
A Cartographic Study of Chinese and Japanese Modal Constructions

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1. Introduction

This paper investigates modal constructions in Chinese and Japanese under the Cartographic Approach as laid out in Rizzi (1997) and Cinque (1999). The aim is to disentangle the complex relationship between modals and modality from a comparative point of view. As is well-known, the two languages differ considerably in terms of syntactic analyticity: Namely, Chinese use a discrete modal system to express the spectrum of modality, as shown below:

(1) a.  Akiu  hui  ziji  hui  jia.  [dynamic]
     Akiu  can  self  return  home
     ‘Akiu is capable of returning home by himself.’

b.  Akiu  chang  hui  hui  jia.  [dispositional]
     Akiu  often  tend.to  return  home
     ‘Akiu tends to return home often.’

c.  Akiu  dagai  hui  hui  jia.  [epistemic]
     Akiu  probably  Irr  return  home
     ‘Akiu will probably return home.’

Here we observe a systematic correspondence between the syntactic distribution of modals and their interpretations in terms of modality: The dynamic modal *hui* in (1a) expresses capability, while in (1b), it expresses tendency or disposition. Finally, *hui* is used as an epistemic modal in (1c).

By contrast, Japanese modals employ some distinct strategies to encode modality: One involves affixies, as in (2a), and the other morphologically complex expressions, as in (2b) (cf. Narrog 2009). In addition, some of the so-called formal nouns such as *hazu* ‘should$^E$’ are also able to function as modal expressions, as shown in (2c):$^1$

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* This paper is a tribute to Professor Mamoru Saito, whose devotion to the cause of linguistics has inspired a generation of syntacticians. We are also grateful to Guglielmo Cinque, Richard Kayne, Luigi Rizzi, Ian Roberts and Peter Svenonius for their helpful comments on related works. The research leading to this article is funded by the National Science Council of Taiwan (NSC 100-2911-I-007-001).

(2) a. Hanako-wa zibun-de gakkoo-ni ko-rare-ru.
   Hanako-Top self-with school-to come-can^A-Npt
   ‘Hanako is capable of coming to school by herself.’

b. Hanako-wa kyoo gakkoo-ni ku ru kamosirenai.
   Hanako-Top today school-to come-Npt might^E
   ‘It might be the case that Hanako will come to school today.’

c. Hanako-wa kyoo gakkoo-ni ku ru hazu-da.
   Hanako-Top today school-to come-Npt should^E-Cop
   ‘It should be the case that Hanako will come to school today.’

As seen in (2a), -(r)are ‘can’ is an affix expressing dynamic modality, whereas kamosirenai in (2b) can be further decomposed into ka-mo-sir-e-na-i ‘Q-also-know-be.able.to-Neg-Nps’, which may well be a lexicalized epistemic expression in Modern Japanese. The formal noun hazu, derived from a noun with the meaning ‘arrow nock’, is also a modal expression, as in (2c).^2

Although Chinese and Japanese differ in regard to the means of encoding modality, both languages observe essentially the same hierarchy of modal projections along the line of Cinque (1999, 2006). It follows that linguistic variations result from distinct head-parameter settings, as well as the rearrangement of word order through local movement. First note that it has been established in Tsai (2012) that Chinese modals have a rather peculiar trait of keeping their verbal origins while undergoing grammaticalization and leaving their cognates throughout syntactic projections (also cf. Lin & Tang 1995, among others). As shown below, hui displays the evolution history of a functional category from the lexical to the complementizer layer in the sense of Rizzi (1997):

(3) a. yiqian waijiaoguan dou hui fayu. [verb]
    before diplomat all know French
    ‘In old time, all diplomats know French.’

b. yiqian waijiaoguan dou hui shuo fayu. [dynamic modal]
    before diplomat all can speak French
    ‘In old time, all diplomats can speak French.’

c. waijiaoguan changchang hui lai zheli. [disposition modal]
    diplomat often tend.to come here
    ‘Diplomats often tend to come here.’

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^2 It is pointed out by a reviewer that Japanese actually sports nominal modal expressions like hazu. We appreciate his input on this issue.
Unlike their Chinese counterparts, Japanese modals are less polyfunctional, producing less ambiguities as a result. The representative examples of Japanese modal are as follows: daroo ‘I speculate’, kamosirenai ‘might’, nitigainai ‘must’ as epistemic modals; -(te)moii ‘may’ (permission), -(a)nakerebanaranai ‘must’ (obigation), V+(r)u-mono-da ‘should’ or ‘ought to be’ as deontic modals; the morpheme –e or –(r)are ‘can’ (ability or possibility) as dynamic modals. Consider the following sentences:

\[(4)\]

\(a.\) Taroo-wa asu gakkoo-e iku daroo.
Taro-Top tomorrow school-to go I.suppose
‘I suppose that Taro will go to school tomorrow.’

\(b.\) * Taroo-wa kinoo gakkoo-e iku daroo-ta.
Taro-Top yesterday school-to go I.suppose-Pst

\(c.\) Taroo-wa asu gakkoo-e ik-anakerebanaranai^{D}.
Taro-Top tomorrow school-to go-must^{D}
‘Taro must go to school tomorrow.’

