may be best analyzed as being base-generated in three distinct preverbal positions:

(36) jinnian   women meitian dou bixu liudian   qichuang.
      this-year we   everyday all must six-o'clock get-up
      'This year we must get up at six o'clock everyday.'

(37) zai taiwan women zai ziji-de   jia-li   keyi zai
      at   Taiwan we   at self-DE   home-inside can at
      mei-yi-ge   fangjian-li   fang yi-ge fouxiang zai zhuozi-shang.
      every-one-Cl room-inside put one-Cl Buddha at   table-up
      'In Taiwan we could put a Buddha on the table in every room of
      our own house.'

English, by contrast, allows only sentence-initial temporals and locatives. Given that under Cinque's analysis preverbal circumstantial adverbials must be licensed as the specifier of the topmost functional projection, it is not clear how he is able to capture the relevant Chinese facts without changing his claim about the universal hierarchies of functional projections and adverbs.

Cases like (36) also raise problems for Alexiadou's (1997) claim that only one temporal expression can appear per sentence, given the assumption that each maximal projection has only one specifier. According to Alexiadou, such a constraint correctly predicts that while Greek cases like (38a) below are ill-formed, those like (38b) and (39) are not.

(38) a. *O Janis   irthe   kthes   simera.
             the-John-NOM   came-3SG   yesterday   today
      b. O Janis   irthe   kthes   stis   tris
             the-John-NOM   came-3SG   yesterday   at-the   three

'John came yesterday at three.'
(39)   On Monday, he came at 3 p.m.

That is, although there appear two temporals in (38a-b), in (38b), not (38a), the two adverbs may form a complex adverb. Hence, the well-formedness of (38b) and the ill-formedness of (38a). In (39), by comparison, the sentence-initial temporal is generated in topic position but not the Spec of T. It is, therefore, also grammatical. Note, however, that in Chinese (36) there are two temporals that are not in topic position, nor do they form the so-called complex adverb.

All the above-mentioned problems concerning the location of temporals seem to indicate that both the number and site of their generation may not be universally the same. As a further example, as pointed out in Tang (1999), temporal expressions in Formosan languages like Paiwan and Tsou exhibit rather distinct distributional variation from Chinese and English. Examine, for instance, Paiwan (40) and Tsou (41), to be compared with Chinese (42) and English (43):

(40)   (katiau)   na-v-en-eLi (katiau)   ti   kai (katiau)   tua azua
        yesterday   past-buy-AF yesterday Nom Kai yesterday Acc that
        a   kun (katiau).
        A   skirt yesterday
        '(Yesterday) Kai bought that skirt (yesterday).'
(41)   (ho hucma) te-ta   (*ho hucma) bonu (*ho hucma) to   fou
        tomorrow Fut-3S   tomorrow   eat   tomorrow   Obl   meat
        (ho hucma)   ta   pasuya (ho hucma).
        tomorrow   Nom Pasuya tomorrow
        '(Tomorrow) Pasuya will eat meat (tomorrow).'
(42)   (zuotian) ta (zuotian)   mai-le (*zuotian)   qunzi (*zuotian).
        yesterday she yesterday buy-LE yesterday skirt   yesterday
        '(Yesterday) She bought a skirt (yesterday).'
(43)   (Tomorrow) he (*tomorrow) will (*tomorrow) eat (*tomorrow)
        the meat (tomorrow).

Both Paiwan and Tsou are predicate-initial languages. The former allows the VSO and VOS word orders, but Tsou only observes the VOS word order. By comparison, the SVO word order is found in Chinese and English. The distribution of temporals in these four languages is also very different, as shown by (40)-(43).

Before turning to the discussion of the distributional variations among different types of adverbials, one more thing needs to be mentioned concerning the licensing of

temporals. Cinque (1999) suggests that the fact that temporals cannot appear in non-sentence-initial preverbal position may be attributed to a condition that PPs and predicates are generally barred from the IP functional space. Chinese temporal expressions like *mingtian* and their English counterparts like *tomorrow* may both be either adverbial DPs or the so-called headless PPs.[22] Their distributional behavior, however, is still rather different.[23]

According to Cinque (1999), Italian temporals like *ieri* 'yesterday' cannot appear between epistemic adverbs and lower adverbs, as in (44), but deictic ones like *allora* 'then' can, as in (45):

(44)   *Gianni non ha (probabilmente) ieri (mai) dormito.

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[22] See Li (1985) for a discussion of the case marking of Chinese temporals and locatives (cf. Shyu 1995). It should be noted here that there appear to be some differences between Chinese temporals and locatives. For example, as shown in (i)-(iv), while the presence of *zai* 'at' is obligatory for preverbal locatives and postverbal locatives/temporals, it is optional for preverbal temporals:

(i)   ta *(zai) jia-li   kanshu.
      he   at   home-inside read-book
      'He reads at home.'

(ii) ta (zai) zuotian   kandao   ni.
      he   at   yesterday see-arrive you
      'He saw you yesterday.'

(iii) ta si   *(zai) meiguo.
      he die   at   America
      'He died in the States.'

