

Moving heads to specifiers

Evidence from Mandarin multiple pre-subject modals

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April 6, 2022

Abstract Based on a hitherto neglected set of multiple pre-subject modal sentences, this squib offers a novel syntactic account of Mandarin modals whereby the derivation of pre-subject modal sentences involves Internal Merge of modals to specifiers of the left-peripheral focus projection, and discusses new problems facing a traditional head-movement analysis and the existing XP-movement accounts. Our proposal lends novel support to recent claims that ‘true’ syntactic head movement targets specifier positions.

Keywords modals · head movement · (Internal) Merge · Mandarin

1 Introduction

A recalcitrant problem with the syntax of Mandarin modals concerns the flexible ordering of these modals with respect to the surface subject:

- (1) a. *Pre-subject modal sentence*
yinggai^{epis} Zhangsan xiang jia le
should Zhangsan miss home SP
‘It should be the case that Zhangsan misses home now.’
- b. *Post-subject modal sentence*
Zhangsan yinggai^{epis} xiang jia le
Zhangsan should miss home SP
‘Zhangsan should miss home now.’

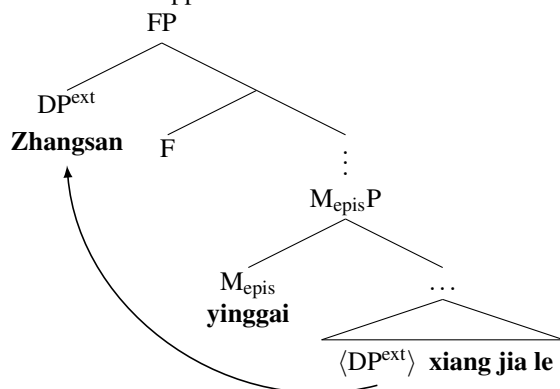
Cases involving single modals like (1a–b) have been well studied, and the common consensus is that modals are in their base position, and that post-subject modals are

The data reported in this squib have been cross-checked with five native speakers of Mandarin via direct elicitation (three naïve and two with a linguistics background, who are from Chongqing, Jiangsu, Shanghai and Sichuan; gender: two male and three female; age range: 21 – 56). Names of consultants to be included.

Address(es) of author(s) to be included.

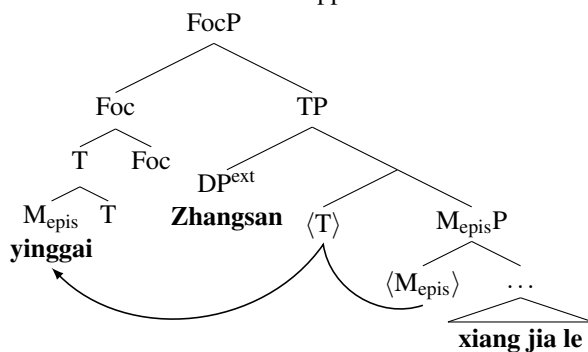
the result of XP-movement of the subject past the modal (see J.-W. Lin and Tang 1995; Tsai 2010, 2015; Lin 2011, 2012; Chou 2013 among others), which is taken to instantiate *raising* (e.g. Lin 2011, 2012; Chou 2013) or to always instantiate *topicalisation* (e.g. Tsai 2010, 2015). This general line of analysis will be referred to as the XP-MOVEMENT APPROACH.

(2) XP-movement approach



In contrast, Hsu (2019) recently pursues an interesting approach that differs from the previous analyses in deriving the pre-subject modal sentence *from* the post-subject modal one, such that the former will involve head movement of the modal to a left-peripheral X^0 -position (more specifically, Foc^0):

(3) Traditional head-movement approach



In this squib, we complicate the existing empirical picture by bringing in and exploring the implications of a hitherto neglected set of facts involving multiple pre-subject modals for the analysis of Mandarin modal constructions:

- (4) **yinggai**^{epis} **keneng**^{epis} ta erzi shou shang le
 should may 3.SG son receive injury SP
 ‘It should be the case that his son may have become injured.’
- (5) **keneng**^{epis} **bixu**^{deon} women yiqi gongzuo le
 may must 1PL together work SP

‘It may be the case that we must work together now.’

- (6) **yinggai**^{epis} **dei**^{deon} Huang laoshi shuo hua le
 should must Huang teacher say speech SP
 ‘It should be the case that Teacher Huang must speak now.’

These facts are significant for various reasons. For one thing, the data considered in Lin (2012), the first and only detailed study of the syntax of Mandarin multiple-modal constructions, exclusively involve multiple *post-subject* modals. As we will demonstrate, the current facts indicate that a traditional head-movement analysis is untenable, and that the existing XP-movement approaches cannot be maintained. For another, the observation that Mandarin permits multiple modals in pre-subject position now lends plausibility to yet another approach whereby pre-subject modal sentences are derived via modal movement to SpecFocP (cf. Toyoshima 2001). In what follows, we aim to pursue and develop such a novel idea.

Before we proceed further, it is worth noting that a reviewer does not accept the examples in (4)–(6), or any multiple pre-subject modal examples for that matter. Naturally occurring examples, however, are easily attested, and exist in abundance:

- (7) qun-li kending hui you bensen jiu bijiao huoyue de xinsheng.
 group-inside certainly will have self then more active DE new-student
yinggai^{epis} **keneng**^{epis} tamen ye you yishi-dao zai xinsheng qun
 should may 3PL also have realise at new-student group
 duo shua-shua cunzai-gan rang tongji de xinsheng
 more brush-brush presence-sense let same-class DE new-student
 jizhu ziji shi hao-shi
 remember self be good-thing
 ‘Within the group, there will certainly be new students who are more active by their nature. It should be the case that they may have also realised that crafting their sense of presence more in the group of new students so as to let new students of the same class remember them is a good thing.’
<http://www.zhuhu.com/question/340421762/answer/787529490>
- (8) suoyi wo yeye kai de gongsi **keneng**^{epis} **bixu**^{deon} wo dali
 so 1SG grandfather open DE company may must 1SG manage
 yixia
 somewhat
 ‘So the company founded by my grandfather, it may be the case that I must somewhat manage (it).’
http://wap.bequgexs.com/94_94221/35482220_2.html
- (9) wo ye mei wen, wo xiang-zhe zhe-zhong shi **yinggai**^{epis} **dei**^{deon}
 1SG also NEG ask 1SG think-DUR this-CL matter should must
 ta ziji shuo
 3SG self say
 ‘I didn’t ask either; I have been thinking that this kind of matter, it should be the case that he must speak about (it) himself.’
<http://zhuanlan.zhuhu.com/p/405929060>

We leave open whether there indeed exists variation among speakers of Mandarin, and if so, whether it can (or should) be characterised in terms of dialects or regions. What is significant to note from this perspective is that the grammars of speakers who accept and those who reject multiple pre-subject modal sentences *can* in fact both be straightforwardly accommodated under the current proposal (see Sect. 3.4 for further discussion).

