Modal Licensing and Subject Specificity in Mandarin and Taiwan Southern Min: A Cartographic Analysis

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Abstract: This paper aims to provide an explanation of the modal licensing of subject indefinites under the cartographic approach (Rizzi 1997; Cinque 1999; Tsai 2015). We observe that there are asymmetries among modals licensing quantity subject indefinites in Mandarin and Taiwan Southern Min. Firstly, in contrast to deontic modals, no epistemic and dynamic modals may license subject indefinites. Secondly, not all deontic modals are equipped to carry out the same construal. This paper offers a coherent account of both asymmetries by recognizing the height of interpretation for both modals and subjects. The proposal is further supported by the specificity restriction displayed by individual subject indefinites, which varies with respect to the type of modals involved and their morpho-syntactic distributions, in particular, the curious behavior of the capacity modal *tit* in Taiwan Southern Min.

Keywords: Modals, Subject Specificity, Chinese Syntax, Comparative Syntax

1. Introduction

It is widely noted that there are some restrictions of indefinite nominal phrases as a subject in Mandarin Chinese (Chao 1986, Li and Thompson 1981, Lee 1986, Shyu 1995, Tsai 1994, 1996, 2001, Xu 1996, Li 1996, 1998, Liao 2011, among others). Li (1998) proposes that subject indefinites cannot refer to individuals (henceforth individual SI) without the precedence of the existential operator *you* 'have', as shown by contrast of (1). In contrast, a subject indefinite alone may obtain a quantity reading (henceforth quantity SI) in certain "bare" constructions, as in (2).

(1) a. * san-ge   ren   zuo-le   yi-bu   che.   [individual]
       three-Cl person   sit-Prf   one-Cl   car
       'Three persons were seated in one car.'

b. zuotian you san-ge   ren   zuo-le   yi-bu   che. [individual]
    yesterday have three-Cl person sit-Prf   one-Cl   car
    'Three (specific) persons were seated in one car yesterday.'

(2) **san-ge   ren**   zuo yi-bu   che.   [quantity]
    three-Cl   person ride one-Cl   car
    'Three persons, instead of four persons, should ride a car.'

(1) concerns the event of leaving by riding a car, so it requires an agent (i.e., individuals) as its subject. On the contrary, (2) conveys a rule with respect to a certain quantity of person, and hence the subject is quantity-denoting. As shown by the contrast of these two sentences, individual SIs should be preceded by *you*, but quantity SIs do not have this restriction.

Tsai (2001) further points out that the quantity SI actually occurs in an implicit modal construction, as exemplified by (3) (Tsai 2001: 146).

(3) a. san-ge   ren   (**yinggai/keyi**) zuo yi-bu   che.   [quantity]
        three-Cl person   should/may   sit one-Cl   car
        'Three persons should/may be seated in one car.'

    b. san-ge   ren   zuo-**de/bu**-xia   yi-bu   che.   [quantity]
        three-Cl person   sit-can/cannot-down one-Cl   car
        'Three people can/cannot be seated in one car. '

Alternatively, the same construction can host an infixal modal *-de-* or its negative counterpart *-bu-*, which in turn triggers verb raising in syntax, as seen in (3).

Along the line of Tsai (2001), this paper sets out to investigate what types of modals are capable of licensing quantity SIs. In general, quantity SIs can only occur with two types of deontic modals, namely, *ought-to-be* modals and capacity modals. In episodic sentences, as mentioned above, these subject indefinites must be preceded by *you* 'have' and interpreted as individuals.

To provide a plausible explanation of the above phenomena, we suggest that deontic modals should be divided into two subtypes. First, an *ought-to-be* modal selects an implicit capacity modal phrase as its complement, which in turn licenses a quantity SI by introducing existential closure (∃-closure) on the edge of *v*P. Crucially, this proposal is supported by corresponding data from Taiwan Southern Min, where a quantity SI co-occurs with an *ought-to-be* deontic modal *e* and an explicit capacity modal *tit*. On the other hand, an *ought-to-do* modal is not compatible with a capacity

modal, which explains why they fail to license quantity SIs. Finally, dynamic modals, being in the lexical layer, are simply too low to c-command the inner subject position, whereas epistemic modals, being in the complementizer layer, are too high to select capacity modals, hence the failure of licensing quantity SIs (cf. Tsai 2015). The advantage of this cartographic analysis will become clear when we address the issues surrounding the specificity restriction observed by individual SIs.

This paper is organized as follows. Section 2 looks into the interaction of different types of modals and subject indefinites. In section 3, based on the proposal that modals are mapped onto distinct positions under the cartographic approach (Rizzi 1997; Cinque 1999), we provide a solution as to how quantity SIs are licensed by modals in section 4. Section 5 is devoted to relevant phenomena in Taiwan Southern Min, which are particularly interesting from a comparative point of view. We conclude this paper in section 6.

2. Modals and the Interpretation of Indefinite Subjects

As mentioned above, indefinite subjects can be interpreted as either quantity-denoting or individual-denoting, depending on the syntactic distribution of the subjects in question. In this section, we focus on subject indefinites in modal contexts. We will explore the issue surrounding quantity SIs, and then move on to the specificity restriction on individual SIs.

2.1. Quantity Subject Indefinites

Quantity SIs, as pointed out by Tsai (2001), are typically licensed in modal constructions, where the modal in question can be either overt or implicit. Even more interestingly, we notice that subject indefinites are acceptable only in the presence of deontic modals: in contrast to the deontic modals in (3a,b), the epistemic/dynamic modals in (4) simply do not have the same ability to license the SIs.

(4) a. * **san-ge   ren**   dagai   zuo yi-bu   che. [epistemic]
          three-Cl person   probably sit one-Cl   car
          'Three persons will probably be seated in one car.'

   b. * **san-ge   ren**   ken   zuo yi-bu   che. [dynamic]
          three-Cl person   willing   sit one-Cl   car
          'Three persons are willing to be seated in one car.'

Moreover, deontic modals should be further divided into two subtypes on the *v*P periphery, i.e., *ought-to-be* modals vs. *ought-to-do* modals, as already proposed for other languages (Feldman 1986; Hacquard 2006; see also Kratzer 1981, 1991, Portner 2009, among others). Simply speaking, the major difference between them is that when the former occurs the addressee is under an obligation to carry out the event, but for the latter it is the subject that should fulfill the duty. Please see the contrast of (5) (Portner 2009: (226)) for an illustration.

(5) a.   At least one son should become a priest.   [*ought-to-be*]
    b.   Mary should return the pen she borrowed.   [*ought-to-do*]

In (5a), the addressee, instead of any particular son, is under an obligation to make sure that at least one son will become a priest. On the other hand, with *should* as the *ought-to-do* modal, it is the subject (i.e., Mary) that is under an obligation to return the pen she borrowed, as exemplified by (5b).[1]

More interestingly, these two types of modals also show difference with respect to the interaction of quantity SIs. Only *ought-to-be* modals are compatible with them, as illustrated by the following contrast.