(iv) ta   sheng *(zai) 1978 nian.
      he   born   at   1978 year
      'He was born in 1978.'

We will leave for future research this and other distinctions between locatives and temporals in Chinese.

[23] As pointed out in Tang (1990), it is also not true that in Chinese adjunct VPs cannot appear in the IP functional space. Sentences like (i) are of this kind.

(i) a. [xiezi]   ta keyi xie-de   hen kuai.
         write-character he can write-DE very fast
         'He writes characters very fast.'

     b. ta [xiezi]   keyi xie-de   hen kuai.
         he write-character can   write-DE   very fast
         'He writes characters very fast.'

     c. ta keyi [xiezi]   xie-de   hen kuai.
         he can write-character write-DE very fast
         'He writes characters very fast.'

      Gianni didn't (probably) yesterday (ever) sleep.'

(45)   a. Era allora forse stata fortunata.

          'She had then perhaps been lucky.'

       b. *?Era forse allora stata fortunata.

          'She had perhaps then been lucky.'

Consequently, as shown in (23), temporal expressions like *then* have been ordered between adverbs like *probably* and those like *perhaps*.

    By contrast, the same hierarchy is not true with Chinese. All instances of (46), for example, are grammatical:

(46)   a. ta keneng zuotian buceng shui-guo.

          he probable yesterday not-ever sleep-GUO

          'Probably he did not ever sleep yesterday.'

       b. ta zuotian   keneng buceng shui-guo.

          he yesterday probable not-ever sleep-GUO

          'Yesterday he probably did not ever sleep.'

       c. ni   nashi huoxu hen xingyun.

          you then   perhaps very   lucky

          'You perhaps had been very lucky then.'

       d. ni huoxu nashi hen   xingyun.

          you perhaps then   very lucky

          'You perhaps had been very lucky then.'

That is, while in (46a-d) the c-commanding adverbials have a wider scope than the c-commanded ones, in Chinese either order is possible.

    Such a possibility for cross-linguistic variation in alternation will pose two problems for Alexiadou's (1997) and Cinque's (1999) analyses. For one thing, the hierarchies of clausal functional categories and adverbials will no longer be universal. For another, the already-very-complicated structure of clausal functional projections posited by Cinque will become even more complicated.

    Note further that the above-mentioned alternation is possible even for sentences with more than two preverbal adverbials. Cases like (47) illustrate this observation:

(47)   a. ta ye zai nali wei wo gai-le   yi-dong fangzi.

          he also at there for me build-LE one-Cl   house

          'He also built a house for me over there.'

       b. ta ye   wei wo zai nali   gai-le   yi-dong fangzi.

he also for I at there build-LE one-Cl house

'He also built a house for me over there.'

    c. ta zai nali ye wei wo gai-le   yi-dong   fangzi.

        he at there also for me build-LE one-Cl house

        'Over there he also built a house for me.'

    d. ta zai nali wei wo ye gai-le   yi-dong fangzi.

        he at there for I   also build-LE one-Cl house

        'Over there he also built a house for me.'

    e. ta wei wo ye   zai nali gai-le   yi-dong   fangzi.

        he for I   also at   there build-LE one-Cl house

        'For me he also built a house over there.'

    f. ta   wei wo zai nali ye gai-le   yi-dong   fangzi.

        he for I   at   there also build-LE one-Cl house

        'For me he also built a house over there.'

In each instance of (47) there appear three adjuncts between the subject and the verb. The ordering among them is free, though the scope of modification is determined by the c-command relation among them. If, as argued in Cinque (1999), every adverb must be licensed as specifier of a particular functional head, the clausal structure of Chinese would be not only rather strange but also distinct from languages like English.

    It should be pointed out here that in explaining the order facts about sentences like (48) and (49), Cinque (1999) suggests that (48) is derived from (50) when *twice$_2$* is absent and that (49) is derived from (51) by moving the subject across *intentionally*:

    (48)   ?John twice intentionally knocked on the door.

    (49)   ??John intentionally twice knocked on the door.

    (50)   John (twice$_1$) [$_{xp}$ intentionally [$_{yp}$ knocked (twice$_2$) on the door]].

    (51)   ??Intentionally John twice knocked on the door.

In other words, he analyzes *intentionally* in (49), not that in (48), as adverb of setting. Consequently, the marginality of (49) is attributed to the low acceptability of locating adverbs like *intentionally* in sentence-initial position and no problem arises with respect to the assumed universal hierarchies of clausal functional heads and adverbs. An account along this line of thought, however, seems to be problematic.

    First, if (49) is derived from (51) via moving the subject across an adverb of setting, why is it that sentences like (52a) are ungrammatical, even though in (52b) expressions like *tomorrow* can also act as adverb of setting:

(52) a. *He tomorrow will come.
      b. Tomorrow he will come.

And what triggers the posited subject movement and why is it optional?

Second, it is not clear how sentences like (47) and (6), the latter of which is repeated below as (53), may fall under this kind of analysis:

(53) a. ta   zai nali   jingjing-de kanshu.
          he   at   there quiet-DE   read-book
          'Over there he is reading books quietly.'
      b. ta   jingjing-de zai   nali   kanshu.
          he   quiet-DE   at   there read-book
          'Quietly he is reading books over there.'