This squib is structured as follows. Section 2 introduces the main background assumptions as well as the current proposal, and Section 3 offers related arguments. In Section 4, two alternative accounts are discussed. Section 5 demonstrates how our proposal can be refined to deal with some examples raised by a reviewer. Section 6 is the conclusion.

2 The proposal: Head-to-Spec movement

The account to be proposed below builds on Harizanov and Gribanova's (2019; hereafter 'H&G') recent proposal that there are in fact two distinct classes of phenomenon that fall within the traditional realm of head movement, which should be captured by distinct grammatical operations. Many instances of what is previously described as head movement in fact involve *postsyntactic amalgamation*. This operation produces head-adjunction structures, is morphology-driven, and cannot possibly yield any interpretive effect. On the other hand, bona fide instances of *head movement* that occurs in the syntax do not produce adjunction structures, are not driven by morphology, and may yield effects on interpretation.

It is long observed that there are instances of head movement that appear puzzling from the perspective of the Head Movement Constraint (hereafter 'HMC'). For instance, verb-fronting in a number of Slavic languages, including Bulgarian participle fronting, is known to be able to skip intervening heads (Lema and Rivero 1989; Rivero 1991; Lambova 2004). At that time, such phenomena were commonly taken to counter-exemplify the HMC, and the term 'long head movement' was coined to refer to the movement operation involved in (10b).

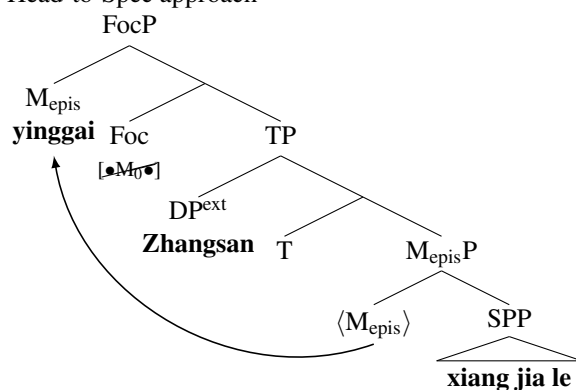
- (10) a. *šte si bila pročela knigata* [Bulgarian]
 FUT be-2.SG been-FEM read-FEM book-the
 'You will have read the book.' (Embick and Izvorski 1997, ex. (30a))
- b. *pročela_i šte si bila —_i knigata* [Bulgarian]
 read-FEM FUT be-2.SG been-FEM book-the
 (ibid., ex. (30c))

However, the fact that 'head movement' should observe the HMC is also suspect from a minimalist perspective, since it does not obey the Extension Condition (Chomsky 1995), unlike other instances of narrow-syntactic movement. The main significance of H&G's shift of perspective is that there is in fact nothing inherently special about head movement per se; *genuine* instances of head movement indeed obey the Extension Condition. Accordingly, the fact that head movement should target a specifier position is completely unsurprising, and constitutes the default state of affairs (see also Toyoshima 2001; Matushansky 2006; Harizanov 2019 among others). It also follows

that head movement does *not* actually observe the HMC, a requirement which only stems from misunderstandings at the time. Rather, it is postsyntactic amalgamation that is actually subject to the stringent locality requirement.

We therefore propose that post-subject modals, as heads, move directly from their base position to SpecFocP in Mandarin. To execute the idea, we assume, à la Heck and Müller (2007), the existence of the structure-building feature [**•F•**] that triggers movement of the goal to a specifier of the head that bears such a feature. Furthermore, the structure-building feature can be further specified with the diacritic ‘0’ or ‘2’ (Müller 2017, 2018), such that, respectively, only the minimal or maximal projection of the category feature F constitutes the relevant goal. In the current case, modal movement is induced by the [**•M₀•**] feature on the null functional head Foc⁰, as the following example derivation illustrates (to be further refined in Sect. 5):

(11) Head-to-Spec approach



The null Foc⁰ in this case may encodethetic focus (Hsu 2019). Hsu observes that pre-subject modal sentences readily occur in contexts that call for a *thetic focus* structure (in Lambrecht’s 1994 terminology) where the entire proposition is focussed. For instance, (12b) as compared to (12a) is infelicitous in the given context:

(12) [Context: The doorbell rings.]

- a. yinggai^{epis} Zhangsan mai pisa huilai-le
 should Zhangsan buy pizza return-PFV
 ‘It should be the case that Zhangsan has bought pizzas and now returned.’
- b. #Zhangsan yinggai^{epis} mai pisa huilai-le
 Zhangsan should buy pizza return-PFV
 ‘Zhangsan should have bought pizzas and now returned.’

(Hsu 2019:24, ex. (10))

A reviewer notes the following example and ‘wonder[s] how athetic focus is compatible with a subject focus’:

- (13) yinggai^{epis} shi Zhangsan mai pisa huilai-le
 should FOC Zhangsan buy pizza return-PFV

‘It should be the case that it is Zhangsan who has bought pizzas and now returned (but not some other person, say, Lisi).’

Notice, however, that (13) does not involve the null Foc^0 of current interest, but a distinct Foc^0 (i.e. *shi*). Accordingly, the example does not bear on the null Foc^0 . Instead, we believe the reviewer’s example shows that the focus marker *shi* can likewise bear at least one instance of $[\bullet\text{M}_0\bullet]$ (in fact more, and hence, our proposal is actually more general than we thought). The fact that (13) may express subject focus is then not unexpected, since this is how focus association normally works with *shi*.

It is also worth clarying that while an X^0 is targeted for movement in our proposal, the movement is expected to pattern with *phrasal* movement in its behaviour, given that the same operation (i.e. MERGE) is involved. Recently, Arregi and Pietraszko (to appear) argue forcefully that an ontology of movements based on movement targets (i.e. the type of moved element, which in this case is X^0) as in the traditional GB conception would lead to a number of wrong predictions (see also Hein 2018; Harizanov and Gribanova 2019). Simplifying, a more accurate ontology of movements should be defined based on the type of landing site that the movement targets, rather than the type of element targeted for movement.¹

3 Supporting arguments

To our knowledge, the proposal just presented has not been defended or even considered in previous literature. In this section, we present arguments in its favour, and, where relevant, provide further technical details of the current proposal.