\(d.\) Taroo-wa kinoo gakkoo-e ik-anakerebanaranakat^{D}-ta.
Taro-Top yesterday school-to go-must^{D}-Pst
‘Taro had to go to school yesterday.’

In the literature, it has been claimed that modal expressions in Japanese can be divided into two groups, i.e., genuine modals which do not have tense inflection (ex. daroo ‘I speculate’), and quasi modals which do get inflected for tense (ex. –(a)nakerebanaranai ‘must’). However, as we look deeper into the syntax-semantic correspondence of these modals, it becomes clear that this genuine-quasi dichotomy will not be able to provide a plausible account of the cartographic properties illustrated above. Instead, we propose a three-tier analysis in the spirit of Rizzi (1997) for the task, i.e., a three-way distinction among modals on the complementizer layer, the inflectional layer, and the lexical layer (cf. Tsai 2012).

The paper is organized as follows. Section 2 gives a general overview as to how Chinese modals behave. In section 3, we then proceed to comparing Japanese data in the
same light, by looking into their morpho-syntactic properties from a comparative point of view. Section 4 discusses further consequences and remaining issues, while section 5 concludes this paper.

2. The Topography of Chinese Modals.

Before discussing the syntactic hierarchy of modals in Japanese, we will give a brief review of some important properties of Chinese modals. As mentioned above, *hui* can be either a verb, a dynamic modal, a disposition modal, a future modal, a generic modal or an epistemic modal. By building our analysis upon a battery of tests, we will be able to pin down the syntax-semantics correspondences of all those occurrences of *hui*.

First of all, we would like to look at the co-occurrence restriction between modal adverbs and *hui*. As Tsai (2012) argues, normally an epistemic adverb such as *dagai* ‘probably’ precedes epistemic *hui* or ability (i.e., dynamic) *hui*, as in (5a,b). Deontic adverbs such as *bixu* ‘obligatorily’, on the other hand, can be followed by ability *hui*, as in (5c), but never by epistemic *hui*, as in (5d):3

(5) a. Akiu *dagai* huiE qu xiancheng,
    Akiu probably HUI go town
    wo bu shi hen queding
    I not be very sure
    ‘Akiu probably will go to the town. I am not very sure.’

b. Akiu *dagai* huiA qu xiancheng,
    Akiu probably HUI go town
    wo bu shi hen queding.
    I not be very sure
    ‘Akiu probably know how to go to the town. I am not very sure.’

c. * Akiu *bixu* huiE kai che,
    Akiu obligatorily HUI drive car
    fouze mai le ye meiyou yong.
    otherwise buy Inc. still have not use
    ‘*Akiu obligatorily will drive a car, otherwise there is still no use to buy a car.’

3 One reviewer notes that *bixu* seems to get an epistemic interpretation in front of *hui* below:

(i) mingtian bixu hui xia yu.
    tomorrow must will fall rain
    ‘It must be the case that it will rain tomorrow.’

For us, the above epistemic construal is possible only when *bixu* is replaced by a typical left-periphery modal adverbial such as *shibi* ‘necessarily’. This discrepancy may well result from a dialectal variation: That is, *bixu* may has evolved into a full-fledged epistemic modal for the reviewer but not for us.
d. Akiu bixu hui\textsuperscript{A} kai che,
Akiu obligatorily HUI drive car,
ouze che mai le ye meiyou yong.
otherwise car buy Inc. still have not use
‘Akiu must\textsuperscript{D} know how to drive, otherwise there is still no use to buy a car.’

Here we detect a syntactic hierarchy of modals: Namely, the epistemic modal is higher than
its deontic counterpart, which in turn stands higher than its dynamic counterpart.

Next consider the following entailment relations: A symmetric predicate \textit{xiang}
‘resemble’ allows entailment when the roles of its argument are reversed, as in (6a). This
entailment relationship is maintained in presence of an epistemic modal, as in (6b). By
contrast, the same construal is blocked by its deontic and dynamic counterparts, as illustrated
in (6c,d) respectively:

(6) a. Akiu gen Xiaodi hen xiang.
Akiu with Xiaodi very alike
‘Akiu looks very much like Xiaodi.’

\begin{center}
\rightarrow
\begin{align*}
\text{Xiaodi gen Akiu hen xiang.} \\
\text{Xiaodi with Akiu very alike} \\
\text{‘Xiaodi looks very much like Akiu.}
\end{align*}
\end{center}

b. Akiu keneng gen Xiaodi hen xiang.
Akiu possibly with Xiaodi very alike
‘It is possible that Akiu looks very much like Xiaodi.’

\begin{center}
\rightarrow
\begin{align*}
\text{Xiaodi keneng gen Akiu hen xiang.} \\
\text{Xiaodi possibly with Akiu very alike} \\
\text{‘It is possible that Xiaodi looks very much like Akiu.}
\end{align*}
\end{center}

c. Akiu bixu gen Xiaodi hen xiang.
Akiu obligatorily with Xiaodi very alike
‘Akiu must\textsuperscript{D} look very much like Xiaodi.’

\begin{center}
\rightarrow x
\begin{align*}
\text{Xiaodi bixu gen Akiu hen xiang.} \\
\text{Xiaodi obligatorily with Akiu very alike} \\
\text{‘Xiaodi must\textsuperscript{D} look very much like Akiu.}
\end{align*}
\end{center}
This again demonstrates that, while epistemic modals merge above (hence scope over) the subject, deontic and dynamic modals are positioned under the scope of the subject.