That is, as shown by the ill-formedness of (54), although adjuncts like *ye* 'also' and *jingjing-de* 'quietly' cannot act as adverbs of setting, cases like (47) and (53) are grammatical. In fact, it seems impossible to decide which instances of (47) and (53) are the derived:

(54) a. *ye   ta zai nali   wei wo gai-le   yi-dong   fangzi.
           also he at   there for I   build-LE one-Cl   house
      b. *jingjing-de   ta   zai   nali   kanshu.
           quiet-DE   he   at   there read-book

Third, as already pointed out in cases like (53) and (7)-(8), the latter of which is repeated as (55)-(56), in Chinese only adverbials licensed by the same head might interchange:

(55) a. ta jianjian-de   renzhen-de kaolu   na-yi-jian   shi.
          he gradual-DE   serious-DE consider that-one-Cl thing
          'Gradually he seriously considers that matter.'
      b. *ta   renzhen-de jianjian-de   kaolu   na-yi-jian   shi.
           he   serious-DE gradual-DE   consider that-one-Cl thing
(56) a. ta   xianran mingtian neng lai.
          he   obvious tomorrow can   come
          'Obviously he can come tomorrow.'
      b. ta   mingtian xianran neng lai.
          he   tomorrow obvious can   come
          'Tomorrow he obviously can come.'

If the possibility of alternation among adjuncts is dependent on whether they may appear in sentence-initial position, such an observation will be missing. Moreover, if this observation is correct, it means that adverbs need not be projected as specifiers.

All the problems presented above concerning adverbial alternation variations across languages, again suggest that UG should allow variation in the generation of adverbials. There appears to be another kind of evidence for such a claim. As mentioned in 3.1, Alexiadou (1997) states that only adverbs projected as postverbal complements may take complements, be modified or have comparative forms. For languages like Chinese, this prediction is not borne out. In (57) and (58), for instance, preverbal temporals and manner adverbs may have comparative forms or be modified:

(57) ta jintian bi   zuotian   geng   kuaile.
      he today than yesterday more   happy
      'He is happier today than yesterday.'

(58) ta bi   [ni yiwei]-de geng   dali-de   da-le   wo.
      he than you think-DE more   big-force-DE beat-LE I
      'He beat me more heavily than you thought.'

So far we have shown in this section that Alexiadou's (1997) and Cinque's (1999) assumption (that the generation sites of preverbal and postverbal adverbials are cross-linguistically the same) seems to be problematic. In addition, the adverbial alternation variations among languages seem to further suggest that adverbials need not be projected as specifiers. The distinction in word order between Chinese-type languages and English-type languages have been well known and much research has been done within the framework of Government and Binding to explain word order facts in Chinese. For instance, Huang (1982), Li (1985) and Tang (1990) all provide different possible ways of approaching the issue under consideration. Huang takes up the topic from the viewpoint of X'-theory and suggests that the notions head-initial and head-final can be parametrized across all levels and types of projections. Li, by contrast, argues that Chinese word-order facts can be properly accounted for by the parametrization of the directionality of theta-role and case assignment (cf. Koopman 1983 and Travis 1984). And, assuming the claims of binary branching and V-movement, Tang approaches the issue in question via a theory of adjunct licensing that is defined in terms of heads coupled with features as well as in accordance with the possible domains of modification of adjuncts. In other words, as stated in section 2, Tang indicates that both clausal functional categories and semantic rules are needed for the licensing of adverbials.

Tang's (1990) discussion of the relation between preverbal adjuncts and clausal functional heads suggests two main points. One is about licensing heads and the other about alternation variations. Depending on the choice of licensing heads, adjuncts may be classified at least into three types as in (59):

(59)   a. adjuncts licensed by heads X and Y*
          b. adjuncts licensed by head X or head Y*
          c. adjuncts licensed by head X

In Chinese, temporals and locatives are of the first type, as in (36)-(37); benefactives are of the second type, as in (60); and manners are of the third type, as in (61):

(60)   (wei ni) ta (wei ni) keyi (wei ni)   xisheng yiqie.
          for you he for you can   for you   sacrifice everything
          'For you he can sacrifice everything.'
(61)   (*dasheng-de) ni (*dasheng-de) neng dasheng-de   chang   ma?
          big-voice-DE you big-voice-DE can   big-voice-DE sing   MA
          'Can you sing loudly?'

With respect to the alternation possibility, while adjuncts licensed by the same head might interchange, as in (53), those licensed by distinct heads cannot, as in (55). The hierarchy of the latter types of adjuncts patterns with that of clausal functional projections.