3.1 The absence of HMC effects

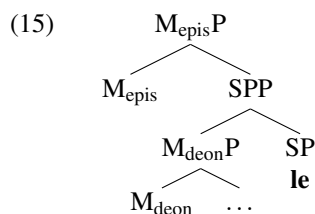
One argument for the proposed Head-to-Spec account is that modal displacement in fact does *not* observe locality restrictions such as the HMC. Erlewine (2017) notes that the sentence particle (SP) *le* scopes below epistemic but above deontic and dynamic modals. Consider:

- (14) The SP *le* scopes above the deontic modal *bixu* but below the epistemic modal *keneng*
- a. Zhangsan *bixu*^{deon} qu Taipei le [LE > MUST; *MUST > LE]
 Zhangsan MUST go Taipei LE
Asserts: ‘Zhangsan must go to Taipei.’
Presupposes: ‘Zhangsan need not go to Taipei in the immediate past.’
 (i) ‘It has become the case that Zhangsan must go to Taipei.’
 (ii) *‘Zhangsan must have gone to Taipei.’
- b. Zhangsan *keneng*^{epis} qu Taipei le [*LE > MAY; MAY > LE]
 Zhangsan MAY go Taipei LE
Asserts: ‘Zhangsan may have gone to Taipei.’
Presupposes: ‘Zhangsan had not gone to Taipei in the immediate past.’

¹ In fact, this is not the typology of movements that Arregi and Pietraszko (to appear) propose, but nonetheless suffices for current purposes.

- (i) *‘Zhangsan is able to have gone to Taipei.’
 (ii) ‘Zhangsan may have gone to Taipei.’
 (Erlewine 2017:49, ex. (23b))

It follows that the SP projection headed by *le* is situated between the epistemic modal and the denotic/dynamic modal projections:

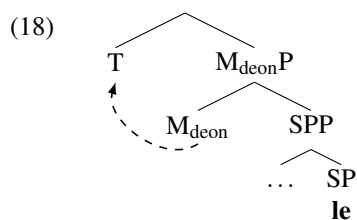


Now, displacement of a denotic modal in the presence of *le* does *not* result in ungrammaticality:

- (16) **bixu**^{deon} Zhangsan qu Taipei **le**
 must Zhangsan go Taipei SP
 ‘It has become the case that Zhangsan must go to Taipei.’
- (17) **yinggai**^{deon} wo mai pisa **le**
 should 1SG buy pizza SP
 ‘It has become the case that I should buy pizzas.’

The well-formedness of these examples (not noted in Hsu 2019) is unexpected under the traditional head-movement approach, since their derivations would accordingly involve the skipping of the SP headed by *le* by the deontic modal. By contrast, the fact that (16)–(17) is grammatical falls out from our proposal, since modal displacement is triggered by the structure-building feature [$\bullet M_0 \bullet$]. Accordingly, the SP *le*, which does not bear the category feature [M(odal)], does not constitute a potential goal.

As a reviewer points out, the traditional head-movement approach could obviate the current HMC problem if one abandons the assumption that the relative scope of *le* and deontic modals is computed on the basis of c-command. The reviewer might have in mind the following structure:



We leave it to proponents of the traditional head-movement approach to come up with an alternative theory of scope that could correctly distinguish between the two cases in (14), where the deontic modal *bixu* and the epistemic modal *keneng* both linearly precede *le*. But even if such a theory is formulable, one piece of evidence against (18)

is that the deontic modal forms a constituent with the verb phrase to the exclusion of *le*.

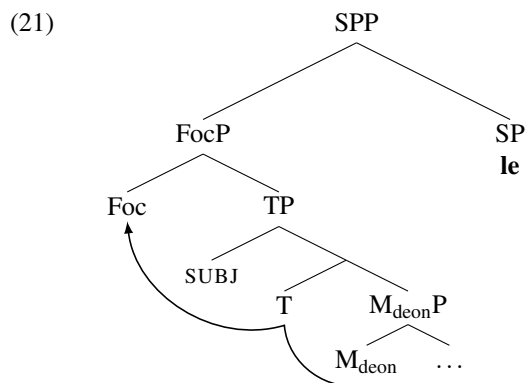
- (19) A1: ta mingtian bixu^{deon} zhunbei pisa le
 3SG tomorrow must prepare pizza SP
 ‘By tomorrow, it will have become the case that he must prepare pizzas.’
 B1: shenme? wo ting bu qingchu. ta mingtian zenme le?!
 what 1SG hear NEG clear 3SG tomorrow how SP
 ‘What? I didn’t catch that. By tomorrow, it will have become the case that he what?!’
 A2: bixu^{deon} zhunbei pisa!
 must prepare pizza
 ‘Must prepare pizzas!’

As (19A2) shows, a deontic modal and the verb phrase may stand alone. In contrast, an epistemic modal and the exact same verb phrase may not, as (20A2) indicates:

- (20) A1: ta zuotian keneng^{epis} zhunbei pisa le
 3SG yesterday may prepare pizza SP
 ‘He may have prepared pizzas yesterday.’
 B1: shenme? wo ting bu qingchu. ta zuotian zenme le?!
 what 1SG hear NEG clear 3SG yesterday how SP
 ‘What? I didn’t catch that. He what yesterday?!’
 A2: *keneng^{epis} zhunbei pisa!
 may prepare pizza
 A2’: keneng^{epis} zhunbei pisa le!
 may prepare pizza SP
 ‘May have prepared pizzas!’

Instead, one must repeat *le* as in (20A2’). As is clear, results of the current standalone/sentence fragment test are consistent with (15) but not (18).

On the other hand, the following structure would obviate the HMC problem, while maintaining the standard syntax–semantics mapping:



This structure assumes that the SP *le* is situated in the high CP-region, as proposed in Paul (2014) and others (cf. Erlewine 2017, which recently offers arguments that *le* is situated low in the vP-region). The grammaticality of the following example, however, indicates that small-size coordination to the exclusion of the surface subject is possible (crucially, both coordinates contain the SP *le*):²

- (22) ta ji [yinggai^{deon} zhao gongzuo le], ye [yinggai^{deon} yang jia le]
 3SG both should find work SP also should raise home SP
 ‘It has become the case that he should look for a job, and it has also become the case that he should support his family.’

The traditional head-movement approach, furthermore, faces additional problems when it is extended to cover *multiple* pre-subject modal sentences, as we will demonstrate in the next section.

3.2 Order preservation effects

Another argument is that the current proposal readily accommodates the existence of multiple pre-subject modal sentences noted in the Introduction (recall (4)–(6)). We take these facts to indicate that the null Foc^0 can bear one or more instances of the structure-building feature [$\bullet\text{M}_0\bullet$]. For explicitness, we assume Chomsky’s (1995) conception of cyclicity:

- (23) *Featural Cyclicity* (based on Richards 2001:38)
 A feature must be discharged as soon as it is introduced into the derivation.