Third, the interaction between negation and modals in Chinese also shows the same pattern: On the one hand, epistemics cannot appear within the scope of realis negation, as illustrated by the contrast between (7a,b). On the other, there is no such restriction for epistemics with irrealis negation, regardless of word order, as in (7c,d):

(7)  a. Akiu yidingE mei jin xiancheng. [epistemics + NegRea]
    Akiu surely have.not enter town
    ‘Akiu must have not entered the town.’
  b. * Akiu mei yidingE jin xiancheng. [*NegRea + epistemics]
    Akiu have.not surely enter town
    ‘Akiu must have not entered the town.’
  c. Akiu yidingE bu jin xiancheng. [epistemics + NegIrr]
    Akiu surely not enter town
    ‘It is certain that Akiu will not enter the town.’
  d. Akiu bu yidingE jin xiancheng. [NegIrr + epistemics]
    Akiu not surely enter town
    ‘It is uncertain that Akiu will enter the town.’

Furthermore, we can tell from the double negation in (8a) that the irrealis negation bu can appear on both sides of the epistemic modal yiding 'surely'. In comparison, the realis negation mei can appear below bu and yiding, as in (8b), but not vice versa, as in (8c).

(8)  a. Akiu bu yiding bu jin xiancheng.
    Akiu not surely not enter town
    Akiu bu yiding mei jin xiancheng. [NegIrr + epistemics + NegIrr]
  b. Akiu bu yidingE mei jin xiancheng.
    Akiu not surely have.not enter town
    ‘It is certain that Akiu will not enter the town.’ [NegIrr + epistemics + NegRea]
c. * Akiu mei yiding\textsuperscript{E} bu jin xiancheng.  
Akiu have.not surely not enter town  
‘It is certain that Akiu will not enter the town.’  
\[\text{Neg}^{\text{Rea}} + \text{epistemics} + \text{Neg}^{\text{Irr}}\]

The above patterns indicate that irrealis negation is merged either on the complementizer layer or on the inflectional layer, whereas realis negation is associated with the tense node exclusively. The local topography for these functional elements is sketched in the following diagram:

(9)

Fourth, it is also shown that only epistemics are compatible with tense/aspect markers in Chinese, as in (10a-c) while both deontics and dynamics are not allowed to co-occur with these markers, as evidenced by the ungrammaticality of (11a-c) and (12a-c) respectively:

(10) a. Akiu keneng qu-le xiancheng.  
Akiu possibly go-Prf town  
‘It is possible that Akiu has gone to the town.’

b. Akiu yiding\textsuperscript{E} qu-le xiancheng.  
Akiu surely go-Prf town  
‘Akiu must\textsuperscript{E} have gone to the town.’

c. Akiu yingga\textsuperscript{E} qu-le xiancheng.  
Akiu should go-Prf town  
‘It should be the case that Akiu has gone to the town.’
The above asymmetry receives a straightforward account given our analysis that only epistemic modals are merged to the left periphery, hence not interfering with any tense and aspectual construals. By contrast, Asp-to-T raising in LF is blocked by deontic and dynamic modals, as illustrated in the following diagram:
Lastly, the interaction between modals and frequency adverbs also lends support to our position. For instance, we can use *changchang* ‘often’ to set the boundary between the CP domain and the IP domain for the purpose of our modal hierarchy here: When *neng* 'can' precedes *changchang*, it is interpreted as epistemic, as in (14a); when the word order is reversed, *neng*, receives a deontic/dynamic interpretation, as in (14b).

(14) a. Akiu neng\textsuperscript{E} changchang qu Taipei.
Akiu can often go Taipei
‘Akiu can often go to Taipei.’

b. Akiu changchang neng\textsuperscript{D} qu Taipei.
Akiu often can go Taipei
‘Akiu was often able to go to Taipei.’

Exactly the same epistemic-deontic dichotomy appears in (15a,b), where *neng* is replaced by *hui*:

(15) a. Akiu hui\textsuperscript{E} changchang qu Taipei.
Akiu HUI often go Taipei
‘Akiu will go to Taipei often.’

b. Akiu changchang hui\textsuperscript{D} qu Taibeinge.
Akiu often HUI go Taipei
3. Modals in Japanese

In this section, we give a basic description of Japanese modal constructions, while investigating their morpho-syntactic properties in relation to the “right” periphery from a comparative point of view.