Alexiadou (1997) and Cinque (1999), by comparison, seem to attribute the hierarchy of adjuncts mainly to the computational system of language. An analysis along this line of thought, however, may be problematic. It is pointed out in Tang (1990) that while the hierarchy of the licensing functional heads may be responsible for the hierarchy of adverbials, not all the ordering possibilities can be attributed to such syntactic structure. For example, as already shown in (36) and (37), in Chinese, temporals and locatives can occur sentence-initially, between the subject and the modal, and between the modal and the predicate. Furthermore, sentences like (62)-(65) illustrate that they both can interchange with adjuncts like *xianran* 'obviously', *huoxu* 'maybe', *dangran* 'certainly', etc.:

(62)   a. xianran mingtian   ta   yuanyi lai.[24]
               obvious tomorrow he   willing come
               'Obviously he is willing to come tomorrow.'

          b. mingtian xianran ta   yuanyi lai.
               tomorrow obvious he   willing come
               'Tomorrow he obviously is willing to come.'

          c. xianran ta mingtian   yuanyi lai.
               obvious he tomorrow   willing come
               'Obviously he is willing to come tomorrow.'

          d. mingtian   ta   xianran yuanyi lai.
               tomorrow he   obvious willing come
               'Tomorrow he obviously is willing to come.'

          e. ta   xianran   mingtian   yuanyi lai.
               he   obvious tomorrow   willing come
               'Obviously he is willing to come tomorrow.'

          f. ta   mingtian   xianran   yuanyi lai.
               he   tomorrow obvious   willing come
               'Tomorrow he is obviously willing to come.'

(63)   a. xianran zai jia-li   ta hen kuaile.
               obvious at   home-inside he very   happy
               'Obviously he is very happy at home.'

          b. zai jia-li   xianran ta   hen   happy
               at   home-inside obvious he   very   happy
               'At home he obviously is very happy.'

          c. xianran ta zai jia-li   hen   kuaile.
               obvious he at   home-inside very   happy
               'Obviously he is very happy at home.'

          d. zai jia-li   ta xianran hen   kuaile.
               at   home-inside he obvious   very   happy
               'At home he obviously is very happy.'

          e. ta   xianran zai jia-li   hen kuaile.
               he   obvious at   home-inside very happy
               'Obviously he is very happy at home.'

          f. ta zai jia-li   xianran hen   kuaile.
               he at   home-inside obvious   very   happy
               'At home he obviously is very happy.'

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[24] For a discussion of the relation between topics and sentential adverbs, see Tang (1990), Chiu (1993) and Shyu (1995), among others.

(64)   a. huoxu zuotian ta lai-guo zheli.
        maybe yesterday he come-GUO here
        'Maybe he had been here yesterday.'

       b. zuotian huoxu ta lai-guo zheli.
        yesterday maybe he come-GUO here
        'Yesterday maybe he had been here.'

       c. huoxu ta zuotian lai-guo zheli.
        maybe he yesterday come-GUO here
        'Maybe he had been here yesterday.'

       d. zuotian ta huoxu lai-guo zheli.
        yesterday he maybe come-GUO here
        'Yesterday maybe he had been here.'

       e. ta huoxu zuotian lai-guo zheli.
        he maybe yesterday come-GUO here
        'Maybe he had been here yesterday.'

       f. ta zuotian huoxu lai-guo zheli.
        he yesterday maybe come-GUO here
        'Yesterday maybe he had been here.'

(65)   a. huoxu zai nali ta bu kuaile.
        maybe at there he not happy
        'Maybe he is not happy there.'

       b. zai nali huoxu ta bu kuaile.
        at there maybe he not happy
        'Over there maybe he is not happy.'

       c. huoxu ta zai nali bu kuaile.
        maybe he at there not happy
        'Maybe he is not happy there.'

       d. zai nali ta huoxu bu kuaile.
        at there he maybe not happy
        'Over there maybe he is not happy.'

       e. ta huoxu zai nali bu kuaile.
        he maybe at there not happy
        'Maybe he is not happy there.'

       f. ta zai nali huoxu bu kuaile.
        he at there maybe not happy
        'Over there maybe he is not happy.'

However, as opposed to (62a, c, e) and (64a, c, e), temporals cannot be c-commanded by expressions like locatives, goals, sources, manners, etc.:

(66)   a. ta (zuotian) zai nali (*zuotian)   mai   dongxi.
            he yesterday at   there yesterday buy   thing
            'Yesterday he bought things there.'

        b. ta (zuotian)   wei wo (*zuotian)   mai   dongxi.
            he yesterday for I   yesterday buy   thing
            'Yesterday he bought things for me.'

        c. ta (jintian) xiang wo (*jintian) mai   dongxi.
            he today from I   today   buy   thing
            'Today he bought things from me.'

        d. ni (zuotian) henhen-de (*zuotian) da-le   wo.
            you yesterday cruel-DE   yesterday hit-LE me
            'Yesterday you cruelly beat me.'

Note also that, as shown in (47) and (53), there appear alternation variations between locatives and goals as well as between locatives and manners.

If the above-mentioned distinction in ordering between (62)-(65) and (66) must all be attributed to the hierarchy of clausal functional projections, the phrase structure of Chinese clauses will become rather complicated and strange.[25] Moreover, the hierarchies of clausal functional categories and adverbs will no longer be universal. This is because in languages like English, for instance, temporals may be c-commanded by expressions like locatives, as in (19b), goals, as in (9), etc. While we will leave for future study the observed distributional contrast between Chinese- and English-type temporals, we can say that there may be three factors involved. That is, Chinese and English seem to differ in the generation sites of temporals, the possible domains of modification of temporals, and the landing sites of LF movement.