Moreover, we assume that syntactic dependencies like movement observe Shortest, as defined below:

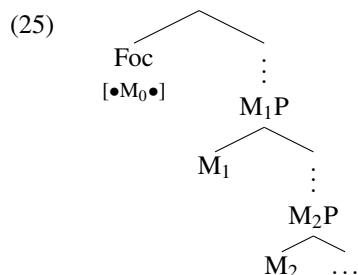
- (24) *Shortest* (Richards 2001:98)
 A dependency between the members of a pair P of elements $\{\alpha, \beta\}$ obeys Shortest iff no well-formed dependency could be created between the members of a pair P', created by substituting γ for either α or β , such that the set of nodes c-commanded by one element of P' and dominating the other is smaller than the set of nodes c-commanded by one element of P and dominating the other.

Importantly, Shortest regulates both the relation between attractor and attractee and the relation between two copies of a moved element (i.e. it subsumes both ‘Shortest Attract’ and ‘Shortest Move’).

² The use of the discontinuous coordinator *ji...ye* helps preclude ATB subject extraction, since it is a category-sensitive coordinator that does not conjoin full clauses:

- (i) *ji [ta yinggai^{deon} zhao gongzuo le], ye [ta yinggai^{deon} yang jia le]
 both 3SG should find work SP also 3SG should raise home SP
 Intended: ‘It has become the case that he should look for a job, and it has also become the case that he should support his family.’

The combination of these two assumptions yields desirable consequences. Consider first a case where Foc^0 bears one instance of $[\bullet\text{M}_0\bullet]$ and more than one modal is present in the structure:

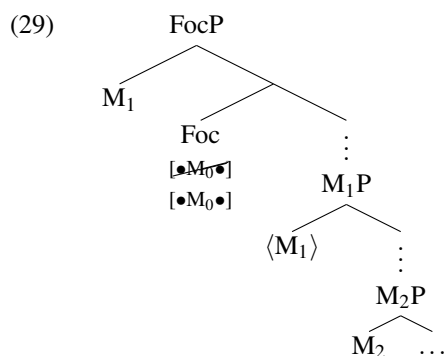


Given Featural Cyclicity, Foc^0 , upon entering the derivation, must immediately discharge its structure-building feature. In this case, it might target either M_1^0 or M_2^0 for movement. If it attracts M_2^0 , Shortest will not be obeyed since the attraction of the higher M_1^0 (which *is* licit) would involve a shorter ‘path’ (i.e. the set of nodes c-commanded by Foc^0 and dominating M_1^0 is a proper subset of, hence *smaller* than, the set of nodes c-commanded by Foc^0 and dominating M_2^0 , due to the fact that (at least) the node ‘ M_2P ’ is an element of the latter, but not the former, set). Accordingly, attraction of M_2^0 is blocked. Indeed, only the highest modal can be displaced to a pre-subject position (an instance of ‘Shortest Attract’):

- (26) a. **yinggai**₁^{epis} ta erzi —₁ **keneng**^{epis} shou shang le
 should 3.SG son may receive injury SP
 ‘It should be the case that his son may have become injured.’
 b. ***keneng**₁^{epis} ta erzi **yinggai**^{epis} —₁ shou shang le
 may 3.SG son should receive injury SP
- (27) a. **keneng**₁^{epis} women —₁ **bixu**^{deon} yiqi gongzuo le
 may 1PL must together work SP
 ‘It may be the case that we must work together now.’
 b. ***bixu**₁^{deon} women **keneng**^{epis} —₁ yiqi gongzuo le
 must 1PL may together work SP
- (28) a. **yinggai**₁^{epis} Huang laoshi —₁ **dei**^{deon} shuo hua le
 should Huang teacher must say speech SP
 ‘It should be the case that Teacher Huang must speak now.’
 b. ***dei**₁^{deon} Huang laoshi **yinggai**^{epis} —₁ shuo hua le
 must Huang teacher should say speech SP

Now, consider a derivation where Foc^0 bears two instances of the structure-building feature $[\bullet\text{M}_0\bullet]$, one of which has already been discharged:³

³ To be even more explicit, we assume that features on a lexical item are ordered (à la Müller 2010), such that when Foc^0 bears two or more structure-building features of the same kind, they are discharged one at a time.



At this point, only one potential goal exists (i.e. M_2^0), and Featural Cyclicity as is in fact says nothing about whether this goal should land in a specifier position higher or lower than the one just created by M_1^0 (or whether both options are possible). Nonetheless, given Shortest, M_2^0 is required to move to a position *below* M_1^0 , rather than above, since the ‘path’ (which can be understood in terms of the set of nodes c-commanded by the the higher copy and dominating the lower copy) involved in the former will again be shorter than the one involved in the latter. Put differently, M_2^0 must ‘tuck in’ (in Richards’ 2001 terminology) below M_1^0 (an instance of ‘Shortest Move’).

It thus follows that pre-subject modals in a multiple-modal sentence *must* preserve their base order.⁴ This prediction is borne out:

(30) **yinggai**^{epis} **keneng**^{epis} ta erzi shou shang le = (4)
 should may 3.SG son receive injury SP
 ‘It should be the case that his son may have become injured.’

(31) **keneng**^{epis} **bixu**^{deon} women yiqi gongzuo le = (5)
 may must 1PL together work SP
 ‘It may be the case that we must work together now.’

(32) **yinggai**^{epis} **dei**^{deon} Huang laoshi shuo hua le = (6)
 should must Huang teacher say speech SP
 ‘It should be the case that Teacher Huang must speak now.’

The ordering of modals in these pre-subject modal sentences is identical to that found in the base examples:

(33) ta erzi **yinggai**^{epis} **keneng**^{epis} shou shang le
 3.SG son should may receive injury SP
 ‘It should be the case that his son may have become injured.’

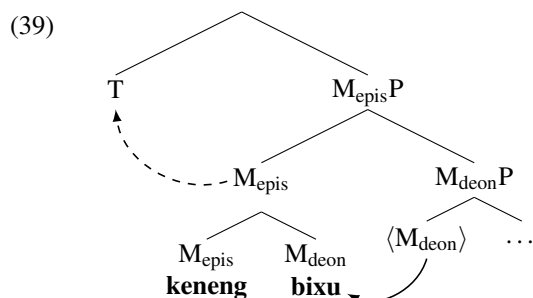
⁴ The question of whether the so-called epistemic modals are in fact adverbs is not new. In fact, Lin (2012) also faces the same question from a reviewer who questions the status of epistemic modals, and devotes an entire section to addressing the question. Chou (2013), who adopts the same assumption as Lin’s, also addresses a similar concern in a footnote. We refer the interested reader to Lin (2012, section 4) and Chou (2013, footnote 7) for further discussion on why epistemic modals are not adverbs. See also J.-W. Lin and Tang (1995).

- (34) women **keneng**^{epis} **bixu**^{deon} yiqi gongzuo le
 1PL may must together work SP
 ‘It may be the case that we must work together now.’
- (35) Huang laoshi **yinggai**^{epis} **dei**^{deon} shuo hua le
 Huang teacher should must say speech SP
 ‘It should be the case that Teacher Huang must speak now.’