(6) a.   san-ge   ren   **yinggai** zuo yi-bu   che.   [*ought-to-be*]
    three-Cl person   should   sit one-Cl   car
    'Three persons should be seated in one car.'

    b. * san-ge   ren   **yinggai** zhuang yi-bu   che. [*ought-to-do*]
    three-Cl person   should   assemble one-Cl   car
    'Three persons should assemble a car.'

More specifically, the subject of (6a) denotes a certain quantity of people with *ought-to-be yinggai*, and the subject of (6b) individuals with *ought-to-do yinggai*. This is because only the latter construal involves an Agent role carried by the car-assemblers, which enables the subject to fulfill the obligation.

2.2. Individual Subject Indefinites

It has been long established in the literature that individual SIs are allowed in the subject position when licensed existentially quantified by *you* 'have'. One intriguing

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[1] It is worthwhile to mention that the modal *should* in (5b) may have the *ought-to-be* reading. In this case, it is the addressee that is required to make sure that Mary returns the pen she borrowed.

observation is that a SI licensed by *you* only allows an individual interpretation. More interestingly, there is an inner-outer distinction for SIs with respect to their structural positions relative to deontic modals. A pre-modal indefinite subject (henceforth outer subject) must be specific, as in (7a), whereas a post-modal one (henceforth inner subject) is interpreted as nonspecific, as in (7b).

(7) a. **you san-ge ren** yinggai^{Deo} zuo yi-bu che.
have three-Cl person should ride one-Cl car
'Three particular persons should ride a car.'

b. yinggai^{Deo} **you san-ge ren** zuo yi-bu che.
should have three-Cl person ride one-Cl car
'Three nonspecific persons should ride a car.'

This subtle specificity distinction can be detected by the felicity of a follow-up sentence expressing the specificity of SIs. As evidenced by the contrast of (8), outer subject is only compatible with sentences expressing that the SI refers to particular individuals. Since the outer subject is specific, it is felicitous to continue to point out the names of the denoted individuals, as in (8b). That is also why (8a) is infelicitous: asserting that any individual can fulfill the obligation is contradictory to the specific reading of the SI.

(8) a. **you san-ge ren** yinggai^{Deo} zuo yi-bu che,
have three-Cl person should ride one-Cl car
#shei zuo dou keyi, shi san-ge jiu hao.
who sit DOU can be three-Cl just good
'Three particular persons should ride a car. #Anyone can ride a car as long as there are three persons in total.'

b. **you san-ge ren** yinggai^{Deo} zuo yi-bu che,
have three-Cl person should ride one-Cl car
jiu shi Akui, Xiaodi, hen Lisi.
just be Akui Xiaodi and Lisi
'Three particular persons should ride a car. They are Akiu, Xiaodi, and Lisi.'

In contrast to outer subject, sentences including an inner subject are only allowed to be followed by sentences implying that the speaker does not know the referent of the SI. Please consider (9).

(9) a.　yinggai^{Deo}　**you san-ge ren**　zuo yi-bu　che,
　　　　should　　havethree-Cl person　ride one-Cl　car
　　　　shei zuo dou　　keyi,　shi san-ge　jiu hao.
　　　　who sit DOU　　can　　be three-Cl　just good
　　　　'Three nonspecific persons should ride a car. #Anyone can ride a car as long
　　　　as there are three persons in total.'

　　b.　yinggai^{Deo}　**you san-ge ren**　zuo yi-bu　che,
　　　　should　　havethree-Cl person　ride one-Cl　car
　　　　#jiu shi Akui,　Xiaodi,　hen Lisi.
　　　　 justbe Akui　　Xiaodi　　and Lisi
　　　　'Three nonspecific persons should ride a car. #They are Akiu, Xiaodi, and
　　　　Lisi.'

The inner subject in (9) does not refer to specific individuals, so it is odd to provide more information, such as the names, of the SI, as shown by the infelicity of (9b). Instead, as evidenced by (9a) it is only felicitous if the follow-up sentences implying that the SI does not have specific referent; that is, any individual can do the duty; no one is under the obligation.

　　Even more interestingly, epistemic and dynamic modals interact with SIs in a non-trivial way in terms of the specificity restriction. SIs receive a specific reading when preceding an epistemic modal, as in (10a). By contrast, they can be either specific or nonspecific when preceded by an epistemic modal, as in (10b).

(10)a.　**you san-ge ren**　mingtian　dagai　hui lai.
　　　　havethree-Cl person　tomorrow　　probably will come
　　　　'Three particular persons will probably come tomorrow.'

　　b.　dagai　**you san-ge ren**　mingtian hui lai.
　　　　probably have three-Cl　person　　tomorrowwill come
　　　　'Three persons will probably come tomorrow.'

　　Again, this contrast becomes clear by means of the test of follow-up sentences we exploit before. Due to its specific interpretation, an outer subject is only compatible with sentences indicating that the speaker knows the referent of the SIs, such as providing the names of the individuals as in (11b). Please compare it with the infelicitous sentence as in (11a). On the other hand, when following epistemic modals,

SIs can be specific or nonspecific, so the follow-up sentences can either further specify the names of the denoted individuals, as in (12b), or just point out that SIs do not refer to particular persons, as in (12a).

(11) a. **you san-ge   ren**   mingtian dagai   hui lai,
          have three-Cl person   tomorrow probably will come
          #dan   wo bu zhidao   shi shei.
           but   I   not know   be   who
          'Three particular persons will probably come tomorrow, #but I don't' know who will come.'

      b. **you san-ge   ren**   mingtian dagai   hui lai,
          have three-Cl person   tomorrow probably will come
          jiu shi Akui,   Xiaodi, hen Lisi.
          just be Akui   Xiaodi   and Lisi
          'Three particular persons will probably come tomorrow. They are Akiu, Xiaodi, and Lisi.'

(12) a. dagai   **you san-ge   ren**   mingtian hui lai,
          probably have three-Cl person   tomorrow will come
          dan   wo bu zhidao   shi shei.
          but   I   not know   be   who
          'Three persons will probably come tomorrow, but I don't' know who will come.'