To give another example of the need for semantic rules, consider the following sentences:

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[25] It needs to be pointed out here that there appears to be no evidence for the claim that the observed alternation variations concerning Chinese preverbal adjuncts must be analyzed as resulting from the topical, focusing or parenthetical uses of these adjuncts.

Also, as pointed out in Tang (1990), both Li (1985) and Ernst (1989) suggest that some of the observed facts about temporal expressions may be captured if temporal expressions are not projected under the same node as other adjuncts. This does not seem to be correct because, as we have illustrated, temporal expressions do co-occur with other adjuncts.

(67)   a. ta xian zai nali   mai-le yi-dong   fangzi.
           he first at there buy-LE one-Cl   house
           'He first bought a house there.'

        b. ta zai nali   xian mai-le yi-dong fangzi.
           he at   there first   buy-LE one-Cl house
           'Over there he first bought a house.'

(68)   a. ta   yijing zai nali   mai-le   yi-dong   fangzi.
           he   already at   there buy-LE   one-Cl house
           'He already bought a house there.'

        b. ta zai   nali   yijing   mai-le yi-dong   fangzi.
           he at   there already   buy-LE one-Cl house
           'Over there he already bought a house.'

(69)   a. ta   gang zai nali   mai-le yi-dong fangzi.
           he   just   at   there buy-LE one-Cl house
           'He just bought a house there.'

        b. ta zai nali   gang   mai-le   yi-dong   fangzi.
           he at   there   just   buy-LE   one-Cl   house
           'Over there he just bought a house.'

(70)   a. ta *xian yijing / yijing   xian   mai-le   fangzi.
           he first already already first   buy-LE   house
           '(lit) He already bought a house first.'

        b. ta *xian gang/*gang xian mai-le   fangzi.
           he first just   just first buy-LE   house

        c. ta *yijing   gang/*gang yijing   mai-le   fangzi.
           he already just   just already buy-LE   house

Although expressions like *xian* 'first', *yijing* 'already' and *gang* 'just' may interchange with locatives, as in (67)-(69), *gang* cannot appear with *xian* nor with *yijing*, as in (70b-c), and *yijing* must c-command *xian*, as in (70a). The ill-formedness of (70b-c) may be due to the imcompatability of the semantics of *gang* with that of *xian* and *yijing*.

As mentioned in sections 1 and 2.2, the split-Infl hypothesis and the split-Comp hypothesis have been posited respectively in Pollock (1989) and Alexiadou (1997). Nevertheless, as (23)-(25) illustrate, various kinds of proposals have been made with respect to the number and type of projections separated from I and C. Consequently, while the hierarchy of the clausal functional heads may be relevant for the ordering requirement between *yijing* and *xian* in (70a), semantic rules may still be needed if, for instance, the following data are taken into consideration. First, *xian*, *yijing* and *gang*

can appear between the subject and the deontic modal, but not in sentence-initial position, as in (71):

(71)　a.　ta xian/yijing/gang hui xie　hanzi.
　　　　　he first already just　can write　Chinese-character
　　　　　'He first can write Chinese characters./He is already able to write Chinese characters./He just learned to write Chinese characters.'
　　　b.　*xian/yijing/gang　ta hui xie　hanzi.
　　　　　 first already just　he can　write　Chinese-character

Second, they need to follow *xianran* 'obvious'-type adjuncts, as in (72):

(72)　ta (xianran) xian/yijing/gang (*xianran) hui xie　hanzi.
　　　he obvious　　　　　　　　　　　 first already just　　obvious
　　can　write　　　Chinese-character
　　　　'(Obviously) He first can write Chinese characters/He is already able to write Chinese characters/He just learned to write Chinese characters.'

Third, they can interchange with locatives, as in (67)-(69). Fourth, locatives can interchange with *xianran*-type adjuncts, as in (63).

5. Chinese preverbal adverbials

So far we have shown that both clausal functional categories and semantic rules are relevant for the licensing of adverbial expressions in Chinese. As for the generation of Chinese adjuncts, it has been suggested that they are not projected as specifiers and that different types of adjuncts are licensed by different heads. An analysis along this line of thought may explain in a principled way the previously mentioned multi-occurrence and alternation variations among Chinese adverbials.

To give more instances of how clausal functional heads interact with Chinese preverbal adverbials, examine first sentences like (73) below, with a manner expression:

(73)　a.　ta (yijing)　dasheng-de　(*yijing) shuochu-le　ziji-de　mimi.
　　　　　he already　big-voice-DE　already speak-out-LE self-DE　secret
　　　　　'He (already) loudly revealed his secret.'
　　　b.　ta (chang) yongli-de (*chang) da　xiaohai.
　　　　　he often　heavy-DE often　hit　child

'He (often) heavily beats his child.'

    c. ta (rengran) toutou-de (*rengran) xihuan ni.
        he still   secret-DE still   like   you
        'He (still) secretly likes you.'