And the following sentences are ungrammatical:

- (36) ***keneng**^{epis} **yinggai**^{epis} ta erzi shou shang le
 may should 3.SG son receive injury SP
- (37) ***bixu**^{deon} **keneng**^{epis} women yiqi gongzuo le
 must may 1PL together work SP
- (38) ***dei**^{deon} **yinggai**^{epis} Huang laoshi shuo hua le
 must should Huang teacher say speech SP

In our account, then, the current order preservation effect follows naturally from the way Featural Cyclicity and Shortest interact. By contrast, under the traditional head-movement approach, the only viable way to generate sentences like (30)–(32) is to assume that a Mandarin modal can freely right-adjoin to any higher modal to form an X^0 -complex.



There are at least two problems with such an analysis. The first problem is that the movement seen in (39) goes against the commonplace assumption that Mandarin head movement always involves left-adjunction (Lin 2001; Paul and Whitman 2010; Huang 2015; see also Kayne 1994 for a theoretical proposal that head-adjunction can only be to the left). Even in the case of verb–object compounds, whose formation involves head movement when disyllabic compound components are involved (Author 2016), the N–V order is observed:

- b. ?*kakvo kogo e pital Ivan? [Bulgarian]
 what whom is asked Ivan
 (ibid.:239, ex. (20b))
- (47) a. koj kogo kakvo e pital? [Bulgarian]
 who whom what is asked
 ‘Who asked whom what?’ (ibid.:239, ex. (20c))
- b. koj kakvo kogo e pital? [Bulgarian]
 who what whom is asked
 (ibid.:239, ex. (20d))

Bošković (1998) proposes that the ordering freedom seen in (47) arises in Bulgarian because in fact only one *wh*-phrase checks the strong [+*wh*] feature on C^0 . All *wh*-phrases have to undergo obligatory fronting, however, not because C^0 requires it, but because every *wh*-phrase itself bears a strong [+focus] feature (the [+focus] feature on the interrogative C^0 is weak). Because Economy requires that the strong [+*wh*] feature on C^0 be checked through the shortest movement possible, it will be checked by the highest *wh*-phrase. In contrast, Economy does not require a particular order in which the remaining *wh*-phrases check their strong [+focus] features, as the same number of nodes (more specifically, maximal projections) will be crossed regardless of the way in which focus movement proceeds (see also Bošković 1999).⁶

Mandarin does not exhibit such an ordering freedom, however. Regardless of the number of modals being displaced, the order of the pre-subject modals remains rigid and their base order must be preserved.⁷

- (48) a. **yinggai**^{epis} **keneng**^{epis} **keyi**^{deon} women yiqi qu chi fan
 should may can 1PL together go eat rice
 ‘It should be the case that we may be allowed to go to have a meal together.’
- b. ***yinggai**^{epis} **keyi**^{deon} **keneng**^{epis} women yiqi qu chi fan
 should can may 1PL together go eat rice
- (49) a. **keneng**^{epis} **yinggai**^{deon} **dei**^{deon} Zhangsan lai
 may should must Zhangsan come
 ‘It may be the case that it should be the case that Zhangsan must come.’
- b. ***keneng**^{epis} **dei**^{deon} **yinggai**^{deon} Zhangsan lai
 may must should Zhangsan come

We take the absence of an ordering flexibility with respect to the triple pre-subject modals as further support for our assumption that Foc^0 may bear more than one instance of the structure-building feature [$\bullet M_0 \bullet$]. This is because if modal movement

⁶ The Bulgarian facts also fall under Richards’ (1997, 1998) Principle of Minimal Compliance. The basic idea is that once a constraint is obeyed once, the part of the structure where the constraint is obeyed can then tolerate subsequent violations of the constraint. We refer the interested reader to Richards’ work for details, and leave open how the Principle might be reconciled with the observed Mandarin facts.

⁷ A reviewer wonders whether factors like topicality might have an effect on the order of the pre-subject modals (see Jaeger 2004; Krapova and Cinque 2005; Scott 2012 on such effects with multiple *wh*-movement in some languages). No such effect has been found. We thank the reviewer for raising this question.

is indeed target-driven rather than moving-element-driven as we propose, then each instance of [$\bullet M_0 \bullet$] on Foc^0 must be discharged in a way that conforms to Featural Cyclicity and Shortest.⁸ Notice also that unlike the case of Bulgarian *wh*-phrases, movement of Mandarin modals is ‘optional’, such that in a multiple-modal structure, it is possible to front only some but not all of the modals to a pre-subject position (recall the (a) examples in (26)–(28), for instance).

3.4 A place for potential cross-dialectal variation

A reviewer notes that *s/he* and the native speakers *s/he* consulted do not accept any sentence containing multiple pre-subject modals. If this fact is real, we will then have yet another argument *for* the current proposal over the traditional head-movement approach. This is because in our account, the main difference between grammars that permit and those that reject multiple pre-subject modal sentences can simply be traced to the lexical properties of the left-peripheral Foc^0 in question: for one group of speakers, Foc^0 may bear one or more instances of [$\bullet M_0 \bullet$], while for another group of speakers, it may bear at most one instance of [$\bullet M_0 \bullet$]. Our account can thus explain any potential variation in the current domain in a unified and elegant manner. By contrast, because the traditional head-movement approach is inherently unable to accommodate the possibility of multiple pre-subject modals, for the reasons outlined above, a non-uniform analysis is thus required to capture the two grammars (not to mention the possibility that, in the end, we might still need something like the current Head-to-Spec approach to capture the more permissive grammar).

4 Alternatives

4.1 The XP-movement approach

So far, the arguments offered in the previous section all militate against the traditional head-movement approach: as we have shown, some derivations will accordingly (i) incur an HMC violation; (ii) involve rightward head-adjunction; and/or (iii) the formation of an X^0 -complex, and moreover, (iv) it leaves no room for potential cross-dialectal variation. There is thus enough reason not to pursue a traditional head-movement analysis further. Significantly, the current neglected multiple modal data also cast doubt on the *existing* XP-movement approaches that take the pre-subject modal sentence as more basic. Consider (50), for instance, which exemplifies the derivation of a multiple post-subject modal sentence under Lin’s (2012) XP-movement account (which extends the theory proposed in Lin 2011).

⁸ Bošković (1999) offers an alternative way of implementing focus movement that is also target-driven. In particular, whereas the *wh*-feature on the Bulgarian interrogative C^0 has the ‘Attract-1F’ property, the focus feature has instead the ‘Attract-all-F’ property. Accordingly, each instance of [$\bullet M_0 \bullet$] that the Mandarin Foc^0 bears will be of the ‘Attract-1F’ type.