      b. dagai   **you san-ge   ren**   mingtian hui lai,
          probably have three-Cl person   tomorrow will come
          jiu shi Akui,   Xiaodi, hen Lisi.
          just be Akui   Xiaodi   and Lisi
          'Three persons will probably come tomorrow. They are Akiu, Xiaodi, and Lisi.'
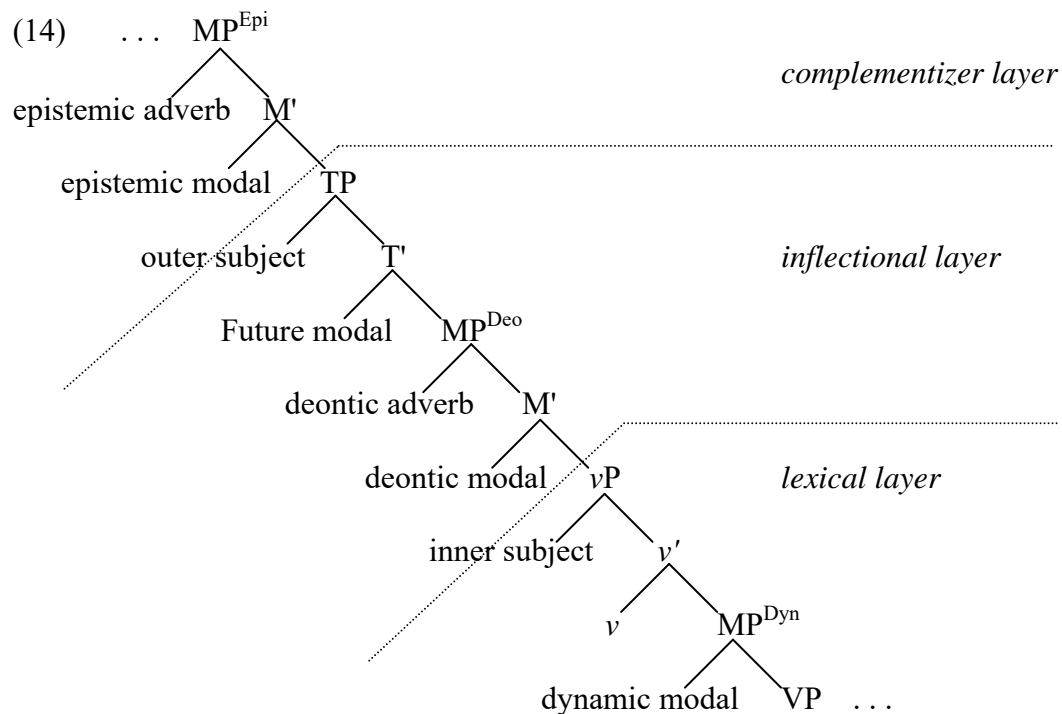
As for dynamic modals, they must follow indefinite subjects, and the subjects in question can be either specific or nonspecific, as evidenced by the contrast between (13a) and (13b).

(13) a. **you san-ge ren** mingtian ken lai.
have three-Cl person tomorrow willing come
'Three persons are willing to come tomorrow.'

b. * ken **you san-ge ren** mingtian lai.
willing have three-Cl person tomorrow come
'Three persons are willing to come tomorrow.'

All the patterns presented above point to the conclusion that the specificity effects on individual SIs vary according to their height relative to the particular type of modals involved. In the following discussion, we will provide a more explicit account of the interaction between SIs and modals in cartographic terms.

3. Mapping the Topography of Chinese Modals

Under the approach of syntactic cartography (Rizzi 1997; Cinque 1999), Tsai (2015) proposes to associate distinct types of modality with distinct structural positions in terms of "their height of interpretation". As illustrated in the diagram below, the three types of modals correspond to the three syntactic layers, i.e., epistemic modals located in the complementizer layer, deontic modals located in the inflectional layer, and dynamic modals located in the lexical layer.

(14) . . . MP^{Epi}

complementizer layer

epistemic adverb M'

epistemic modal TP

outer subject T' *inflectional layer*

Future modal MP^{Deo}

deontic adverb M'

deontic modal vP *lexical layer*

inner subject v'

v MP^{Dyn}

dynamic modal VP . . .

The above hierarchical arrangement is supported by the restrictions on modal distributions, modal entailment relations, and modal-negation interactions. First, epistemic modals precede deontic and dynamic modals in Chinese multiple modal constructions, as evidenced by the contrast of (15) and (16).

(15) a. Zhangsan   dagai   bixu   qu   Taibei.
      Zhangsan   probably   must   go   Taipei
      'It is may be the case that Zhangsan must go to Taipei.'

    b. *Zhangsan   bixu   dagai   qu   Taibei.
       Zhangsan   must   probably   go   Taipei

(16) a. Zhangsan dagai   ken   qu   Taibei.
      Zhangsan probably   willing   go   Taipei
      'It is may be the case that Zhangsan is willing to go to Taipei.'

    b. *Zhangsan ken^{Dyn} dagai   qu   Taibei.
       Zhangsan willing   probably   go   Taipei

Furthermore, deontic modals must precede dynamic modals, as shown by (17).

(17) a. Zhangsan   bixu   ken   qu   Taibei.
      Zhangsan   must   willing   go   Taipei
      'Zhangsan must be willing to go to Taipei.'
    b. *Zhangsan   ken   bixu   qu   Taibei.
       Zhangsan   willing   must   go   Taipei

These examples indicate that epistemic modals are located in a higher position than deontic modals, which in turn appear higher than their dynamic counterparts.

Second, epistemic modals can be distinguished from their deontic and dynamic counterparts in terms of the entailment relationship induced by symmetric predicates (Brennan 1997, Bulter 2003, Tsai 2015). Consider the following examples, where the (a)-sentence entails the (b)-sentence in (18) and (19), but not in (20) and (21).

(18) a. Akju　　　he　Xiaodi　　hen　xiang.
　　　　Akju　　　and　Xiaodi　　very　similar
　　　　'Akju looks like Xiaodi.'
　　　b. Xiaodi　　he　Akju　　　hen　xiang.
　　　　Xiaodi　　and　Akju　　　very　similar
　　　　'Xiaodi looks like Akju.'

(19) a. Akju　　　dagai　　he　Xiaodi　　hen　xiang.　　[epistemic]
　　　　Akju　　　probably　and　Xiaodi　　very　similar
　　　　'Akju probably looks like Xiaodi.'
　　　b. Xiaodi　　dagai　　he　Akju　　　hen　xiang.　　[epistemic]
　　　　Xiaodi　　probably　and　Akju　　　very　similar
　　　　'Xiaodi probably looks like Akju.'

(20) a. Akju　　　bixu　　　he　Xiaodi　　hen　xiang.　　[deontic]
　　　　Akju　　　must　　and　Xiaodi　　very　similar
　　　　'Akju must look like Xiaodi.'
　　　b. Xiaodi　　bixu^{Deo}　he　Akju　　　hen　xiang.　　[deontic]
　　　　Xiaodi　　must　　and　Akju　　　very　similar
　　　　'Xiaodi must look like Akju.'

(21) a. Akju　　　xiang　　he　Xiaodi　　hen　xiang.　　[dynamic]
　　　　Akju　　　want　　and　Xiaodi　　very　similar
　　　　'Akju wants to look like Xiaodi.'
　　　b. Xiaodi　　xiang　　he　Akju　　　hen　xiang.　　[dynamic]
　　　　Xiaodi　　want　　and　Akju　　　very　similar
　　　　'Xiaodi wants to look like Akju.'

The contrast in question supports our analysis of the modal topography in Mandarin. Epistemic modals in the left periphery operate over propositions in which the predicate and subject are already composed, so they can not affect the relation of the predicate and subject. Hence, the entailment relation is preserved. On the contrary, deontic and dynamic modals in the inflectional layer and lexical layer only operate on the symmetric predicates instead of the proposition, so the modals change the type of the predicates and destroy the symmetric predicates.