As mentioned above, Japanese has three distinct means for marking modality on a predicate; affixes, morphologically complex expressions, and formal nouns. In the traditional Japanese linguistics, modals are classified according to whether they can be inflected for tense or negation. Those which cannot be inflected for tense or negation are generally called “genuine modals”, while those which are subject to tense/negation inflection are called “quasi modals”. Along this line, *daroo* ‘I speculate’ in (16a) is analyzed as a genuine modal since it cannot be conjugated in past tense (*daroo-ta ‘I.speculate-Pst’) or negation (*daroo-nai ‘I.speculate-Neg’). On the other hand, an modal affix -tai ‘want’ in (16b), a morphologically complex expression *kamosirenai* ‘might’ in (16c), and a formal noun *hazu* ‘should’ in (16d) are all regarded as quasi modals because they have past tense form *iki-takat-ta ‘go-want-Pst’*, *kamosirenakat-ta ‘might-Pst’*, and *hazu-dat-ta ‘shouldE-Cop-Pst’* respectively.

    Taro-Top tomorrow Tokyo-to go I.speculate
    ‘I think Taro will go to Tokyo tomorrow.’

b.  Watasi-wa asu Tokyo-e iki-tai.
    I-Top tomorrow Tokyo-to go-want
    ‘I want to go to Tokyo tomorrow.’

c.  Taroo-wa asu Tokyo-e iku kamosirenai.
    Taro-Top tomorrow Tokyo-to go might
    ‘It might be the case that Taro will go to Tokyo tomorrow.’

    Taro-Top tomorrow Tokyo-to go shouldE-Cop
    ‘It shouldE be the case that Taro will go to Tokyo tomorrow.’

With regard to negation, epistemic quasi modals in (16c) and (16d), for instance, are different; *hazu-da ‘shouldE-Cop’* in (16d) can be negated (*hazu-zyanai ‘shouldE-Neg’), but *kamosirenai in (16c) does not go with another negative form (*kamosirenakai ‘might-Neg’*. It has been proposed in the literature that genuine modals are inflectional affixes, and quasi modals should be regarded as verbs (cf. Inoue 2007, Ueda 2007 and Endo 2010).
Since daroo, kamosirenai, and hazu count as epistemic semantically when they are in non-past forms, it is difficult to account for their characteristics properly in terms of the genuine-quasi dichotomy. In this paper, we would like to adopt the three-tier analysis instead to provide a cartographic account.

3.1. The Co-occurrence Restriction

First let’s take a look at issues concerning the co-occurrence restrictions between modal adverbs and modal predicates in Japanese. As shown in section 2, the hierarchical distinction between epistemics, deontics and dynamics in Chinese are attested through an array of objective tests.

At least on the surface, Japanese appears to observe no such co-occurrence restrictions as it is strict head-final. Consider the following sentences: In (17a), the epistemic adverb hyottositara ‘probably’ is paired with the epistemic modal kamosirenai ‘might’. It can also be paired with a deontic modal such as –(na)kerebanaranai ‘mustD’, as in (17b). Similarly, the deontic adverb yamoezu ‘inevitably, necessarily’ in (18a) is paired with kamosirenai ‘might’, which construal is again available for –(na)kerebanaranai ‘mustD’, as in (18b):

    Taro-Nom probablyE tomorrow home-to come mightE
    ‘Taro probably might come to my place tomorrow.’

    Taro-Nom probablyE tomorrow home-to come-mustD
    ‘It is probable that Taro must come to my place tomorrow.’

(18) a. Taroo-ga yamoezu asu uti-ni kuru kamosirenai.
    Taro-Nom inevitablyD tomorrow home-to come mightE
    ‘It might be the case that Taro is inevitably coming to my place tomorrow.’

d. Taroo-ga yamoezu asu uti-ni ko-nakerebanaranai.
    Taro-Nom inevitablyD tomorrow home-to come-mustD
    ‘Taro must come to my place inevitably tomorrow.’

We should therefore ask why the two languages differ in this respect. The reason, in our opinion, lies in the difficulty of determining the hierarchical relation between a Japanese modal adverb and its auxiliary counterpart, which, unlike Chinese, appear on the opposite sides of the main verb. Adjunct Scrambling only makes the situation worse.

On the other hand, Japanese does exhibit a rigid hierarchical relation among epistemics, deontics and dynamics: In (17b), hyottoshitara ‘probably’ takes scope over the whole
sentence, while in (18a), *kamosirenai* ‘might’ scopes over other elements instead. It seems that epistemics, whether it is a head or an adjunct, always take the widest scope in Japanese. The same conclusion is supported by the fact that epistemics must appear to the right of deontics and dynamics, as in (19a-d), while deontics must appear to the right of dynamics, as in (19e,f).\(^4\)

\[(19)\]

\[a.\] Taroo-wa asu Tokyo-e ik-anakerebanaranai kamosirenai.
   Taro-Top tomorrow Tokyo-to go-must\(^D\) might\(^E\)
   ‘It might be the case that Taro must go to Tokyo tomorrow.’

\[b.\] * Taroo-wa asu Tokyo-e ik-u kamosirenaku-nakerebanaranai.
   Taro-Top tomorrow Tokyo-to go-Npt might\(^E\)-must\(^D\)

\[c.\] Taroo-wa zibun-de gakkoo-ni ko-rare-ru nitigainai.
   Taro-Top self-with school-to come-can\(^A\)-Npt must\(^E\)
   ‘It must\(^E\) be the case that Taro is capable of coming to school by himself.’