- (50) [TP ta_i T_{FIN} [VP keneng [TP t_i T_{FIN} [VP keyi [TP PRO_i T_{NONFIN} jin
3SG may can enter
xiancheng]]]]]]
town
'It may be the case that she can enter the town.'

Notice that deontic modals like *keyi* are assumed to take a nonfinite TP complement. One question that arises is thus how multiple pre-subject modal examples like (51) can be accommodated under Lin's account:

- (51) **keneng**^{epis} **keyi**^{deon} {ta / Lisi} jin xiancheng
may can 3SG Lisi enter town
'It may be the case that {she/Lisi} can enter the town.'

To accommodate such examples, one might assume that the Mandarin PRO can be overtly realised. The issue, however, is that such an option is *not* otherwise available in the language, as Huang (1989) notes (notice that PRO is standardly invoked in analysing the following examples):

- (52) *wo bi Lisi [**ta** lai]
1SG force Lisi 3SG come
Intended: 'I forced Lisi to come.' (Huang 1989:190, ex. (13))
- (53) *Lisi shefa [**ta** lai]
Lisi try 3SG come
Intended: 'Lisi tried to come.' (ibid.:190, ex. (14))

As discussed in Zhang (2016), overt controllees in Mandarin are extremely restricted: they could be what Zhang calls a '*cpro*' like *ta yi-ge ren*, but not a simple pronominal like *ta* or a lexical DP like *Lisi* as in (51).

On the other hand, Tsai (2015) proposes a different XP-movement account within the cartographic framework, where the subject of a multiple post-subject modal sentence has undergone topicalisation.

- (54) [TopP ta_i Top [M_{epis}P keneng [TP t_i T [M_{deon}P keyi jin xiancheng]]]]
3SG may can enter town
'It may be the case that she can enter the town.'

In order for this account to accommodate sentences like (51), one must now subscribe to the view that the external argument may remain in Spec-*vP* in Mandarin. However, the following contrast suggests that the external argument (when present) must obligatorily raise to Spec-TP in an active sentence.

- (55) a. Zhangsan you qipian-le Lisi
 Zhangsan again deceive-PFV Lisi
 ‘Zhangsan deceived Lisi again.’
 b. *you Zhangsan qipian-le Lisi
 again Zhangsan deceive-PFV Lisi

Crucially, the following example indicates that the adverbial *you* ‘again’ is base-generated *outside* vP.

- (56) Lisi <you> bei Zhangsan <*you> qipian-le
 Lisi again PASS Zhangsan again deceive-PFV
 ‘Lisi was deceived by Zhangsan again.’

In Liu and Huang’s (2016) latest analysis of Mandarin passives, which improves on Huang (1999), the post-BEI phrase (e.g. *Zhangsan* in (56)) occupies Spec-vP.⁹

Furthermore, an XP-movement analysis must explain why the pre-subject modal counterparts of certain post-subject modal sentences are ungrammatical.

- (57) a. Zhangsan **hui**^{fut} zhunbei wancan
 Zhangsan will prepare dinner
 ‘Zhangsan will prepare the dinner.’ (Lin 2011:50, ex. (7))
 b. ***hui**^{fut} Zhangsan zhunbei wancan
 will Zhangsan prepare dinner
 Intended: ‘Zhangsan will prepare the dinner.’ (ibid.:50, ex. (6))

While it might be the case that modals like *hui* differ from other modals in obligatorily bearing an edge feature, one major problem with this view is that the exact same future modal *can* appear in pre-subject position in certain environments.

- (58) **hui**^{fut}-**bu-hui**^{fut} Zhangsan zhunbei wancan?
 will-NEG Zhangsan prepare dinner
 ‘Will Zhangsan prepare the dinner?’ (ibid.:69, ex. (76))

Recently, Yip and Lee (2020) propose an account whereby modal movement is possible only if it has a semantic effect, generalising the idea of scope economy in Fox (2000). Their account is thus similar to ours in the sense that pre-subject modal sentences are derived from post-subject modal ones (although they have not explicitly addressed the question of where a moved modal exactly lands). If their explanation is basically correct, and no comparable explanation for the current data set is available under the XP-movement approach (which assumes the reverse derivational relation), the results of their work will then constitute an important argument against such an approach in general.

⁹ A reviewer notes that our account would predict sentences containing the adverbial *you* ‘again’ and a pre-subject modal to exhibit the order ‘modal-SUBJ-*you*-XP’. This is indeed correct:

- (i) keneng^{epis} Lisi you bei Zhangsan qipian-le
 may Lisi again PASS Zhangsan deceive-PFV
 ‘It may be the case that Lisi was deceived by Zhangsan again.’

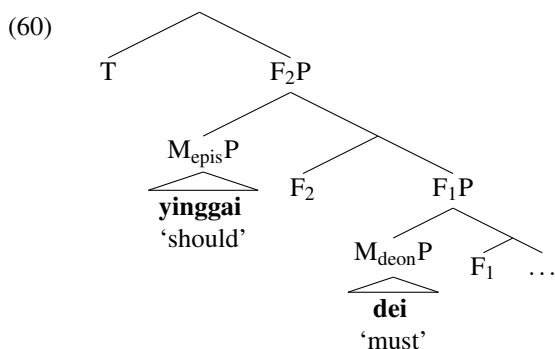
In this respect, a reviewer points out examples like the following:

- (59) a. Zhangsan **yinggai**^{epis} **keneng**^{epis} **hui**^{future} **nenggou**^{dynamic} lai
 Zhangsan should may will can come
 ‘It should be the case that it is likely that Zhangsan will be able to come.’
 (Lin 2012:152, ex. (4))
- b. ***yinggai**^{epis} **keneng**^{epis} **hui**^{future} **nenggou**^{dynamic} Zhangsan lai
 should may will can Zhangsan come

It is worth emphasising that there is a way to make sense of these and other similar examples under our proposal. Because the modal *hui* (in its bare form) independently cannot appear in pre-subject position, as seen in (57b), it is hence unsurprising that (59b) should also be bad. The point is that the central idea pursued in Yip and Lee (2020) is *not* incompatible with the current Head-to-Spec approach: their ‘generalised scope economy’, for instance, can be implemented as an LF constraint in our account. As a reviewer correctly notes, our syntax indeed overgenerates.¹⁰

4.2 Modals as maximal projections

A reviewer remarks that the fact that modal movement targets specifiers would be hardly surprising if modals are themselves maximal, rather than minimal, projections. The reviewer might have in mind the following structure:



In this respect, it is worth noting that our proposal is no different from the major existing works in taking Mandarin modals to be minimal projections (J.-W. Lin and Tang 1995; Huang, Li and Li 2009; Lin 2011, 2012; Chou 2013; Yip and Lee 2020). Ascertaining the exact status of Mandarin modals, however, has turned out to be a rather tricky issue, and helpful diagnostics are hard to come by.¹¹ We thus simply

¹⁰ Notice that in order to uphold the alternative where examples like (57b) and (59b) are directly excluded in the syntax, one would have to assume that semantics is directly relevant to syntax, that ‘scope considerations’ (whatever this means) can drive syntactic movement, and/or that the modal movement in question is not feature-driven.

