THE INTERACTION OF MODALS AND TEMPORAL MARKINGS IN MANDARIN CHINESE*

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1. Introduction

Mandarin Chinese lacks tense morphology but utilizes many other factors such as lexical and viewpoint aspects, time adverbs, and pragmatic resources to determine the temporal reference of sentences (Smith and Erbaugh 2005, Lin 2003, 2006). It is sporadically indicated in the literature that the viewpoint aspects interact with different types of modals in different ways (Hsieh 2004: 34-38, Lin 2011:59, Tsai 2009). This paper aims to investigate how modals interact with the viewpoint aspects and temporal marking in Mandarin by examining full temporal orientations of eventuality embedded under types of modals. Ren (2008) argues that circumstantial modals (her deontic and dynamic modals) in Mandarin encode futurity, whereas epistemic modals diverge as to whether they expand forward the topic time of the eventuality to the future. However, the modals she classifies as epistemic modals actually include both circumstantial modals and future modals, and the eventuality types, which are a factor influencing temporal interpretation, are not kept uniform under the modals. Considering these drawbacks, I modify Ren’s (2008) study by controlling both modality types and eventuality types with respect to overt temporal or aspectual marking within the prejacent clause.

The methods of eliciting sentences follow Matthewson (2004). The judgments for the temporal interpretations are obtained by offering the sentences containing modals to consultants in different discourse contexts. For instance, a sentence which is accepted in a modal context with a future T.O. is judged to be true in that context. If a sentence is rejected in a particular situation, follow-up elicitation including direct translation and grammatical judgments is supplemented to inquire if the sentence is false or infelicitous in that situation. The meta-language used to elicit the sentences in question is Mandarin.

This paper is organized as follows. Section 2 presents classification of Mandarin modals based on Kratzer (1991) and Rullmann et al. (2008). Section 3 introduces Mandarin temporal marking by reviewing Lin’s (2006) analysis. Section 4 discusses temporal orientation possibilities of the modals and the various marking they utilize. A null prospective analysis of futurity for circumstantial modals is given in Section 5. Section 6 concludes this paper.

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1 Condoravdi (2002) distinguishes two notions of the temporal interpretation of modals, temporal perspective and temporal orientation. Temporal perspective is the time at which the modal background, the evidence available or the laws in effect, is accessed, whereas temporal orientation is the relation between the temporal perspective and the time of a proposition embedded under modals. This paper examines the temporal orientation of the Mandarin modals. For shifting of the temporal perspective for the modals, please refer to Chen (to appear).
2. **Classification of Modals in Mandarin**

Kratzer (1991) argues that uses of modals are decided by an implicit conversational background in context, which consists of two sets of propositions: the modal base and the ordering source. The modal base maps each world onto a set of accessible worlds, over which the modal quantifies, and the ordering source ranks and restricts the domain of the accessible worlds. In terms of Kratzer, epistemic modals have an epistemic modal base and can come with a stereotypical or doxastic ordering source. Circumstantial modal base can also combine with different ordering sources depending on the context, such as a deontic, bouletic, teleological or empty ordering source. Rullmann et al. (2008) adopt Kratzer’s (1991) conversational backgrounds but propose that languages might vary in whether they have a contextually given or lexicalized conversational background. For instance, the St’át’imcets (Lilloet Salish) modals lexically specify quantificational strength but allow variable conversational backgrounds. The Pesisiran Javanese modals have specified quantificational strength as well as a selective modal base (Vander Klok 2008). I follow the emerging theoretical typology and give a Kratzer-style’s analysis of Mandarin modals. There’s an identifiable class of auxiliary verbs that express modality in nature, despite the imperfect criteria for distinguishing auxiliaries, verbs, and adverbs (cf. Chao 1968, Li and Thompson 1981, Tsang 1981, Lin and Tang 1995, Li 2004, Ren 2008 etc.). I classify five frequently discussed modals in this paper: yīdìng, kěnéng, bìxū, kěyǐ, and yīnggāi. The five modals can be analyzed as lexically encoding both of the two main types of modal bases, epistemic vs. circumstantial, and the quantificational strength, necessity or possibility:

1. a. Context: *He looks for his dog all over the house, but cannot find it.*
   
   xiaoergou yiding/kene ng pao diao le.  
   
   small.dog EPIS.NEC/EPIS.POS run.away PRF
   
   ‘The dog must have escaped.’

   b. Context: *He was playing with a dog. When he just turned, he couldn’t find the dog.*
   
   xiaoergou *yiding/kene ng pao diao le.  
   
   small.dog EPIS.NEC/EPIS.POS run.away PRF
   
   ‘The dog may have escaped.’