\[d.\] * Taroo-wa zibun-de gakkoo-ni ku-ru nitigainai-rare-ru.
   Taro-Top self-with school-to come-Npt must\(^E\)-can\(^A\)-Npt.

\[e.\] Taroo-ga zibun-de Tokyo-e iki-tagatte-moi.
   Taro-Nom self-with Tokyo-to go-want\(^V\)-can\(^D\)
   ‘Taro may\(^D\) want to go to Tokyo by himself.’

\[f.\] * Taroo-ga zibun-de Tokyo-e itte-moi-tagaru.
   Taro-Nom self-with Tokyo-to go-can\(^D\)-want\(^V\)

3.2. Entailment Relations

Based on the research of Butler (2003) and Tsai (2012), we can test further whether Japanese modals show the entailment restriction or not: A symmetric predicate such as *niteiru* ‘resemble’ allows entailment when the roles of its argument are reversed, as shown in (20a). Similar to Chinese, this entailment relationship is maintained in presence of the complementizer layer modal *kamosirenai* ‘might’, as in (20b):

\[4\] As one reviewer points out, examples in (19) do not make real minimal pairs for supporting our conclusion on the scope of different modal elements. This issue is related to the morphological constraints for the combination of distinct lexical items (cf. Narrog 2009): The affix –*rare* ‘can\(^A\)’ can only follow a morphological verb, while *nitigainai* ‘must\(^E\)’ only take a finite complement. In (19d), *nitigainai* cannot be followed by the affix –*rare* because *nitigainai* ends with the negation suffix –*nai* that is an adjectival item but not a morphological verb. As for (19e,f), the morphological constraints only allow the dynamic modal –*tagaru* ‘want\(^V\)’ to follow the verb but not the adjectival item. In (19f), this constrain is not observed since the deontic (permission) modal –*moii* ‘can\(^D\)’ contains the adjectival item –*ii* ‘good’ at the right end and it is impossible for the dynamic modal –*tagaru* ‘want\(^V\)’ to follow such an adjectival element. Despite the issue above, it remains clear that epistemics always scope over deontics, which in turn scope over dynamics.
(20) a.  Taroo-ga  Ziroo-ni  nite-iru.  
Taroo-Nom  Ziroo-Dat  resemble-Asp  
‘Taro resembles Ziroo.’

\[\text{Ziroo-ga  Taroo-ni  nite-iru.}\]
\[\text{Ziroo-Nom  Taroo-Dat  resemble-Asp}\]
‘Ziro resembles Taro.’

b.  Taroo-ga  Ziroo-ni  nite-iru    kamosirenai.  
Taroo-Nom  Ziro-Dat  resemble-Asp  might  
‘It might be the case that Taro resembles Ziro.’

\[\text{Ziroo-ga  Taroo-ni  nite-iru  kamosirenai.}\]
\[\text{Ziro-Nom  Taroo-Dat  resemble-Asp  might}\]
‘It might be the case that Taro resembles Ziro.’

c.  Taroo-ga  Ziroo-ni  nite-i-nakerebanaranai.  
Taroo-Nom  Ziro-Dat  resemble-Asp-must^{D}  
‘Taro must^{D} resemble Ziro.’

\[\text{Ziroo-ga  Taroo-ni  nite-i-nakerebanaranai.}\]
\[\text{Ziro-Nom  Taroo-Dat  resemble-Asp-must^{D}}\]
‘Ziro must^{D} resemble Taro.’

d.  Taroo-ga  Ziroo-ni  ni-tagatte-iru.  
Taroo-Nom  Ziro-Dat  resemble-want-Asp  
‘Taro wants to resemble Ziro.’

\[\text{Ziroo-ga  Taroo-ni  ni-tagatte-iru.}\]
\[\text{Ziro-Nom  Taroo-Dat  resemble-want-Asp}\]
‘Ziro wants to resemble Taro.’

Also as expected, the entailment relation does not hold when a deontic/dynamic modal appears, as illustrated by (20c,d). It is thus quite plausible to suggest that, in Japanese, epistemics are indeed modals on the complementizer layer, hence scoping over the whole sentence, which construal is unavailable for their counterparts on the inflectional and lexical layers.
3.3. Interaction between Negation and Epistemic Modals