In the previous discussion we indicated that Chinese manner expressions cannot occur in sentence-initial position, as in (54b), before the sentential adverb, as in (55), or in sentence-final position, as in (26a). Also, as stated in (5), in Chinese, manner expressions may be licensed by a functional category immediately c-commanding the projection of VP. Depending on the choice of the type of X'-structure, this functional head could be Pr, as in (5), or Voice, as in (23) and (25).

According to Alexiadou (1997) and Cinque (1999), expressions like *yijing* 'already' are licensed by T and those like *chang* 'often' and *rengran* 'still' by Asp. Cases like (73) demonstrate the fact that the manner expression must follow them. In other words, in Chinese, manners cannot be licensed by any head separated from the split-Infl, nor from the split-Comp.

In the discussion of (36)-(37) and (59a), we have suggested that temporals and locatives may be simultaneously licensed by three distinct heads. Given the facts that they can appear in sentence-initial position, between the subject and the modal, and between the modal and the predicate, as in (36)-(37), and that the locative expression may interchange with the manner expression, as in (53), it seems that the relevant licensing heads would be C, I and Pr/Voice.

As stated in (5), Tang (1990) posits that in Chinese different kinds of PPs are licensed by different kinds of heads. For example, in the discussion of the benefactive expression marked with *wei* 'for', cases like (47) show that it can interchange with *ye* 'also' and locatives; those like (60) demonstrate that it can appear sentence-initially, between the subject and the modal, and between the modal and the predicate. In addition, as exemplified in (74) below, it can also interchange with adjuncts licensed by T, Asp and Voice in the sense of Alexiadou (1997) and Cinque (1999):

  (74)   a. ta (yijing) wei wo (yijing) chi-le hen   duo   ku.
            he already for I   already eat-LE very   many   pain
            'He has (already) paid a lot of price for me.'
        b. ta (gang) wei ni (gang) mai-le   yi-jian xin   yifu.
            he just   for you just   buy-LE one-Cl new   clothes
            'He (just) bought new clothes for you.'
        c. wo (zixi-de) wei ni (zixi-de)   jiancha-le   yi-bian   bizi.
            I   close-DE for you close-DE examine-LE one-Cl   nose

'I (closely) examined your nose once for you.'
Thus, as claimed in Tang (1990) and (59b), the *wei*-expression may be licensed by C, I or Pr/Voice.[26]

Before turning to the discussion of postverbal adjuncts in Chinese, we would like to examine the distribution of preverbal adjuncts in clauses with finite/nonfinite predicates and deontic/epistemic modals. To begin with, consider cases like (75), with *yijing* 'already'-type adjuncts:

(75)   a.   ta (yijing) zhidao [ni (yijing) lai-le].
            he already know you already come-LE
            'He (already) knew that you (already) came.'
    b.   ta (yijing)   shefa [(*yijing) tongzhi wo].
            he already   try   already inform I
            'He has (already) tried to inform me.'
    c.   ta (yijing) neng (*yijing) shuo yingwen.
            he already can   already speak English
            'He (already) can speak English.'
    d.   ta (*yijing) keneng (yijing) lai-le.
            he already   possible already   come-LE
            'He probably has (already) come.'

Assuming with T.-C. Tang (1979, to appear), Huang (1988a) and Lin and Tang (1995), among others, that deontic modals involve control constructions and epistemic modals raising constructions, in (75a, d) the embedded clauses are tensed, whereas in (75b, c) they are tenseless. Note that in (75b, c) the embedded occurrence of *yijing* is ungrammatical. This seems to suggest that if expressions like *yijing* should be licensed by T in the sense of Cinque (1999), it needs to be the one marked with the feature [+tensed]. This prediction is borne out in sentences like (76), in which *yijing* can appear in both the matrix and the embedded clauses:

(76)   ta   yijing zhidao [ni yijing lai-le].
       he   already know you already come-LE
       'He already knew that you already came.'

Note further that although in (75a-d) all the matrix predicates and modals are finite, *yijing* cannot precede the epistemic modal, nor can it occur sentence-initially.

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[26] For a discussion of other preverbal adjuncts and PPs in Chinese, see Tang (1990).

Thus, the presence of a sentence-initial *yijing* in sentences like (77) below will result in the ill-formedness of (77):

(77) (*yijing) keneng (*yijing) ta (yijing) lai-le.
      already possible already he already come-LE
      'He probably has (already) come.'

Consider next clauses with *gang* 'just'-type and *rengran* 'still'-type adjuncts:

(78) a. ta (gang) zhidao [ni (gang) lai].
          he just   know you just   come
          'He (just) knew that you (just) came.'
      b. ta (gang) shefa [(*gang)   tongzhi   wo].
          he just   try   just   inform   I
          'He has (just) tried to inform me.'
      c. ta (gang) neng (*gang) shuo   yingwen.
          he just   can   just   speak   English
          'He is (just) able to speak English.'
      d. ta (*gang) keneng (gang)   lai.
          he just   possible just   come
          'He probably has (just) come.'