2. a. Context: *My meeting with the student isn’t done but he has to attend a class.*
   
   wò bixu/*keyi rang tā likai.  
   
   I CIRC.NEC/CIRC.POS let he leave
   
   ‘I have to let him go.’

   b. Context: *Only family members are allowed to enter the patient’s room during visiting hours, but you’re exceptional since you are a really close friend.*
   
   nǐ *bixu/keyi jinlai.  
   
   you CIRC.NEC/CIRC.POS come.in
   
   ‘You may come in.’

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2 They also differ from Kratzer in adopting choice function but not the ordering source to restrict the domain of the accessible worlds universally quantified over.

3 There are two more modals which often overlap with bixū and kěyǐ respectively: dé and néng(gòu). Like bixū and kěyǐ, they lexically encode a circumstantial modal base but may differ from bixū and kěyǐ in allowing different ordering sources. The reader who is interested in their use can refer to Tsang (1981) and Li (2004).

4 Abbreviations used in morpheme glosses are as follows: ABIL = ability, CIRC = circumstantial, CL = classifier, EPIS = epistemic, EXP = experiential, FUT = future, IMPFV = imperfective, LOC = locative, NEC = necessity, NEG = negative, PFV = perfective, PL = plural, POS = possibility, PRF = perfect, PROG = progressive, PRT = particle, REL = relative clause, W = weak.
The only exception to this generalization is the weak necessity modal yīnggāi, which is ambiguous between both types of modal bases (3). The Mandarin modal system is summarized in Table 1.

(3) a. Context: *It looks like my friend has left the party; her bag is gone, but she might have just taken it into the bathroom.*  
   wǒ péngyǒu yīnggāi yǐjǐng huíqù le.  
   ‘My friend must have left.’

b. Context: *We rotate to do chores and today’s your turn.*  
   nǐ yīnggāi xǐ pánzi.  
   ‘You ought to do the dishes.’

Table 1. The Mandarin Modality System

<table>
<thead>
<tr>
<th>QF</th>
<th>CB</th>
<th>Epistemic</th>
<th>circumstantial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>stereotypical</td>
<td>bouletic</td>
</tr>
<tr>
<td>necessity</td>
<td>Yīdìng</td>
<td></td>
<td>bǐxū</td>
</tr>
<tr>
<td>weak necessity</td>
<td>yīnggāi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>possibility</td>
<td>Kěnéng</td>
<td></td>
<td>kěyí</td>
</tr>
</tbody>
</table>

3. Temporal Reference in Mandarin

This section introduces the primary temporal marking by reviewing Lin’s (2006) analysis. Lin argues that every sentence has a viewpoint aspect, at least a covert aspect head, and the aspect gives temporal reference. Sentences with imperfective aspect, like the progressive marker zài in (4a), have a present interpretation, whereas those with the perfective aspect -le have a past interpretation (4b).

(4) a. tāmen zài chǎng gē.  
   IMPERFECTIVE: PRESENT  
   they PROG sing song  
   ‘They are singing songs.’

b. tāmen chǎng-le yī-shǒu gē.  
   PERFECTIVE: PAST  
   they sing-PFV one-CL song  
   ‘They sang a song.’