In Japanese, testing the interaction between negation and epistemics is difficult owing to the morphological make-up of modals such as *kamosirenai* ‘might’ and *nitigainai* ‘mustE’. As shown in (21a) and (22a), negation –*nai* can appear within the scope of epistemics. For one thing, it is unclear whether negation can scope over epistemics or not, since epistemics such as *kamosirenai* ‘might’ cannot be followed by negation. More specifically, –*nai* ‘not’ at the right end of the morphological complex prevents the addition of another –*nai*, as illustrated in (21b) and (22b):

\[\begin{align*}
(21) & \quad \text{a. } \text{Taroo-ga} & \text{ Tokyo-e} & \text{ ik-anakat-ta} & \text{ kamosirenai.} \\
& & \text{Taro-Nom} & \text{ Tokyo-to} & \text{ go-Neg-Pst} & \text{ might} \\
& & & & & \text{‘It might be the case that Taro did not go to Tokyo.’} & [\text{Neg}^{\text{Pst}} < \text{epistemics}] \\
& b. * & \text{Taroo-ga} & \text{ Tokyo-e} & \text{ iku} & \text{ kamosirenai-nakat-ta.} \\
& & \text{Taro-Nom} & \text{ Tokyo-to} & \text{ go} & \text{ might-Neg-Pst} & [\text{epistemics} < *\text{Neg}^{\text{Pst}}] \\
\end{align*}\]

\[\begin{align*}
(22) & \quad \text{a. } \text{Taroo-ga} & \text{ Tokyo-e} & \text{ ik-anai} & \text{ kamosirenai.} \\
& & \text{Taro-Nom} & \text{ Tokyo-to} & \text{ go-not} & \text{ might} \\
& & & & & \text{‘It might be the case that Taro won’t go to Tokyo.’} & [\text{Neg}^{\text{Npt}} < \text{epistemics}] \\
& b. * & \text{Taroo-ga} & \text{ Tokyo-e} & \text{ iku} & \text{ kamosirenai-nai.} \\
& & \text{Taro-Nom} & \text{ Tokyo-to} & \text{ go} & \text{ might-not} & [\text{epistemics} < *\text{Neg}^{\text{Npt}}] \\
\end{align*}\]

For another, there is an epistemic modal which can actually take negation. The so-called formal noun *hazu* ‘shouldE, be supposed to’ in (23a) is such an example. The copula following *hazu* can be conjugated in past tense, as in (23b). *Hazu* may precede either non-past negation of copula –*zyanai*, as in (23c), or past-tensed negation –*zyanakat-ta*, as in (23d). It is also worthwhile to note that, when the sentence containing *hazu* with past-tensed copula is followed by another epistemic like *kamosirenai* ‘might’, it tends to involve non-realization (cf. Takanashi 2010), resulting in counterfactual interpretations as in (23e):

\[\begin{align*}
(23) & \quad \text{a. } \text{Taroo-wa} & \text{ 10-zi -mae-ni} & \text{ Tokyo-ni} & \text{ tuku} & \text{ hazu-da.} \\
& & \text{Taro-Top} & \text{ 10-time-before-at} & \text{ Tokyo-at} & \text{ arrive shouldE-Cop} \\
& & & & & \text{‘It should be the case that Taro will arrive at Tokyo before 10 o’clock.’} \\
& b. * & \text{Taroo-wa} & \text{ 10-zi-mae-ni} & \text{ Tokyo-ni} & \text{ tuku} & \text{ hazu-dat-ta.} \\
& & \text{Taro-Top} & \text{ 10-time-before-at} & \text{ Tokyo-at} & \text{ arrive should-Cop-Pst} \\
& & & & & \text{‘It was supposed to be the case that Taro would arrive at Tokyo before 10 o’clock.’} \\
\end{align*}\]

\[\footnote{5 \text{It is generally impossible to have the same morpheme repeated immediately in Japanese (Narrog 2009).}}\]
   Taro-Top 10-before-at Tokyo-at arrive shoul^E-not
   ‘It is not supposed that Taro will arrive at Tokyo before 10 o’clock.’

   Taro-Top 10-time-before-at Tokyo-at arrive should-not-Pst
   ‘It was not supposed to be the case that Taro would arrive at Tokyo before 10 o’clock.’

   Taro-Top 10-time-before-at Tokyo-to arrive should-Cop-Pst might
   ‘It might have been the case that Taro would arrive at Tokyo before 10 o’clock.’

The nominal hazu in (23a,c) has epistemic necessity interpretation. In (23c), the negation takes scope over the whole sentence semantically. Following Cinque (2006), we would like to propose that NegP may appear above MPEpi in Japanese, parallel to Mandarin Chinese. As for (23b,d), although hazu may appear to be epistemic when followed by the copula with past tense, the interpretation can actually be deontic, as it is possible for the noun hazu to be construed in terms of moral values or a sense of obligation.

3.4. Modals and Aspectual Licensing

In Chinese, only epistemics are compatible with tense/aspect markers, which means that they can only take a non-finite complement (see section 2). The same restriction duly shows up in the following Japanese modal sentences:

   Taro-Nom Tokyo-to go-Asp-Npt might
   ‘It might be the case that Taro has gone to Tokyo.’

b. Taro-o-ga Tokyo-e itte-i-ru nitigainai.
   Taro-Nom Tokyo-to go-Asp-Npt must^E
   ‘It must be the case that Taro has gone to Tokyo.’

c. Taro-o-ga Tokyo-e itte-i-ru daroo.
   Taro-Nom Tokyo-to go-Asp-Npt I.speculate
   ‘I think that Taro has gone to Tokyo.’