　　　Third, the interaction between modals and realis negation also serves to separate the three types of modals apart. Since the realis negator *mei* is closely related to tense/aspectual construals, Tsai (2015) assume that *mei* combines with the head of TP.

Crucially, epistemic modals can only precede *mei*, as shown by the contrast between (22a) and (22b), whereas dynamic modals can only follow it, as shown by the contrast between (23a) and (23b). Finally, deontic modals can never co-occur with *mei*, as in (24a,b).

(22) a. Akju   yiding[Epi] **mei** qu xiancheng.   [epistemic]
        Akju   must   not go   county-town
        'Akju must have not gone to the county town.'
    b. *Akju   **mei** yiding[Epi] qu   xiancheng.   [epistemic]
        Akju   not must   go   county-town
        'Akju must have not gone to the county town.'

(23) a. * Akju   yinggai[Deo]   **mei** qu   xiancheng.   [deontic]
        Akju   should   not go   county-town
        'Akju should have not gone to the county town.'
    b. *Akju   **mei** yinggai[Deo]   qu   xiancheng.   [deontic]
        Akju   not should   go   county-town
        'Akju should have not gone to the county town.'

(24) a. * Akju   gan   **mei** qu   xiancheng.   [dynamic]
        Akju   dare   not go   county-town
        'Akju dares to have not gone to the county town.'
    b. Akju   **mei** gan   qu   xiancheng.   [dynamic]
        Akju   not dare   go   county-town
        'Akju dares to have not gone to the county town.'

Since the realis negator *mei* is situated in T^0, its ordering restrictions indicate that epistemic modals stands above TP, while dynamic modals appear below TP. The incompatibility between deontic modals and *mei* may well stems from the fact that they are in complementary distribution in the inflectional layer.

Along this line, we reach the conclusion that the licensing of subject indefinite is conditioned by the distribution of modals, which can license subject indefinites by introducing existential closure, which in turn binds the lower subject copy at LF. In the following section we will provide a cartographic analysis of the licensing of quantity SIs, which is directly supported by the specificity restriction displayed by individual SIs.

4.   A Cartographic Analysis: the Licensing of Modals
4.1   Quantity Subject Indefinites

To begin with, it is instructive to note that quantity SIs typically appear in sentences containing *ought-to-be* deontic modals, but not in those with *ought-to-do* deontic modals, as evidenced by the contrast between (25a,b). Furthermore, once we employ an existential operator to license the subject indefinite in (25b), an individual reading emerges, and the modal interpretation is distinctively Agent-oriented, as evidenced by (25c).

(25) a.   san-ge   ren   **yinggai** zuo yi-bu   che.
           three-Cl person   should   ride one-Cl   car
           'Three persons should ride a car.'
           [*ought-to-be* deontics]

    b.   *san-ge   ren   **yinggai** zhuang   yi-bu   che.
           three-Cl person   should   assemble one-Cl   car
           'Three persons should assemble a car.'
           [*ought-to-do* deontics]

    c.   you san-ge   ren   **yinggai** zuo yi-bu   che.
           have three-Cl person   should   ride one-Cl   car
           'Three particular persons should ride a car.'
   [*ought-to-do* deontics]

One the other hand, epistemic and dynamic modals are either too high or too low to license the quantity construals, as illustrated in (26a,b) respectively ((4a) and (4b) repeated here).

(26) a. * **san-ge   ren**   dagai   zuo yi-bu   che. [epistemic]
           three-Cl person   probably ride one-Cl   car
           'Three persons will probably ride a car.'

    b. * **san-ge   ren**   ken   zuo yi-bu   che. [dynamic]
           three-Cl person   willing ride one-Cl   car
           'Three persons are willing to ride a car'

Here we propose that the *ought-to-be* modal of (26) assigns high priority to one

situation over the others according to some form of estimation. Crucially, the *ought-to-be* modal does not involve a subject-oriented construal as its *ought-to-do* counterpart does. Rather, it selects a capacity modal phrase as its complement, which in turn licenses a quantity subject indefinite by introducing existential closure (∃-closure) on the edge of *v*P, as sketched in the following diagram.

(27) *ought-to-be* > capacity modal > quantity subject
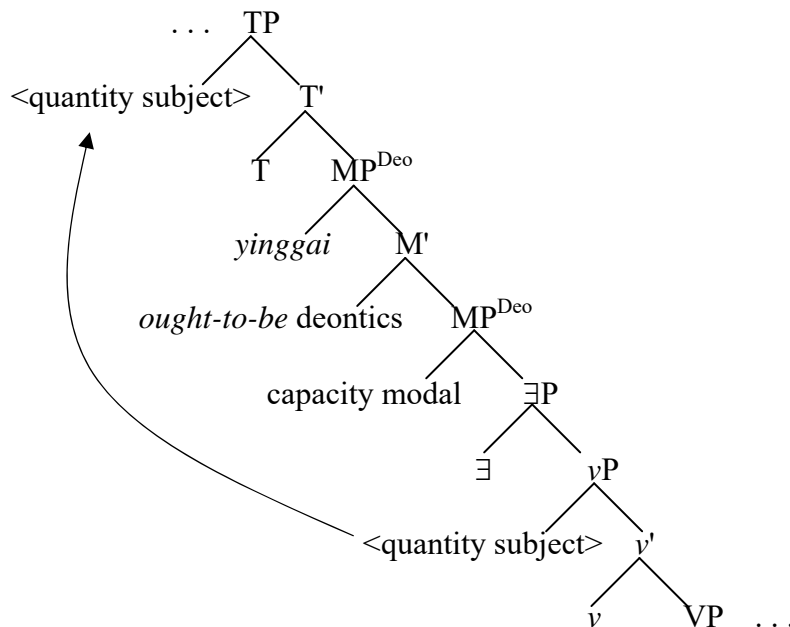
Although the external argument raises further to the outer subject position, it is its lower copy that gets interpreted at the original merge site at LF (while undergoing deletion at PF). The above derivation then gives rise to the quantity reading. Note that the quantity subject can also follow the deontic modal (i.e., remaining in its original merge site), as evidenced by (28).

(28) yinggai^Deo   **san-ge   ren**   zuo yi-bu   che.
     should   three-Cl person   ride one-Cl   car
          'Three persons should ride a car.'   [*ought-to-be* deontics]

(25a) and (28) have virtually the same interpretation: The only difference seems to be that, in the latter case, the upper copy gets deleted at PF instead.

Furthermore, an *ought-to-do* modal is incompatible with the capacity reading because it is Agent-oriented and therefore only allows an individual subject indefinite. Along this line, it also becomes clear why dynamic modals do not license a quantity SI: Not only are they agent-oriented, but also too low to warrant existential closure on

the lower subject. On the other hand, epistemic modals, being situated in the complementizer layer (i.e., the left periphery), are simply too high to existentially close the lexical layer (or the *v*P periphery to the same effect). Finally, our analysis also explains how and why the presence of *you* 'have' gives rise to the specific interpretations, the reason being that it may well serve as a strong existential quantifier which blocks any default operation such as existential closure.