As for the choice of covert aspect, it is determined by the telicity of the relevant eventuality

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5 According to Davis et al. (2009: 231-32), in St’at’imcets, a universal circumstantial of a stereotypical ordering source (i.e. pure circumstantial) is very similar in its semantics to a future when embedding an eventive verb; this is also the case found in Mandarin, where the (weak) necessity circumstantial modals are replaced by the future morpheme huì in a pure circumstantial reading, unlike the possibility circumstantial modal:

(i) a. ta bǐxū dapenti.  
   PURE CIRCUMSTANTIAL/DEONTIC  
   he CIRC.NEC sneeze  
   ‘He must sneeze.’

b. ta (yīdìng/yánggāi) huì dapenti.  
   PURE CIRCUMSTANTIAL  
   he EPIS.NEC/W.NEC FUT sneeze  
   ‘He must/has to sneeze (in view of the present state of his nose, etc.).’ (Kratzer 1991: 640)

(ii) xiūqiúhuā kěyì shèngzhǎng zài zhèlǐ.  
    PURE CIRCUMSTANTIAL  
    hydrangeas CIRC.POS grow LOC here  
    ‘Hydrangeas can grow here.’ (Kratzer 1991: 646)
Covert imperfective aspect combines with an atelic verb, whereas covert perfective aspect a telic verb, which gives present and past respectively:

(5) a. tāmen IMPFV hěn cōngmíng. \[\text{STATIVE: PRESENT}\]
    they very smart
    ‘They are very smart.’

b. tā PFV dā-pò yī-gè bēizǐ. \[\text{ACHIEVEMENT: PAST}\]
    he hit-break one-CL cup
    ‘He broke a cup.’

The semantics of imperfective and perfective aspect Lin proposes is listed in (6). While both aspects specify the inclusive relationship between the topic time and the event time, the perfective aspect additionally encodes the evaluation time $t_0$, which is preceded by the topic time.

(6) a. Imperfective aspect $= \lambda P_{<i,t>} \lambda t_{\text{Top}} \exists t [t_{\text{Top}} \subseteq t \land P(t)]$ (Lin 2006: 4)

b. Perfective aspect $= \lambda P_{<i,t>} \lambda t_{\text{Top}} \lambda t_0 \exists t [t \subseteq t_{\text{Top}} \land P(t) \land t_{\text{Top}} < t_0]$ (Lin 2006: 6)

With a default rule which assigns the speech time as the value of the evaluation time or the topic time at the root level, (6) correctly accounts for the sentences with an overt or covert aspect. For instance, (6a) applies to (5a) and the default speech time is included within the situation: $\exists t [\text{Speech} \subseteq t \land \text{smart (they)(t)}]$, thus giving a present interpretation. (6a) also explains a shifting effect brought about by a past temporal adverb: in (7), the past time adverb gives the value of the topic time, $\exists t [\text{before} \subseteq t \land \text{smart (they)(t)}]$, giving a past interpretation.

(7) tāmen yīqián hěn cōngmíng. \[\text{STATIVE: PAST}\]
    they before very smart
    ‘They were very smart before.’

In contrast, a past time adverb always agrees with the perfective aspect (8), as the perfective aspect in (6b) already encodes a past meaning as part of its semantics ($t_{\text{Top}} < t_0$):

(8) tā zuótiān dǎ-pò yī-gè bēizǐ. \[\text{ACHIEVEMENT: PAST}\]
    he yesterday hit-break one-CL cup
    ‘He broke a cup yesterday.’

Future is lexically marked by an auxiliary hui ‘will/would’ regardless of whether the following verb is eventive or stative (9). Without hui, activity verbs only have a habitual reading, and stative verbs can only be present tense (cf. (6a)).

(9) a. tāmen *(hui) cháng gē.
    they \[\text{FUT}\] sing song
    ‘They will sing songs.’ (w/o hui: ‘They sings.’)

b. tāmen *(hui) hěn máng.
    they \[\text{FUT}\] very busy
    ‘They will be very busy.’

In Lin’s analysis, the function of hui is to locate the topic time after the evaluation time (10), where the evaluation time $t_0$ can be the speech time (9) or the matrix event time if hui is embedded in a subordinate clause (11).

(10) $[[\text{hui}]] = \lambda P_{<i,t>} \lambda t_{\text{Top}} \lambda t_0 [P(t) \land t_0 < t_{\text{Top}}]$ (Lin 2006: 18)
(11) tā shuō tā huì hěn máng.
   he say he FUT very busy
   ‘He said that he would be very busy.’