¹¹ One potentially relevant fact is that Mandarin modals can appear in A-not-A form, e.g. *ying-bu-ying-gai* ‘should-NEG’; *dei-bu-dei* ‘must-NEG’ (Chao 2011:749). Notice also that the A-not-A form is possible with words belonging to different categories: *xi-bu-xi-huan* ‘like-NEG’; *piao-bu-piao-liang* ‘pretty-NEG’;

note here that if the current results should instead constitute support for the claim that Mandarin modals are maximal projections, this work will likewise have advanced our understanding of the syntax of Mandarin modals, for this is at odds with most, if not all, of previous authors' assumption that Mandarin modals are minimal projections.

5 Further refinement

Finally, it is worth examining some data which a reviewer takes to 'argue against the proposed approach'. We will demonstrate that these data only reflect an additional constraint at work, which thus simply suggests that the proposal presented thus far is in need of refinement. Because a coherent explanation *is* available under the current proposal, such data in no way argue against the Head-to-Spec approach in general. Consider the following triplets:

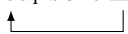
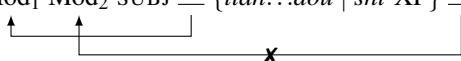
- (61) a. Lisi **keneng**^{epis} lian xuesheng daikuan dou **bixu**^{deon} **dei**^{deon} ti ta
 Lisi may LIAN student loan DOU must must for 3SG
 zhangfu fu
 husband pay
 'It may be the case that Lisi must have to pay the student loans for her husband.'
- b. **keneng**^{epis} Lisi lian xuesheng daikuan dou **bixu**^{deon} **dei**^{deon} ti ta
 may Lisi LIAN student loan DOU must must for 3SG
 zhangfu fu
 husband pay
 'It may be the case that Lisi must have to pay the student loans for her husband.'
- c. ***keneng**^{epis} **bixu**^{deon} **dei**^{deon} Lisi lian xuesheng daikuan dou ti ta
 may must must Lisi LIAN student loan DOU for 3SG
 zhangfu fu
 husband pay
- (62) a. ta **keneng**^{epis} shi zuotian cai **dei**^{deon} lai Taipei de
 3SG may FOC yesterday CAI must come Taipei DE
 'It may be only yesterday that he is required to come to Taipei.'
- b. **keneng**^{epis} ta shi zuotian cai **dei**^{deon} lai Taipei de
 may 3SG FOC yesterday CAI must come Taipei DE
 'It may be only yesterday that he is required to come to Taipei.'
- c. ***keneng**^{epis} **dei**^{deon} ta shi zuotian cai lai Taipei de
 may must 3SG FOC yesterday CAI come Taipei DE

At the outset, it is worth noting that that these data are offered by the same reviewer who rejects *any* multiple pre-subject modal sentence in the first place, and thus the

ba-bu-ba 'BA-NEG'; *bei-bu-bei* 'PASS-NEG'; *zai-bu-zai* 'at-NEG'. Crucially, the following examples (either specifiers or adjuncts) are ill-formed: **man-bu-man-de* 'slowly-NEG'; **fei-bu-fei-chang* 'extremely-NEG'; **dao-bu-dao-di* 'after all-NEG'. We leave to future work whether this fact can indeed be turned into a piece of evidence for the claim that Mandarin modals are minimal projections.

explanation for the reviewer’s own judgement on (61c) and (62c) would be straightforward. Nonetheless, it turns out that our consultants are hesitant to accept these two examples either, and thus the current data deserve further attention.

The purported problem is that since the modals *keneng*, *bixu* and *dei* can all independently occur in pre-subject position, the question is why (61c) and (62c) should be ungrammatical. The relevant difference between the (b) and (c) examples can be illustrated in schematic form as follows:

- (63) a. Mod₁ SUBJ — {*lian...dou* | *shi*-XP} Mod₂ ...

 b. Mod₁ Mod₂ SUBJ — {*lian...dou* | *shi*-XP} — ...


As the (a) examples make clear, the modal *keneng* originates in a position *above* *lian...dou* focus and the focus marker *shi*. As such, modal movement involved in the (b) examples will not cross the latter. By contrast, the ungrammatical (c) examples all involve an instance of modal movement that crosses *lian...dou* focus or *shi*. Hence, the data in (61)–(62) all illustrate one and the same generalisation that modal movement may not cross a focussed phrase.

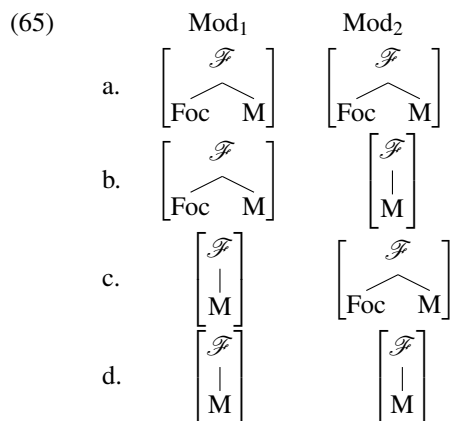
In our proposal, modal movement is induced by the [**•M₀•**] feature on Foc⁰, and thus the question is why *lian...dou* focus or *shi* should count as an intervenor—focussed phrases like *xuesheng daikuan* ‘student loan’ in (61c) and *zuotian* ‘yesterday’ in (62c) certainly do not bear the categorial feature [M]. One might thus take the current data to be evidence that we have been wrong all along in taking the trigger for the relevant modal movement to be [**•M₀•**], and instead revise the relevant trigger as [**•Foc•**] so as to capture the observed (featural) relativised minimality-type effects. This move is ill-advised, however, since the order preservation effects documented in Sect. 3.2 will now be unaccounted for. For instance:

- (64) a. **yinggai**₁^{epis} ta erzi —₁ **keneng**^{epis} shou shang le = (26)
 should 3.SG son may receive injury SP
 ‘It should be the case that his son may have become injured.’
 b. ***keneng**₁^{epis} ta erzi **yinggai**^{epis} —₁ shou shang le
 may 3.SG son should receive injury SP

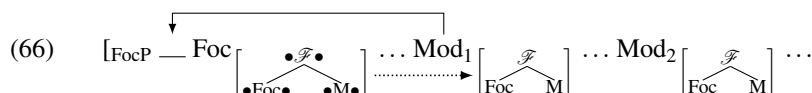
If *keneng* but not *yinggai* bears the [Foc] feature in (64b), the sentence will be incorrectly ruled in according to the revised proposal. One must thus stipulate that every Mandarin modal *obligatorily* bears the [Foc] feature. However, [Foc] is otherwise an optional feature.