## 4.2. Individual Subject Indefinites

As hinted at above, (25) and (26) can be improved by inserting an existential operator *you* 'have' in front of the subject indefinite in question, and the reading is distinctively individual rather than quantity. Now recall our observation that the specificity involved is determined by the position of the subject in relation to modals, as shown below ((25-26) repeated here).

(29) a. yinggai^{Deo} **you san-ge ren**   zuo yi-bu   che.
should   have three-Cl person   ride one-Cl   car
'Three nonspecific persons should ride a car.'
[inner subject: nonspecific individual; modality: *ought-to-do*]

    b. **you san-ge ren**   yinggai^{Deo} zuo yi-bu   che.
have three-Cl person   should   ride one-Cl   car
'Three particular persons should ride a car.'
[outer subject: specific individual; modality: *ought-to-do*]

(30) a. dagai^{Epi} **you san-ge ren**   mingtian hui lai.
probably have three-Cl person   tomorrow will come
'Three persons will probably come tomorrow.'
[inner subject: specific, nonspecific individual; modality: epistemic]

    b. **you san-ge ren**   mingtian dagai^{Epi} hui lai.
have three-Cl person   tomorrow probably will come
'Three persons will probably come tomorrow.'
[outer subject: specific individual; modality: epistemic]

(31) a. * ken   **you san-ge   ren**   mingtian   lai.
        willing   have three-Cl person   tomorrow   come
        'Three persons are willing to come tomorrow.'

  b. **you san-ge   ren**   mingtian ken^{Dyn} lai.
        have three-Cl person   tomorrow willing   come
        'Three persons are willing to come tomorrow.'
        [outer subject: specific or nonspecific individual; modality: dynamic]

Consider the case of *ought-to-do* deontics first: This interaction of modals and the interpretation of the subject would be a natural consequence if we take *you* in the *v*P periphery as a lexical counterpart of ∃-closure associated with the capacity modal, which in turn produces the nonspecific reading of (29). On the other hand, *you* in the left periphery, which functioned as an existential operator, assures that the outer subject is strongly quantified, yielding the specific reading of (29). The distribution of these elements can be visualized in the diagram below:

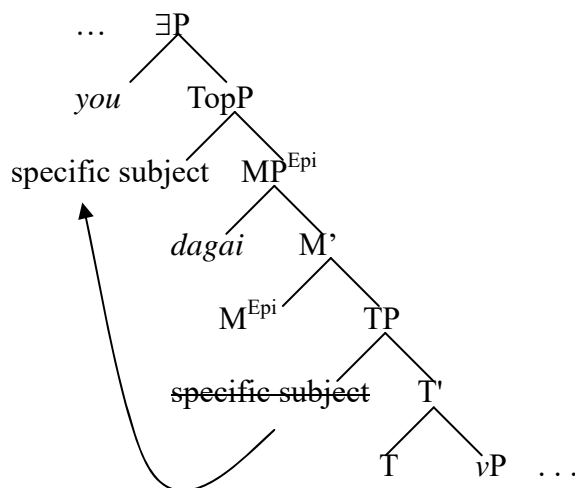(32)   specific subject > ought-to-do > nonspecific subject
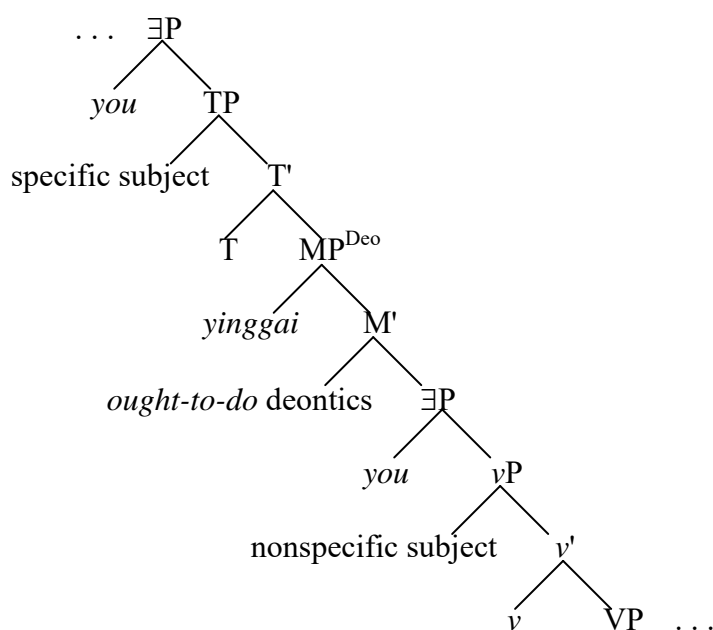
Since epistemic modals are located on the complementizer layer, *you*, below epistemic modals, can be analyzed either as a lexical counterpart of ∃-closure between TP and *v*P or as an existential operator above TP, resulting in the nonspecific reading and specific reading respectively. Please consider the following diagram.

(33)   epistemic modal > specific subject or nonspecific subject

```
...   MP^Epi
      /    \
  dagai    M'
          /   \
      M^Epi   ∃P
             /   \
          you    TP
                /   \
   specific subject  T'
                    /   \
                  T     MP^Deo
                       /    \
                     M      M'
                           /   \
                         M     ∃P
                              /   \
                           you    vP
                                 /   \
               nonspecific subject   v'
                                    /   \
                                  v     VP  . . .
```
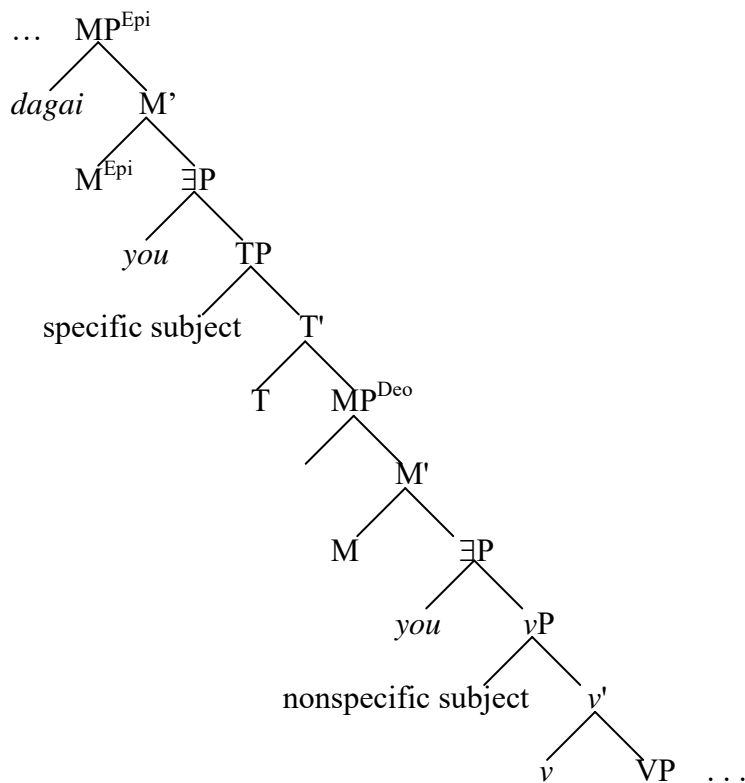
The specific subject may further be topicalized to the sentence initial position, and be strongly quantified by the existential operator *you* above TopP, as visualized by (34).