The Mandarin temporal system can be summarized in Table 2. Future reference is marked by huì, which is compatible with the imperfective aspect. If huì is absent in sentences, an (overt or covert) imperfective aspect gives a present interpretation by default and can be shifted to the past by a past time adverb if the verb is stative, whereas a perfective aspect always yields a past time.

<table>
<thead>
<tr>
<th></th>
<th>Past</th>
<th>Present</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>past time adverb</td>
<td>(covert) imperfective</td>
<td>huì</td>
</tr>
<tr>
<td>Event</td>
<td>perfective</td>
<td>imperfective</td>
<td></td>
</tr>
</tbody>
</table>

4. Interaction of Types of Modals and Temporal Marking

It has been shown that types of modals vary in temporal interpretation of the embedded eventuality (Werner 2006, van de Vate 2010, and Matthewson to appear). By manipulating contexts of eventuality in different time, I will show that this hypothesis is upheld in Mandarin: The epistemic modals allow all the three temporal interpretations, while the circumstantial modals lack a past orientation and obligatorily encode futurity.

4.1. Present Orientation

An event under the epistemic modals which happens at the same time as the time at which the modal base is calculated gives a present orientation. A stative verb of the eventuality doesn’t need any overt marking, whereas an eventive verb must combine with the imperfective marker zài:

(12) Context: You can’t find your friend anywhere and the last place you have not checked is Mahony’s. You’re now at Mahony’s and see your friend’s umbrella outside the door.
   tā yīdìng zài zhèlǐ. STATIVE
   he EPIS.NEC LOC here
   ‘He must be here.’

(13) Context: You hear the uproar and clink of bottles from the living room.
   tāmen kěnéng (*zài) hē jiǔ. EVENTIVE
   they EPIS.POS PROG drink wine
   ‘They may be drinking.’

The same effect of the eventuality types is observed in the circumstantial modals (14-15).

(14) xiànzài shì wǔxiū, tóngxué-men dōu bǐxū zài jiàoshì. STATIVE
    now be lunch.break class-PL all CIRC.NEC LOC classroom
    ‘Now is lunch break so all students have to be in the classroom.’

(15) Context: The school inspector arrives at the school and knows from the students’ course schedule that now is their music class. He thinks:
    tāmen xiànzài bǐxū (*zài) chàng gē. EVENTIVE
    they now CIRC.NEC PROG sing song
    (According to the educational policy,) ‘They must be singing now.’
The only difference is that the circumstantial modals always allow future interpretation of the embedded event, even without the imperfective zài, as compared to (20) below.

4.2. **Future Orientation**

To express a future orientation, both stative and eventive prejacent embedded by the epistemic modals have to take the future auxiliary huì:

(16) Context: You would like to visit your friend tomorrow but you are not sure whether he will be at home. You get information from his sister that their family will have a get-together tomorrow which requires every member to be there.

\[
\text{tā yìdīng (huì) zài jiā. Stative}
\]

‘He will be at home.’

(17) Context: You don’t see your brother at dinner time. Your mother tells you that he just had a quarrel with his girlfriend before you came back and said he was going for a walk alone. You know he always likes to drink when he’s in bad mood.

\[
\text{tā yìdīng (huì) qù hē jiǔ. Eventive}
\]

‘He will go drinking.’

Circumstantial modals differ from the epistemic modals in being incompatible with the future auxiliary huì in a future context, irrespective of whether their ordering source is deontic (18), teleological (19), or stereotypical (20), and of whether their prejacent is stative or eventive, (18a) vs. (18b).

(18) a. Context: You plan to go on a short trip in the coming weekend but your mother rejects your plan because this weekend is your grandfather’s 60th birthday and everyone should be there.

\[
ní bìxū (*huì) zài jiā. Stative
\]

‘You must be at home.’

b. Context: We are playing a game and agree that the loser will sing a song for our entertainment. It comes out that John is the loser.

\[
tā bìxū (*huì) chàng gē. Eventive
\]

‘He must sing.’