(79) a. ta (rengran) zhidao [ni (rengran) ai   wo].
          he still   know you still   love   me
          'He (still) knows that you (still) love me.'
      b. ta (rengran) dasuan [(rengran) tongzhi wo yi-sheng].
          he still   plan   still   inform I   one-sound
          'He (still) plans to inform me (still).'
      c. ta (rengran) neng (*rengran) shuo   yingwen.
          he still   can   still   speak   English
          'He (still) can speak English.'
      d. ta (rengran) keneng (rengran) hen   xihuan ni.
          he still   possible still   very   like   you
          'It is (still) possible that he (still) likes you a lot.'

Based on the fact that the grammaticality contrasts of (75) pattern with those of (78), it seems that although *gang* may be licensed by Asp, like *yijing*, it must appear in the tensed clause.

By comparison, in (79) the possible and impossible occurrences of *rengran* seem to suggest three other things. First, the marking of tense seems to be irrelevant for its distribution, as shown in the embedded nonfinite clause of (79b). Second, while it may appear before or after the epistemic modal, it needs to precede the deontic one, as the well-formedness distinction between (79c) and (79d) indicates. Third, although both *tongzhi* 'inform' in (79b) and *shuo* 'speak' in (79c) are nonfinite, it can only precede the verb not c-commanded by the deontic modal.

In view of the preceding observations on (75)-(79), it should be clear that there appear to be various kinds of conditions on the distribution and interpretation of preverbal adjuncts in Chinese. A proper theory of adjunct licensing in Chinese and other languages should take into consideration not only clausal functional heads and the semantics of adjuncts, but also the semantics of every constituent in the clause. In addition, the just-observed syntactic and semantic behavior of Chinese preverbal adjuncts may also shed light on the analyses of the X'-structure of the finite/nonfinite clauses and that of the deontic/epistemic modals. We will leave these and other related issues for further research.

6. Chinese postverbal adverbials

We have mentioned in the previous discussion that according to Larson (1988), Alexiadou (1997) and Cinque (1999), obliques or circumstantial adverbials may be projected as postverbal arguments of verbs. Tang (1990), however, points out that not all Chinese obliques act like arguments. Some of the nonsubcategorized postverbal elements that Tang (1990, 1993a, 1993b, 1994) has examined are duration expressions, as in (80), frequency expressions, as in (81), descriptive expressions, as in (82), and resultative expressions, as in (83):

(80) a. ta lai-le san-tian.
　　 he come-LE three-Cl
　　 'He has come three days.'

　　 b. ta kan-le yi-ge xiaoshi dianying.
　　 he watch-LE one-Cl hour movie
　　 'He watched the movie for one hour.'

　　 c. wo ma-le Lisi yi-ge xiaoshi.
　　 I scold-LE Lisi one-Cl hour
　　 'I scolded Lisi for one hour.'

　　 d. ta ma-le liang-ge xiaoshi na-yi-ge ren.
　　 he scold-LE two-Cl hour that-one-Cl man
　　 'He scolded that man for two hours.'

(81)   a. ta lai-le   san-ci.
             he come-LE three-Cl
             'He came three times.'
        b. ta kan-le   yi-ci   dianying.
             he watch-LE one-Cl movie
             'He watched the movie once.'
        c. wo qu-guo   nali   yi-ci.
             I   go-GUO there one-Cl
             'I have been there once.'
        d. ta lai-guo   liang-ci zheli.
             he come-GUO two-Cl here
             'He has been here twice.'

(82)   ta xie-de   hen hao.
          he write-DE very well
          'He writes very well.'

(83)   ta ku-de   hen   shangxin.
          he cry-DE very   sad
          'He cried so much that he got very sad.'

Based on (80)-(83) and other related facts, descriptive and resultative expressions are analyzed by Tang as complements of verbs. By contrast, duration and frequency expressions need not occur as arguments. They may be licensed by V in the sense of McConnell-Ginet's (1982) Ad-verb and thus generated under the projection of V.[27]

    Following Huang (1987, 1989), Tang (1990) suggests that one of the reasons for Chinese nonsubcategorized elements to be able to appear as complements is that they need to function as secondary predicates. This constraint, however, does not seem to hold for languages like English.[28] Three other such postverbal adverbials discussed in Tang (1990, 1996) are given in (84)-(86) below:

(84)   wo renshi yi-ge   ren   hen   congming.
          I   know   one-Cl man   very smart
          'I know a man very smart.'

(85)   ta gua-le   yi-fu   hua   zai   qiang-shang.
          he hang-LE one-Cl painting at   wall-top
          'He hung a painting on the wall.'

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[27] Among others, see Huang (1982, 1988b), Huang and Magione (1985), Li (1985), Ernst (1989) for a discussion of duration, frequency, descriptive and resultative expressions in Chinese.

[28] See Tsai (1994) for an account of this distinction between Chinese and English.

(86) ta   mai-le   bi   shi-zhi.
      he   buy-LE   pen   ten-Cl
      '(lit) He bought pens ten.'