(34)   epistemic modal > specific subject or nonspecific subject

```
      ...   ∃P
           /   \
        you    TopP
              /    \
 specific subject  MP^Epi
                  /    \
              dagai    M'
                      /   \
                  M^Epi   TP
                         /   \
          specific subject   T'
                            /   \
                          T     vP  . . .
```

Hence, indefinite subjects following epistemic modals may be specific or nonspecific, but those preceding them are specific.

Dynamic modals on the lexical layer occur lower than subjects, so they cannot be followed by the subjects. Due to the low position of dynamic modals, *you* above

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dynamic modals may be treated either as a lexical counterpart of ∃-closure or as an existential operator in the left periphery. Therefore, the subject may have the nonspecific or specific reading. The following diagram provides an illustration.

(35)　　　specific subject, nonspecific subject > dynamic modal
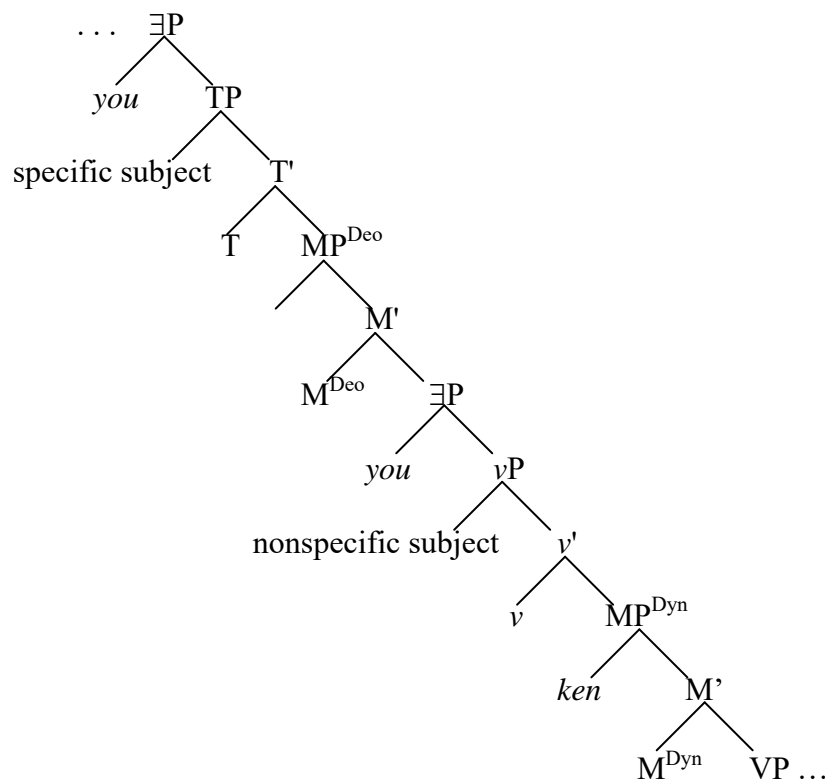
　　　The interaction of modals and indefinite subjects can be neatly explained by the cartographic approach. Only modals on the inflectional layer can license quantity SI because of the capability of selecting a capacity modal. The capacity modal triggers ∃-closure on the inner subject, resulting in the quantity construal of (27). The *ought-to-do* modal, on the other hand, solicits help from an existential *you*, which in turn licenses the individual reading of (32). The position of *you* determines the lexical properties of it, which in turn influence the interpretation of the subject. On the one hand, *you* is functioned as an existential operator if it is located in the left periphery, so the subject is strongly quantified, yielding the specific reading. On the other hand, *you* on the edge of *v*P is a lexical counterpart of ∃-closure, so the licensed subject has the nonspecific reading. As a result, the word order of individual SI on the one hand and *ought-to-do* deontics, epistemic and dynamic modals on the other hand directly reflects the hierarchical structure of these elements. The interpretation of indefinite subjects exhibits a straightforward syntax-semantics mapping. All these testify to the general topography of Chinese modals laid out in (14).

The licensing of quantity-denoting indefinite subjects is attributed to the lexical property of capacity modals, which can introduce an existential closure. Only *ought-to-be* modals locates in an appropriate position and are semantically compatible with capacity modals, so quantity-denoting indefinite subjects are allowed in sentences contain *ought-to-be* modals but not the others. This analysis does not violate the inclusiveness condition because the existential closure is associated with capacity modals instead of certain syntactic projection. Besides, it explains why the word order of modals and subjects correlates to the interpretation of the subjects. Accordingly, the interaction of modals and the interpretations of subject further supports the transparent mapping of syntax and semantics.

5. Deontic Modals in Taiwan Southern Min

From the angle of dialectal comparison, it is worthwhile to note that Taiwan Southern Min patterns with Mandarin in a very interesting way. (36)a demonstrates that only a deontic modal such as *ingkai*, but not an epistemic modal like *huanse* or a dynamic modal like *kann*, may co-occur with a subject indefinite.

(36)a. sann   e   lang   **ingkai**^{Deo} / *huanse^{Epi} /*kann^{Dyn} tse tsit tai tshia.
       three   Cl person should/may/dare   sit one Cl car
       'Three persons should/may/dare ride a car.'

    b.* sann   e   lang   **ingkai**^{Deo} khi   Taipak.
       three   Cl person should   go   Taipei
       (Intended) 'Three persons should go to Taipei.'

On the other hand, the contrast between (36)a,b indicates that the deontic modal *ingkai* is not always a SI licenser. The two sentences differ only in their choices of predicates, which leads to their distinct capability of SI licensing.

    Furthermore, the existence of an implicit capacity modal under an *ought-to-be* modal in Mandarin also receives cross-dialectal support from Taiwan Southern Min, where it is overtly realized in the form of a bound morpheme *tit*. It typically follows the *ought-to-be* modal *e*, and can be found in various types of combination with *e*, as exemplified in (37).

(37)a. sann   e   lang   **e**   tsiah-**tit**   tsit   tiann png.
       three   Cl person E   eat-TIT   one   Cl   rice
       'Three people can finish a pot of rice.'

b. goo   e   lang   tsap   uann   png   tsiah-**e**-(**tit**) liau.
    five   Cl   person ten   Cl   rice   eat-E-TIT   finish
    'Five people can eat up ten bowls of rice.'

c. sann   e   lang   **etit**   be   thuanthephio.
    three   Cl   person E.TIT buy   group.ticket
    'It is allowed for three people to buy a group ticket.'