(19) Context: Your friend asks you to taste her new recipe and give her advice.

\[
ní kěyǐ (*huì) jiā duō yīdiǎn yănba. you CIRC_POS FUT add more a.little salt
\]

‘You can add some more salt.’

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6 (16) and (19) can only be translated with ‘will’ as the English epistemic necessity modal ‘must’ can’t be future-oriented (Portner 2009: 230).

7 The sentence will be grammatical only if huì denotes ability (i). I assume the future and ability uses of huì are homophones.

(i) \[
tā bìxū huì chàng gē. he CIRC.NEC ABL sing song
\]

‘He must be able to sing songs.’
4.3. Past Orientation

Under an epistemic modal, the past orientation of a state is rendered possible by a past time adverb, whereas an eventive verb requires the perfective aspect for backward shifting:

(21) Context: You can’t find your friend anywhere and the last place you have not checked is Mahony’s. You’re now at Mahony’s and find your friend’s umbrella but don’t see him around. The bartender says that there was a guy looking like what you describe.

tā gānggāng yídīng zài zhělǐ. STATIVE
‘He must have been here just before.’

(22) Context: Your brothers come very late, uttering ravings and stinking of wine.

tāmen yídīng hē*(-le) jiǔ. EVENTIVE
‘They must have drunk wine.

By contrast, the circumstantial modals cannot embed a prejacent taking the perfective aspect (23). What if the circumstantial modals embed an achievement verb, which is assumed to have a covert perfective aspect (cf. Section 3)? If there were a covert perfective, it would enforce backward shifting, but the sentence instead is interpreted to be future oriented (24).

(23) *tāmen bìxū chàng-le gē.
they CIRC.NEC sing-PFV song
‘They had to sing songs.’

(24) tāmen bìxū dǎ-yíng bísài.
they CIRC.NEC play-win game
‘They must win the game.’

Moreover, a past time adverb only modifies the past reference time. For instance, (25) conveys that at the mentioned time yesterday, in view of their goal, that they win the game is true in all accessible worlds, but this was not realized in the actual word, thus involving a counterfactual reading.

(25) Context: In order to reach the final champion match, they had to win the game yesterday (but they lost in the end).

tāmen zuótiān bìxū dǎ-yíng bísài (de).
they yesterday CIRC.NEC play-win game PRT
‘They had to win the game yesterday’ (but they didn’t).

Therefore, the unavailability of a past orientation in the circumstantial modals is evidenced by the absence of a perfective aspect with the prejacent as well as the fact that a past time adverb
The interaction of the two types of modals and the temporal marking can be compared in Table 3. The temporal orientations of the epistemic modals exhibit exactly the same patterns as the temporal interpretations of unembedded sentences, in which a non-future orientation heavily relies on the interaction of viewpoint aspect and eventuality type, whereas a future orientation is acquired when huì is present. The fact suggests that the relation between an evaluation time at which modal background is accessed and an event time of prejacent has the same function as the perfective viewpoint aspect and the future auxiliary huì (cf. Section 3). As for the circumstantial modals, they allow a future and present orientation but not a past one; more importantly, a future orientation is default value for the circumstantial as the future auxiliary huì is disallowed with the prejacent, while covert or overt imperfective aspect helps shifting to the present.

Table 3. Types of Modal Bases and Temporal Marking in Mandarin

<table>
<thead>
<tr>
<th></th>
<th>Past</th>
<th>Present</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epistemic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stative</td>
<td>past adverb</td>
<td>(covert) imperf</td>
<td>huì</td>
</tr>
<tr>
<td>Eventive</td>
<td>perfective</td>
<td>imperf</td>
<td></td>
</tr>
<tr>
<td>Circumstantial</td>
<td></td>
<td></td>
<td>null</td>
</tr>
<tr>
<td>Stative</td>
<td>*</td>
<td>(covert) imperf</td>
<td>null</td>
</tr>
<tr>
<td>Eventive</td>
<td></td>
<td>imperf</td>
<td></td>
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</tbody>
</table>

4.4. The Ambiguous Weak Necessity Modal

We have shown that the aspectual and future marking under both types of modals exhibit contrastive occurrence restriction: The epistemic modals co-occur with the perfective marker and the future marker huì, while the circumstantial modals don’t. This generalization predicts that the weak necessity modal yīnggāi, which is ambiguous between an epistemic and circumstantial modal base, will be interpreted differently in terms of the marking. The prediction is upheld. When yīnggāi co-occurs with the perfective marker (26) or the future auxiliary (27), it can only be epistemic.