By contrast, deontics cannot co-occur with a non-past tense (NTP) marker such as -ru, as evidenced by the contrast (25a,b) and that between (26a,b). This indicates that these modals must be at the lower end of the IP domain, thus not high enough to take TP as their complement. The same argument carries over to the dynamic modal in (27a,b):
In light of the above observations, we are now ready to map out the topography of Japanese modals in relation to other functional elements like negation and tense, as visualized below:
4. Further Consequences

4.1. Actuality Entailment

In section 2, we made the observation that frequency adverbs may serve to separate epistemics from deontics in Chinese. It is instructive to note that there is actually a semantic dimension to this issue. As noted by Tsai & Portner (2008) and Tsai (2012), when *neng* 'can' precedes *changchang* 'often', the sentence receives an irrealis reading which can be contradicted, as illustrated by (29a). When the word order is reversed, the interpretation is distinctly realis, which cannot be contradicted, as evidenced by (29b).

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Here a reviewer raises a very interesting issue: In the example below, the *often-can* order fails to trigger actuality entailment, contrary to the prediction of our analysis:
(29) a. Akiu neng\(^E\) changchang qu Taibei, [irrealis]
    Akiu can often go Taipei
    dan conglai mei qu-guo.
    but never have.not go-Pst
    ‘It is possible for Akiu to go to Taipei often, but he never did.’

b. # Akiu changchang neng\(^D\) qu Taibei, [realis]
    Akiu often can go Taipei
    dan conglai mei qu-guo.
    but never have.not go-Pst
    ‘#Akiu was often able to go to Taipei, but he never did.’

For (29b) to be true, Akiu must have been to Taipei in the actual world a number of time. The contrast is reminiscent of the actuality entailments discussed by Bhatt (1999) and Hacquard (2006). They point out that certain modal verbs, when in a perfective form, produce an entailment that an event of the kind described by the clause under the scope of the modal actually occurred. Take the following pair of French sentences for example: Only (30b), but not (30a), entails that Jane actually took the train:

(30) a. Pour aller au zoo, Jane pouvait prendre le train.
    To go to the zoo, Jane can-past-impf take the train
    ‘Jane could have taken the train to go to the zoo.’ [irrealis]

b. Pour aller au zoo, Jane a pu prendre le train.
    To go to the zoo, Jane past-pfv can take the train
    ‘Jane was able to take the train to go to the zoo.’ [realis]

According to Hacquard (2006), actuality entailment occurs with ability modals and certain deontic modals in French, but never with epistemic modals. The same holds for Japanese modal constructions. In (31b), where the ability modal –\(^e\)– is followed by the perfective marker –\(^simau\), an entailment emerges that the Tokyo-going event has actually occurred. By contrast, when the modal is not suffixed by –\(^simau\), hence receiving an

(i) Akiu changchang neng yi-quan dadao tade duishou,
    Akiu often can one-punch knock.out his opponent
dan ta shizhong bu chu-shou.
    but he always not take.action
    ‘(In a boxing match,) Akiu often could knock out his opponent with one punch, but he never took real action.’

While we agree with the judgement, it should be pointed out that \textit{changchang} ‘often’ above actually scopes over the whole disjunction rather than just the first conjunct. As a result, there is no local interaction between \textit{changchang} and \textit{neng} ‘can’, hence the lack of actuality entailment in (i).
epistemic interpretation, no such entailment is available, as in (31a):

(31) a.  Taroo-ga  Tokyo-e  hikooki-de  ik-e-ta.   [irrealis]
Taro-Nom  Tokyo-to  airplane-with  go-can-Pst
‘It was possible for Taro to go to Tokyo by plane’
b.  Taroo-ga  Tokyo-e  hikooki-de  ik-ete-simat-ta.  [realis]
Taro-Nom  Tokyo-to  airplane-with  go-can-pfv-Pst
‘Taro was able to go to Tokyo by plane.’

This cross-linguistic generalization is further strengthened by the fact that the irrealis reading of (32a) allows contradiction, while the realis reading of (32b) does not:

(32) a.  Taroo-wa  Tokyo-e  hikooki-de  ik-e-ta noni,
Taro-Top  Tokyo-to  airplane-with  go-can-Pst however
ik-anakat-ta.
‘It was possible for Taro to go to Tokyo by plane, but he did not go.’
b. # Taroo-wa  Tokyo-e  hikooki-de  ik-ete-simat-ta noni,
Taro-Top  Tokyo-to  airplane-with  go-can-pfv-Pst however
ik-anakat-ta.