At first glance, it may seem that Taiwan Southern Min sports a variety of compound modals. However, not all of them are real compounds. Among those composed of *e* and *tit*, the permission *etit* is relatively high in the *v*P periphery, presumably among the same rank as an *ought-to-be* modal. In the following discussion, we will show how *e* and *tit* interact to derive their surface word orders and distinct modal interpretations.

     To begin with, there are at least three differences between (37a) and (37b). The first one concerns their word order. In (37a) *e* and *tit* wrap around the main verb *tsiah* 'eat', while both of them follow the verb in (37b). Secondly, *tit* is obligatory in (37a) but optional in (37b). Without *tit*, the sentence becomes ungrammatical, as in (38a). This is because the modal flavor of *e* turns into epistemic, thus failing to license the quantity SI. On the other hand, the absence of *tit* in (38b) does not have any impacts on its capacity construal.

(38)a. * sann   e   lang   **e**   tsiah   tsit   tiann png.
      three   Cl   person E   eat   one   Cl   rice
      (Intended) 'Three people are supposed to finish a pot of rice.'

   b. goo   e   lang   tsap   uann   png   tsiah **e** liau.
     five   Cl   person ten   Cl   rice   eat   E finish
     'Five people can eat up ten bowls of rice.'

     Finally, the '*e* V *tit*'-type and the 'V *e* *tit*'-type differ in their ability to take a phase marker: The latter type must co-occur with a phase marker such as *liau* in (37b).[2] By contrast, no phase marker is allowed in the former type, as evidenced by (39).

(39) * sann   e   lang   **e** tsiah   **tit**   **liau** tsit   tiann   png.
    three   Cl   person E   eat   TIT finish one   Cl   rice
    (Intended) 'Three people can finish a pot of rice.'

     Our position is further strengthened by the deviance of (40), where the object is fronted to show that the ungrammaticality of (39) has nothing to do with the failure to comply with obligatory object preposing triggered by a phase marker (see Teng 1995,

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[2] Apart from *liau*, this contrast holds when it comes to other phase marker such as *suah*, *khi*, and *uan*.

among others).

(40) * sann   e   lang   tsit tiann   png   e   tsiah **tit**   liau.
      three Cl   person one Cl   rice E   eat   TIT   finish
      (Intended) 'Three people can finish a pot of rice.'

Now let's turn to the third type in (37), where the two morphemes are fused together as *etit*, and none of them can be dropped, as evidenced by (41a) and (41b). We will therefore take *etit* to be a genuine compound in Taiwan Southern Min.

(41)a.* sann   e   lang   e   be   thuanthephio.
       three Cl   person E   buy   group.ticket
       (Intended) 'It is allowed for three people to buy a group ticket.'

    b. * sann   e   lang   tit be   thuanthephio.
        three Cl   person TIT buy   group.ticket
        (Intended) 'It is allowed for three people to buy a group ticket.'

To provide a coherent analysis of the three types of modal constructions discussed above, we first look into the issue from a diachronic perspective. As Lien (1997) argues quite convincingly, *tit*, a loan word from language contact, entered Southern Min in which it occurs post-verbally to cooperate with the native pre-verbal counterpart *e*. In view of its hybrid nature and the parallelism between the two elements, we propose that the three distinct constructions involving *e* and *tit* evolved from different paths.

At the initial stage when *tit* entered Southern Min, *e* and *tit* wrap around a verb, and the construction of '*e* V *tit*' showed up. It is worth noting that *e* was a dynamic modal in early Southern Min before *tit* was adopted. In fact, the dynamic modal usage of *e* is still available in its cognate *ue* in Quanzhou Southern Min, as seen in (42a), as well as some constructions in Taiwan Southern Min in (42b-c).

(42)a. i   ue   Ingbun.   (Quanzhou Southern Min, Wang 1990)
       he   E   English
       'S/he can speak English.'

    b. hun   ia   e,   tsiu   ia   e. (Yang 2001:286 (73))
       cigarette also E   wine   also E
       'He not only smokes but also drinks.'

    c. i   si   hue   tioh   e   sia   ji. (Yang 2001:289 (88))
       s/he four year-old   PRT   E   write character
       'S/he learned to write when s/he was four.'

d. i tsin e   lim. (Teng 1980)
    s/he very able drink.
    'He can (really) drink.'

We suggest that *tit* is externally merged under MP^{Deo}, which in turn triggers the reanalysis of *e* as a deontic modal. The underlying structure '*e* V *tit*' is given below.
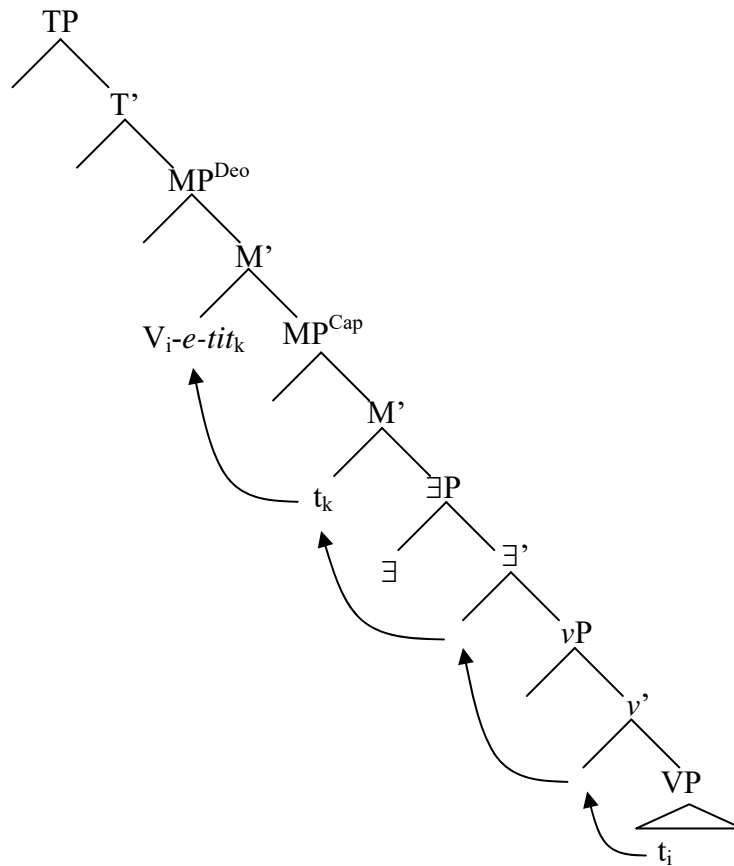
(43)…[$_{MP}$^{Deo} *e* [$_{MP}$^{Cap} *tit* [$_{vP}$ …]

Here *tit* occupies the head position of the capacity modal phrase (i.e., MP^{Cap}), selected by the *ought-to-be* modal *e*. In other words, we have an overt counterpart of the covert capacity modal in Mandarin. Verb movement then takes place to form the '*e* V *tit*' pattern of (37a).