(26) Context: You were watching the Canucks and in the second period, they were up 4-1, but you fell asleep so didn’t know the exact result.
    tāmen yīnggāi dǎ-yìng-le bìsāi. ÉPISTEMIC/*DEONTIC: PAST
    they W.NEC play-win-PFV game
    ‘They should have won the game.’

(27) Context: They have been practicing very hard this season; their competitors haven’t received intensive training; they are also the host team...
    tāmen yīnggāi huì dǎ-yìng bìsāi. ÉPISTEMIC/*DEONTIC: FUTURE
    they W.NEC FUT play-win game
    ‘They should win the game.’

On the contrary, if yīnggāi combines with a bare prejacent, it can only be used as a circumstantial, with possibly varied ordering sources:

(28) tāmen yīnggāi dǎ-yìng bìsāi.
    they W.NEC play-win game
    ‘They should win the game.’

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8 I assume there is a covert imperfective aspect head for stative prejacents, which gives a present orientation, just like present tense of stative verbs in modal-less sentences (cf. Section 3).
DEONTOIC: Their team is the best in the country. Given the convention that the best team always wins the international championship, they should win the game.

TELEOLOGICAL: Given their goal of being recognized by people worldwide, they should win the game.

BOULETIC: In view of the high value prizes they want, they should win the game.

As for the imperfective aspects, since they are able to attach to prejacent of both types of modals, which yields a present orientation for the epistemic modals, and a present or future orientation for the circumstantial modals, we predict that yīnggāi can be used in both types of modal contexts depending on the temporal interpretation. This is upheld:

(29) tāmen yīnggāi zài jiā.  STATIVE
    they  w.NEC  LOC home
    ‘According to the schedule, they should be at home.’
    ‘According to their mother’s order, they should be at home.’
    EPISTEMIC: PRESENT  DEONTOIC: PRESENT/FUT

(30) tāmen yīnggāi zài chàng gē.  EVENTIVE
    they  w.NEC  PROG sing song
    ‘According to the schedule, they should be singing.’
    ‘According to the regulation, they should be singing.’
    EPISTEMIC: PRESENT  DEONTOIC: PRESENT/FUTURE

The weak necessity modal yīnggāi thus reinforces the generalizations we have made: The two types of modals differ in whether they allow a past orientation, as evidenced by the contrastive occurrence of the perfective aspect. Futurity for the two types of modals is derived differently: via huì under the epistemic modals but via the null morpheme under the circumstantial, which suggests that the future semantics is lexically encoded only in circumstantial modals (Enç 1996, van de Vate 2010, Abusch to appear, among others). A present orientation for both types of modals is possible only with a stative verb, and an imperfective aspect. The findings give empirical evidence for the correlation between the types of modal bases and temporal interpretation argued for in the literature (Condoravdi 20029, Stowell 2004, Werner 2006, van de Vate 2010, Matthewson to appear, among others).

5. Analysis

What kind of modal semantics can best account for the temporal difference based on the facts discussed so far? Condoravdi (2002) argues that modals in English are all inherently forward-shifting and different interpretations other than future are conditioned by eventuality and the presence vs. absence of the perfect. This proposal only account for the circumstantial modals in Mandarin, which do not require any overt marking for futurity. The Mandarin epistemic modals, which rely on the presence of the future auxiliary to have a future orientation, thus differ from the English ones with respect to how to express futurity in a simple modal sentence. However, the Mandarin fact is not very surprising. In Gitksan, a Tsimshian language spoken in north-western British Columbia of Canada, it’s also found that a future orientation for epistemic modals always needs a prospective aspect morpheme dim on the prejacent (Matthewson to appear). Although Mandarin and Gitksan are parallel with the epistemic modals, they are different particularly with respect to the presence of the future marker under circumstantial modals: Gitksan obligatorily requires the prospective aspect