It is also worthwhile to point out that Japanese is more in line with French in terms of the way actuality entailment is formed, i.e., by perfective aspectual inflection. By contrast, actuality entailment arises in Chinese when the habitual operator *changchang* ‘often’ is merged above the ability version of *neng* in (29a), binding the event argument inside the scope of the modal, as shown by the formula (33b). No such entailment is available in (29b), where *changchang* is merged below the epistemic version of *neng*, as shown by (33a):

(33) a.  ◇OFTENe  [Akiu goes to Taipei in e]
b.  OFTENe ◇  [Akiu goes to Taipei in e]

4.2. *Ought-to-be* modals in Japanese

In addition to typical *ought-to-do* modals like –nakerebanaranai ‘mustD’ in Japanese, there is also an *ought-to-be* modal, namely, the formal noun *mono*, which was historically grammaticalized from the noun with the meaning ‘thing’ to the functional category keeping the original nominal property. The followings are typical examples of *ought-to-be* modal
**mono:**

(34) a. Byooin-de-wa (hito-wa) sizukani suru mono-da.  
    hospital-at-Top person-Top quietly do-Npt MONO-Cop  
    ‘In a hospital, one has to be quiet.’

b. Okureru toki-wa mazu renraku-su-ru mono-da.  
    being.late when-Top first contact-do-Npt MONO-Cop  
    ‘When you will be late, you have to contact us first.’

Narrog (2009) takes *mono* to express a judgment of general necessity. Takanashi (2010), on the other hand, points out (i) *mono* takes a non-past finite complement; (ii) the speaker regards the event expressed by ‘*mono construction*’ as socially preferable; (iii) the copula following *mono* with *ought-to-be* interpretation cannot be conjugated in past tense, as shown in (35a,b); (iv) since this construction exhibits generic interpretation it is obligatory that common noun appears in the subject position. All these should be clear by comparing (35c) with (35d,e):

(35) a. Byooin-de-wa (hito-wa) sizukani su-ru mono-da.  
    hospital-at-Top person-Top quietly do-Npt MONO-Cop.  
    ‘In a hospital, one has to be quiet.’

b.* Byooin-de-wa (hito-wa) sizukani su-ru mono-dat-ta.  
    hospital-at-Top person-Top quietly do-Npt MONO-Cop-Pst  

    student-Top hard study-do-Npt MONO-Cop  
    ‘Students have to study hard.’

d.* Taroo-wa issyookenenme benkyoo-su-ru mono-da.  
    Taro-Top hard study-do-Npt MONO-Cop  

e.* Kono gakusee-wa issyookenenme benkyoo-su-ru mono-da.  
    this student-Top hard study-do-Npt MONO-Cop

As mentioned above, the finite complement of *mono* contains a verb in non-past form, and in addition, the copula following *mono* is also in non-past form. Therefore, we postulate that there is an agreement relation between the verb in the complement clause and the copula. Interestingly, the verb in the complement clause is replaced by the verb in past-tense, the sentence delivers a different interpretation, namely, the habitual construal, as shown in (36a):  

7 For the habitual reading of (36a), there does not seem to be any tense requirement on the copula.
(36) a. Taroo-wa tiisai-toki ano kooen-de ason-da mono-da/-dat-ta.
    Taro-Top small-time that part-at play-Pst MONO-Cop/-Cop-Pst
    ‘Taro used to play at that part when he was small.’

    b.* Ningen-wa tiisai-toki ano kooen-de ason-da mono-da.
    human.beng-Top small-time that park-at play-Pst MONO-Cop

As shown in (36a), when the verb in the finite complement clause of mono is in the past-tense form, the sentence has the habitual construal. In such a sentence, the common noun cannot appear in the subject position, as illustrated in (36b).

Unlike other deontics, mono is closely related to the speaker’s estimation, and in addition, it takes a finite complement, as mentioned above. Therefore, mono may well occupy a position higher than the subject but lower than an epistemic modal, as evidenced by the contrast between (37a,b). The relevant topography can then be given in (38).

(37) a. Gakusee-wa issyoookenmee benkyoo-su-ru mono (dearu) kamosirenai.
    student-Top hard study-do-Npt MONO Cop might
    ‘It might be the case that students have to study hard.’

    b.* Gakusee-wa issyoookenmee benkyoo-su ru kamosirenai mono-da.
    student-Top hard study-do-Npt might MONO-Cop

(38)     TopP
         /       |
        /       |
   gakusee\  Top’
         /       |
      /       |
     /       |
   MP^epi  Top
         /       |
        /       |
       /       |
      /       |
    MP^de  kamosirenai
         /       |
        /       |
       /       |
      /       |
     /       |
    TP     da (dearu)
          /       |
         /       |
        /       |
       /       |
      t_k issyoookenmee benkyoo-su-ru

21
5. Conclusion

This paper investigated syntactic properties of Chinese and Japanese modal constructions under the cartographic approach. Our study shows that, despite the difference between the two languages in terms of analyticity and headness-setting, they both display the same pattern of syntax-semantic mapping in terms of the modal hierarchy. We present a three-tier syntactic analysis based on the correlations from multiple modal constructions, entailment relations, the interaction between modals and negation, the compatibility between modals and tense/aspect markers, as well as the demarcation effects associated with actuality entailment and ought-to-be modals. All in all, the topography of Japanese modals is essentially the mirror image of that of their Chinese counterparts. Although our study is far from conclusive, the insights and methodology presented above seem to be on the right track. We believe that, given enough time, it should be possible to work out a more fine-grained analysis of how the modal hierarchy is encoded morpho-syntactically across languages.
References


Rizzi, Luigi. 1997. The fine structure of the left periphery. In L. Haegeman (ed.), Elements of