(44)
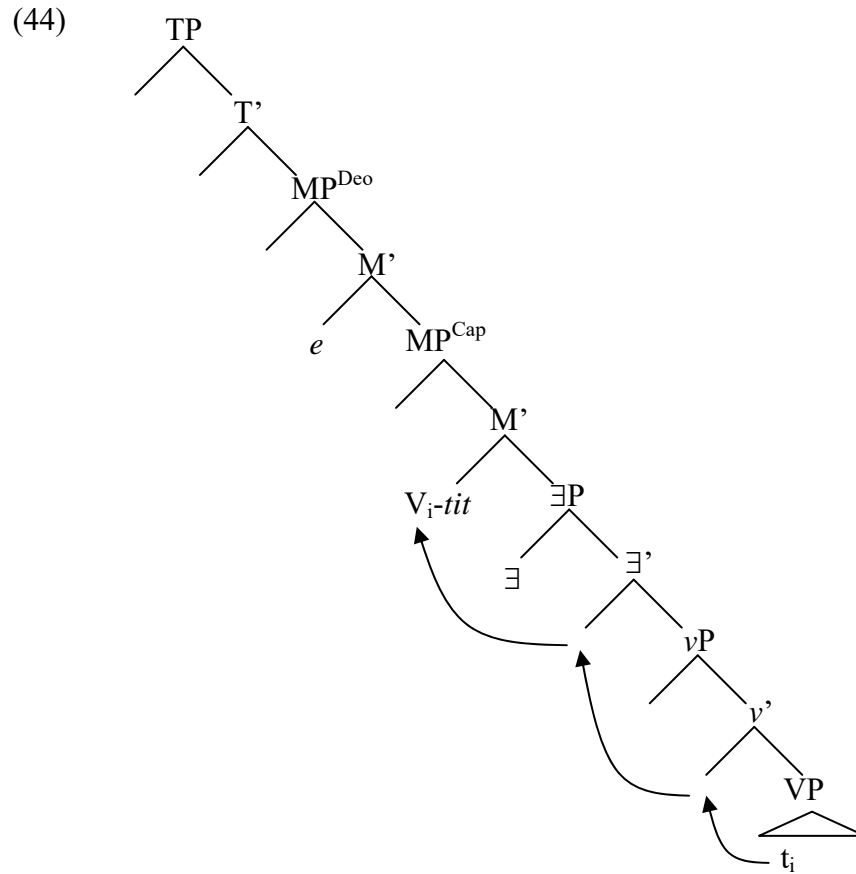
As illustrated above, the main verb raises to join the capacity modal *tit*, where they fuse into a complex head. Next consider the scenario where it raises further to wrap around *e*, i.e., the head of MP^{Deo}. This eventually produces the pattern of 'V *e* *tit*' in (37b), as illustrated in the following diagram.

(45)

TP
　T'
　　MP^{Deo}
　　　M'
　　　V$_i$-*e*-*tit*$_k$　　MP^{Cap}
　　　　　　　M'
　　　　　　t$_k$　　∃P
　　　　　　　∃　　∃'
　　　　　　　　　　*v*P
　　　　　　　　　　　v'
　　　　　　　　　　　　VP
　　　　　　　　　　　　　t$_i$

Finally we have a case of real compounds such as *etit* in (37c). Unlike the other two constructions, this pattern develops from the integration of *e* and *tit* without resorting to verb movement, as sketched below.

(46)

TP
　T'
　　MP^{Deo}
　　　M'
　　　etit　　MP^{Cap}
　　　　　　　M'
　　　capacity modal　. . . . .
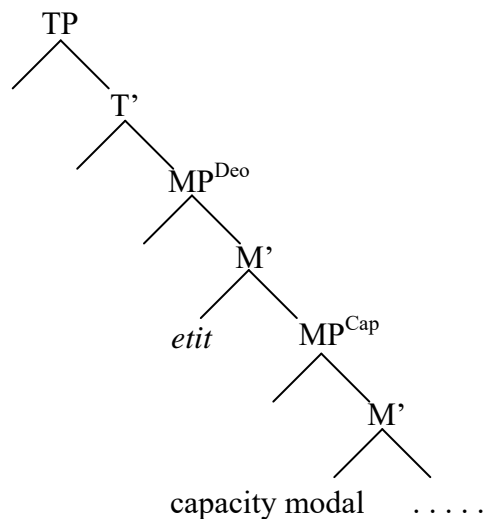
The result is an *allowed-to-be* modal. Here again we have an instance of covert capacity modals embedded under *etit*. This pattern is by no means rare in Taiwan Southern Min: Apart from *etit*, compounds begin with *e* include *etang, esai,* and

eingtit.

If our analysis is on the right track, the cluster of phenomena examined so far reveal some important facts about the emergence of deontic modals in Taiwan Southern Min: The overt capacity modal is a product of language contact, which leads further to the grammaticalization of various root modals in this dialect. Our proposal thus not only accounts for the three distinct morpho-syntactic patterns of *e* and *tit*, but also tells a plausible story about their origins in historical terms.

In sum, the data in Taiwan Southern Min provide substantial support to our view concerning the hierarchical arrangement of modal categories in general. Moreover, both Mandarin and Taiwan Southern Min show that only *ought-to-be* modals may license quantity-denoting subject indefinites, which receives a full-fledged account from my cartographic analysis.

6.   Concluding Remarks

Taking the disparity of modal licensing of SI as a point of departure, we propose to tackle the issue from a comparative point of view. As argued for throughout the paper, dynamic modals in the lexical layer are too low to c-command the inner subject position, while epistemic modals in the complementizer layer are simply too high for the same task, hence the incapability of licensing SI. Under the cartographic approach, distinct types of modality are associated with distinct types of structural projections, conforming to "the height of interpretation". We have thus presented a comprehensive view of the syntax-semantic interaction in SI-licensing, which in turn provides an explicit account of how the proposed mechanism achieves the desirable result from a cross-dialectal comparison.

To explain the asymmetry among deontic modals, we classify them into several subtypes. Only an *ought-to-be* modal, but not an *ought-to-do* modals, selects an implicit capacity modal phrase as its complement, which in turn licenses a quantity SI by introducing existential closure ($\exists$-closure) on the edge of *v*P. This subject may then raise further to the outer subject position, but still get interpreted at its original merge site at LF (i.e., with its lower copy licensed by $\exists$-closure), hence the quantity reading.

Taiwan Southern Min has an overt capacity modal, *tit*, where *e* is an *ought-to-be* modal. This provides a piece of evidence for the existence of an implicit capacity modal in Mandarin. Compared with their Mandarin counterparts, *ought-to-do* modals in Taiwan Southern Min are not compatible with a capacity modal, which explains why they fail to license SI. In addition, it sports a variety of compound modals. The permission modal *e-tit* is one of them. We suggest that it is relatively high in the *v*P periphery, presumably in the same rank as *ought-to-be* modals, hence capable of

licensing SI. By pinpointing the positions of modals in cartographic terms, the variety of their licensing capacity is accounted for, which once again testifies to the robust analyticity of Chinese in general (Huang 2004).

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