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9 Condoravdi (2002) actually proposes that the temporal asymmetry is between epistemic and metaphysical modal bases, but Abusch (to appear) argues that the modals which are always future-oriented use a circumstantial but not metaphysical modal base because not all facts about the base world are taken into account.
marker *dim* whereas Mandarin doesn’t permit the future auxiliary *huì*. A comparison of the marking for futurity of the modals in the three languages is listed below:

<table>
<thead>
<tr>
<th></th>
<th>Epistemic: Future Orientation</th>
<th>Circumstantial</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>null</td>
<td></td>
</tr>
<tr>
<td>Gitksan</td>
<td><em>dim</em></td>
<td><em>dim</em></td>
</tr>
<tr>
<td>Mandarin</td>
<td><em>huì</em></td>
<td>null</td>
</tr>
</tbody>
</table>

Based on the obligatory presence of the prospective aspect marker *dim* under all the modals, Matthewson (to appear) argues that it’s the source of futurity in Gitksan modals. However, this analysis can only be applied to the epistemic modals in Mandarin but not the circumstantial modals as there’s no overt marker under the circumstantials. An alternative is to propose a split analysis, which extends Condoravdi’s (2002) analysis of English modals to the Mandarin circumstantial modals and Matthewson’s (to appear) analysis of Gitksan modals to the Mandarin epistemic modals. This way, specifically, the circumstantial modals encode futurity in their semantics, whereas the epistemic modals only introduce a time variable but don’t specify its reference. However, this analysis can’t explain why the perfective aspect *le* is incompatible with the circumstantial modals. I briefly show it in the following.

(31) give the lexical entry for the circumstantial necessity modal following Condoravdi, in which [*t, _*) designates an interval with *t* as an initial subinterval and extending to the end of time (Abusch 1998) and thus gives forward-shifting semantics. (32) gives the semantics of the perfective aspect *le* converted from Lin (2006) (cf. (6b) above) via adding a world and event variable.

(31)  
\[
[[bìxū_{MB}]] = \lambda P_{s}, t \lambda w \lambda t'. \forall w' [w' \in MB(w, t) \rightarrow AT([t, _), w', P)]
\]

(Condoravdi 2002:71)

(32)  
\[
[[PRF]] = \lambda P_{s}, t \lambda t' \lambda t'' [t'' \subseteq t & \exists e [P(w)(e) & \tau(e, w) = t''] & t < t']
\]

Applying (31-32), the sentence in (33) asserts that there’s a world *w’* which is accessible from *w* at the speech time, in which ‘they sing songs’ at a time *t’* which is included in a past time. Crucially, the precedence relation *t < [t’, _)*] says that the temporal orientation is backward shifted from the speech time (given a present perspective of the modal background here) and has nothing to do with the encoding of the futurity [*t’, _)*] in the modal. The result shows that the perfective aspect can appear under the circumstantial modal and yields a past orientation, contrary to the fact.

(33)  
*tāmen bìxū chāng-le gē.*

They CIRC.NEC sing-PFV song

‘They had to sing songs.’

= [[tāmen bìxū_{MB} chāng-le gē]]

= [[bìxū_{MB}]](\lambda t' \lambda w \exists t \exists t'' [t'' \subseteq t & \exists e [[they sing songs](w)(e) & \tau(e, w) = t''] & t < t'])

\[
\lambda t' \lambda w \forall w' [w' \in MB(w, t') \rightarrow \exists t \exists t'' [t'' \subseteq t & \exists e [[they sing songs](w')(e) & \tau(e, w') = t''] & t < [t', _)]]
\]

Adopting Matthewson’s (to appear) analysis that the futurity of modals comes from a
separate prospective aspect marker, I argue that the prospective aspect is phonologically unpronounced and obligatorily present under the Mandarin circumstantial modals. The covert prospective aspect would ideally explain why the perfective aspect is incompatible with the circumstantials in Mandarin, as they already have a viewpoint aspect. How does this analysis explain the future orientation for the circumstantials? Lexical entries for the circumstantial necessity modal and the covert prospective aspect are spelled out in (34-35). The result in (36) asserts that there’s a world w’ which is accessible from w at the speech time, such that ‘they sing songs’ at a time t’ follows the speech time. The forward shifting semantics is exclusively from the prospective aspect, which places the event time after the topic time.