A third type of the secondary predicate in question involves comparative constructions. Consider, for example, the following sentences:

(87) a. ta liu-chi   gao.
          he six-foot   tall
          'He is six feet tall.'
      b. ta gao liu-chi.
          he tall six-foot
          'His height is six feet.'
      c. ta bi   wo (*yi-chi)   gao (yi-chi).
          he than I   one-foot tall one-foot
          'He is one foot taller than I.'
(88) a. ta yi-bai   bang   zhong.
          he one-hundred pound heavy
          '(lit) He is one-hundred pounds heavy.'
      b. ta zhong yi-bai   bang.
          he heavy one-hundred pound
          'His weight is one-hundred pounds.'
      c. ta bi   ni   (*yi-bang)   zhong (yi-bang).
          he than you   one-pound heavy one-pound
          'His weight is one pound heavier than yours.'

Cases like (87a-b) and (88a-b) demonstrate that measure expressions in Chinese may precede or follow predicates like *gao* 'tall' and *zhong* 'heavy'.[29] In comparative constructions, nevertheless, measure expressions must follow *gao* and *zhong*, as (87c)

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[29] By contrast, the same distributional freedom is not true with predicates like *pang* 'fat' and *kuai* 'fast'.
(i) ta (*ba-bang)   pang-le (ba-bang).
     he eight-pound   fat-LE   eight-pound
     'He is eight pounds heavier.'
(ii) ni (*shi-fen)   kuai-le (shi-fen).
     you ten-minute   fast-LE ten-minute
     'He is ten minutes earlier.'

and (88c) illustrate. Also, degree adverbs like *hen* 'very', *feichang* 'very', *tai* 'too' and *zui* 'most' cannot occur in the comparative construction:

(89) ta bi   wo (*hen/*feichang/*tai/*zui)   gao.
      he than I   very very   too most tall
      'He is taller than me.'

These two observations seem to indicate three things about Chinese. First, measure expressions in verb phrases may be projected as V-complements.[30] Second, both the semantics and X'-structure of adverbials are relevant for their possible occurrence in the comparative construction. Third, the comparative construction requires complement-like verbal measure expressions.

In addition to (87b) and (88b), below are some other secondary predicates marked with adjunct-type semantic roles:

(90) a. ta qi-de   hen/ bu-de-liao/   yaoming.
          he angry-DE   very not-get-LIAO want-life
          'He is very angry.'
      b. ta gao-le   yidian/yixie.
          he tall-LE   some some
          'He is a little bit taller.'

Note that, as suggested in Ernst (1989) and Tang (1990), *-de* in (82)-(83) and (90a) is a bound morpheme that must be attached to the verb. This may be another reason that the *-de*-marked expressions under consideration have to be projected as V-complements.

Recall that, as pointed out in section 3.1, Alexiadou (1997) claims that bare adverbs in complement position may be incorporated into the verb via Head-movement. However, many works on Chinese compounds have also shown that they may be lexically or/and syntactically derived. Also, like complex adverbials, some bare adverbs may precede or follow the predicates, as demonstrated in (91)-(93):

(91) a. zao/ wan/chi lai
          early late late come
          'to come early/late'
      b. lai   zao/ wan/chi
          come early late late
          'to come early/late'

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[30] For a discussion of the internal structure of measure phrases in sentences like (87a) and (88a), see Tang (1990), among others.

(92)   a.   duo/ shao chi
             many little eat
             'to eat more/less'
       b.   chi duo/ shao
             eat many little
             'to eat more/less'

(93)   a.   ji   qi
             very   angry
             'very angry'
       b.   qi   ji
             angry   very
             'very angry'

We will leave for further research the structure of expressions like (91)-(93).[31]

7. Conclusion

We have shown in this study that while functional categories may license adverbials, the latter need not be projected as specifiers in languages like Chinese. In addition, the hierarchy of adverbials is not the same cross-linguistically. Thus, both clausal functional heads and semantic rules are relevant for a proper account of the distribution and interpretation of adverbials.

If our line of thought is on the right track, there should exist evidence from projections of nonclausal functional categories. The answer seems to be in the affirmative. In the case of noun phrases, for instance, Tang (1990, 1993b) discusses several similarities and differences between Chinese and English. Below are two of the distinctions taken from Tang. First, while both N-initial and N-final constructions are

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[31] Below are some of those without such distributional variation.
  (i) a. zao/ wan kai
        early late open
        'to open early/late'
     b. *kai   zao/ wan
         open early late
 (ii) a. bai   zuo
        worthless do
        'to work worthlessly'
     b. *zuo bai
        do worthless

found in English, Chinese only exhibits N-final ones. Second, modifiers in Chinese may precede or follow the (Demonstrative-) Number-Classifer sequence; in English they must follow the definite/indefinite expressions. Also, in the study of Formosan noun phrases, Tang et al. (1998) and Chang et al. (1998) discuss several word-order variations between Paiwan and Kavalan. Note further that there are studies which indicate that functional categories in noun phrases are not the same when comparing Chinese-type and English-type languages (e.g. Li 1999, Cheng and Rint 1999).

An optimal analysis of adverbial expressions in Chinese requires a thorough examination of their morphological, syntactic and semantic properties. The preliminary study presented in this paper is just part of an on-going research into Chinese adjuncts and modifiers. We, nevertheless, hope to have established some interesting and important empirical and theoretical issues for future research.

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