To capture all the facts in question, let us maintain that the [Foc] feature is always optional on Mandarin modals, and propose that the relevant trigger for modal movement involves [**•Foc•**] in addition to [**•M₀•**]. If so, a gluttony-style explanation (à la Coon and Keine 2021) then becomes available for the data in (61)–(62), while at the same time allowing us to preserve the original spirit of our proposal. More specifically, let us assume that the relevant null Foc⁰ bears an articulated structure-building

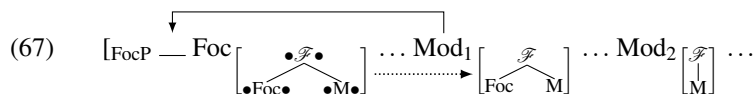
feature consisting of [\bullet Foc \bullet] and [\bullet M \bullet] that are bundled together. In cases where the derivation contains two modals, there are four featural options to consider:



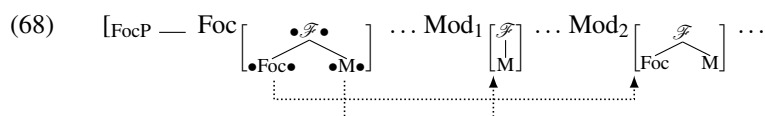
Let us first illustrate how this revised proposal can successfully capture the order preservation effects of the kind illustrated in (64). The case of (65a) is unremarkable:



In this case, Foc^0 identifies Mod_1^0 as the goal and thus displaces it to its specifier. Moreover, since Mod_1^0 is closer to Foc^0 than Mod_2^0 , it is clear that the same result obtains regardless of the featural make-up of Mod_2^0 , as long as Mod_1^0 bears [Foc]:



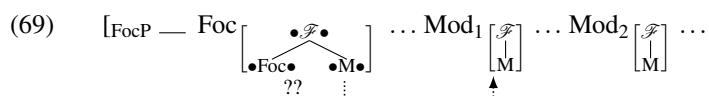
Consider now the case of (65c). The fact that Mod_1^0 lacks [Foc] raises the interesting question of whether it is simply skipped over by the articulated [\bullet \mathcal{F} \bullet] on Foc^0 , as it does not constitute a ‘full’ goal so to speak. Recently, Coon and Keine (2021) argue for a segment-based view of relativised minimality, such that each sub-component of the articulated structure-building feature in the present case in fact identifies its goal independently of one another. Accordingly, whereas [\bullet M \bullet] identifies Mod_1^0 as its goal, [\bullet Foc \bullet] identifies Mod_2^0 as its goal instead:



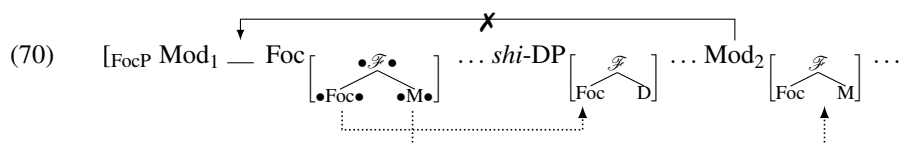
In this case, Foc^0 has identified multiple goals for movement, which constitutes a GLUTTONY scenario whereby an irresolvable conflict is created in the grammar. Ineffability obtains, and neither movement of Mod_1^0 or that of Mod_2^0 is possible.

Finally, the fact that neither Mod_1^0 nor Mod_2^0 bears [Foc] in the case of (65d) simply means that [\bullet Foc \bullet] within the articulated [\bullet \mathcal{F} \bullet] will remain undischarged.

The derivation thus eventually crashes, or it yields a sentence where Mod_1^0 and Mod_2^0 simply remain in their first-Merge positions.



Importantly, the order preservation effects not only fall out under the revised proposal, but the ungrammaticality of (61c) and (62c) is now also entirely expected. Take the latter as an illustration:



Notice that the focus associate of *shi* necessarily bears [Foc]. As shown above, (61c) and (62c) simply instantiate yet another case of gluttony. Moreover, just as expected, these sentences indeed become acceptable when *lian...dou* focus and *shi* are absent:

(71) **keneng**^{epis} **bixu**^{deon} **dei**^{deon} Lisi ti ta zhangfu fu xuesheng daikuan
 may must must Lisi for 3SG husband pay student loan
 ‘It may be the case that Lisi must have to pay the student loans for her husband.’

(72) **keneng**^{epis} **dei**^{deon} ta zuotian lai Taibei
 may must 3SG yesterday come Taipei
 ‘It may be the case that he was required to come to Taipei yesterday.’

In sum, the data in (61)–(62) only bear on the exact identity of the trigger for modal movement on the null Foc^0 . They do not constitute evidence for the traditional head-movement approach or the XP-movement approach, nor do they constitute evidence against the current approach.¹²

¹² To avoid potential misunderstandings, we should emphasise that our refinement applies *only* to the null Foc^0 under discussion. Likewise, examples like the following are unproblematic:

- (i) **bixu**^{deon} [Zhangsan]_F mai pisa huilai(, bushi Lisi)
 must Zhangsan buy pizza return NEG Lisi
 ‘It must be the case that it is Zhangsan who buys pizzas and returns(, not Lisi).’

Recently, Sun (2021: Sect. 3.2) offers convincing evidence that F-marking and [Foc] are distinct notions (at least in Mandarin), based on the absence of superiority effects in multiple focus sentences involving *zhiyou* ‘only’. In her account, crucially, an F-marked element does *not* necessarily bear the [Foc] feature. Since there is independent evidence that F-marking and [Foc] are distinct in Mandarin, we will thus claim that the F-marked phrase in (i) may lack [Foc]; notice that unlike examples involving *lian...dou* focus or *shi*, we know of no evidence that suggests that the F-marked phrase in (i) is targeted by any *syntactic* operation that induces word-order effects.

6 Conclusion

In this squib, we proposed M^0 -to-SpecFocP movement as the mechanism for the derivation of pre-subject modal sentences in Mandarin. The current Head-to-Spec movement approach was shown to obviate the problems facing a traditional head-movement analysis and the existing XP-movement approaches when extended to accommodate the fact that multiple pre-subject modals are possible. This hitherto neglected fact, therefore, helps inform the analysis of Mandarin modals, while lending credence to a novel line of approach that had not been entertained before. The current account on the whole provides additional evidence for distinguishing syntactic head movement from post-syntactic head movement as recently discussed in Harizanov and Gribanova (2019), and for positing Head-to-Spec movement as in Toyoshima (2001) and others.

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