(34) \[[ bǐxū_{MB} ]\] is defined only if MB is circumstantial. If defined, 
\[[ bǐxū_{MB} ] = \lambda P \in D_{ci, st}, \lambda t \lambda w . \exists w’ [w’ \in MB(w, t) & P(t)(w’) = 1] 
(Mattewson to appear: 7)

(35) \[[PROSP ] = \lambda P \in D_{ci, st}, \lambda t \lambda w . \exists t’ [t < t’ & \exists e [P(w)(e) & \tau(e) = t’]] 
(Mattewson to appear: 8)

(36) tāmen bǐxū chàng gē. 
they CIRC.NEC sing song
‘They must sing songs.’
\[[ tāmen bǐxū_{MB} PROSP chàng gē ]
= \lambda w . \exists w’ [w’ \in MB(w, now) & \exists t’ [now < t’ & \exists e [[they sing songs](w’)(e) & \tau(e) = t’]]]

The obligatory covert prospective aspect receives evidence from actuality entailments of the relevant event embedded under circumstantial modals (Bhatt 1999/2006, Hacquard 2009, among others). Matthewson (to appear) argues that circumstantial modals inherently give rise to actuality entailments, and that actuality entailments are removed by prospective aspect. In languages where aspect is obligatory on circumstantial modals, actuality entailments will not be found. This is upheld in Mandarin: For the first conjunct in (37) to be true, ‘I go to school’ must be true in the actual world; however, the second conjunct in (37) can always cancel it.

(37) wǒ zuótiān kěyǐ qù shàngxué, dànshì wǒ méi-qù. 
I yesterday CIRC.POS go attend.school but I NEG-go
‘I was able to go to school yesterday, but I didn’t.’

The challenge to the prospective aspect analysis is why Mandarin possesses both a covert prospective with circumstantial modals and an overt one with epistemic modals. It turns out that the contrastive occurrence of the auxiliary hùi under the modals is only apparent but follows ordering restrictions on multiple modals. Particularly, the epistemic modals precede the circumstantial modals and the auxiliary hùi can precede the circumstantial (J.-H. Lin 2012, Tsai 2009). An example of presence of all the modals in a sentence is shown below:

(38) rìhòu fānshízhī kēnèng hùi bǐxū biāožhū zài shípǐn shàng. 
in.the.future trans.fats EPIS.POS FUT CIRC.NEC label LOC food above
‘Trans fats might have to be labeled on any food in the future.’

The ordering of the modals is argued in the literature to correspond a hierarchy of the modals in the syntactic structure:
... MP

Epis MP1 MP2 hui AspP Circ Asp VP

The hierarchical difference explains that only the epistemic modals, which are projected higher than the circumstantial modals, can co-occur with the perfective aspect and the future modal hui embedding the covert prospective aspect. The multiple-modal constructions in Mandarin thus have a direct bearing on the (in)compatibility of the types of modals and the aspectual and future marking.

6. Concluding Remarks

The temporal orientation of the modals in Mandarin relates to the types of modal bases: The circumstantial modals are future oriented and allow shifting to the present by the imperfective aspect. The epistemic modals do not encode any temporal semantics but allow all the three temporal orientations via the help of the viewpoint aspect and the future modal hui. The interaction of the modals and the temporal marking in Mandarin endorses a crosslinguistic observation that futurity is encoded only in circumstantial modals (Enç 1996, Ren 2008, van de Vate 2010, Abusch to appear, Matthewson to appear, among others). I argue that the future orientation under the circumstantial modals comes from a separate covert prospective aspect, which removes actuality entailments. The contrastive occurrence of the future modal hui under both types of modals is independently explained by the syntactic hierarchy of the epistemic modals above the circumstantial modals.

References

Modals and Temporal Marking in Mandarin (S. Chen)


