

Future and Modality: A Preliminary Study of *jiang*, *hui*, *yao* and *yao ... le* in Mandarin Chinese

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We examine four future-denoting expressions in Mandarin Chinese that function similar to *will* in English: *jiang*, *hui*, *yao* and *yao ... le* and discuss whether Kissine's (2008) criticism against *will* being a modal applies to these expressions. We argue that *jiang* requires a union of all possible conversational background, *hui* and *yao ... le* an epistemic conversational background, and *yao* a bouletic conversational background. We also argue that, in addition to conversational backgrounds, the possible worlds in an ordering semantics are also relative to time. In this way, the four future-denoting expressions can have modal semantics and do not have the problems discussed in Kissine (2008).

1. Introduction

Discussions have been devoted to the issue whether future is a type of modality. For examples, a few studies suggest that *will* in English has a component of modality in its semantics, e.g. Condoravdi (2002), Copley (2002), Enç (1996), Palmer (1986: 216-218), Smith (1978), and so on, whereas others claim that *will* is a modal on the one hand, but not a modal on the other, for example, Comrie (1985: 43-48), Kamp and Reyle (1993: 535), et cetera. Kissine (2008) proposes that *will* cannot be a modal because such an analysis results in logical inconsistency.

In Mandarin Chinese (hereafter, Mandarin), a 'tenseless' language, e.g. Lin (2006), Wu (2009), etc., in addition to temporal words such as *mintian* 'tomorrow', *weilai* 'future', and so on, there are at least four words that function similar to *will* in English, i.e. *jiang*, *hui*, *yao* and *yao ... le*.¹ See the examples below.

1. a. zhangsan mintian jiang chuxi zhe ci huiyi
Zhangsan tomorrow *jiang* attend this CL² meeting
'Zhangsan will attend this meeting tomorrow.'

¹ We argue that *yao ... le* should be treated as a semantic word in latter section.

² The abbreviations used in this paper include: CL for classifier, and Prc for particle.

- b. zhangsan mintian hui chuxi zhe ci huiyi
Zhangsan tomorrow *hui* attend this CL meeting
'Zhangsan will attend this meeting tomorrow.'
- c. zhangsan mintian yao chuxi zhe ci huiyi³
Zhangsan tomorrow *yao* attend this CL meeting
'Zhangsan will attend this meeting tomorrow.'
- d. zhangsan mintian yao chuxi zhe ci huiyi le
Zhangsan tomorrow *yao* attend this CL meeting *le*
'Zhangsan will attend this meeting tomorrow
(contrary to his previous decision).'

In this paper, we discuss three issues. First, can Kissine's (2008) proposal be applied to these four future-denoting expressions, *jiang*, *hui*, *yao* and *yao ... le*, in Mandarin? Second, how are the four expressions semantically different? Third, what are the semantics for the four expressions if Kissine's proposal does not work for them?

This paper is organized as follows. Section 2 is literature review, where I briefly review Kissine (2008). Section 3 includes data of the four future-denoting expressions. In Section 4, we provide semantics for the four expressions along the lines of Kratzer (1977, 1981). Section 5 concludes this paper.

2. Literature Review

Kissine (2008) propose three points: First, *will* is not a modal because a modal analysis of *will* leads to logical inconsistency, second, the necessity reading of *will* comes from a covert necessity operator and, third, the various meanings of *will* are determined by pragmatic principles.

Will, as a modal, is analyzed as a necessity operator, e.g. Enç (1996), Yavas (1982), etc., and it universally quantifies over the set of possible worlds consistent with what is known (or believed) at the present time. Kissine finds that a logical inconsistency occurs when *will* is given a modal semantics.

Suppose W^* is a set of possible worlds such that $W^* = \{w_1, w_2, w_3\}$. What is known in the possible worlds of W^* and the real situations in the possible worlds of W^* are given below as (2).

³ *Hui* and *yao* are both ambiguous. *Hui*, similar to *will* in English can express prediction, personal habit, properties of places, natural law, etc., e.g. Chang (2000), Hsieh (2002), Liu (1996: 40-51) and so on. *Yao* can also be a deontic modal, and some may claim that *yao* expresses volition, instead of future (Hsieh, Miao-Ling, personal communication). In this paper, I will put aside the issue regarding the ambiguity of these words, and focus only on the future usage of *hui* and *yao*. The ambiguity of *hui* and *yao* is left for future studies.

2. W^*
- | | |
|----------------------------|--------------------------|
| $w = \{p\}$ | $K_w i = \{p\}$ |
| $w_1 = \{p, \neg r\}$ | $K_{w_1} i = \{\neg r\}$ |
| $w_2 = \{\neg r, \neg p\}$ | |

In (2), w stands for the real world, and w_1, w_2 possible worlds. In the real world w , p holds. In w_1 , p holds but r does not hold. In w_2 , neither p nor r holds. $K_{w_n} i$ represents the things that are known in w_n at a time i . For a sentence such as *Mary will come*, listed as (3a), its semantics is represented as (3b):

3. a. *Mary will come.*
 b. $\llbracket \text{Mary will come} \rrbracket$ is true in w iff, for every possible world w_1 such that $wE_i w_1$, $\llbracket \text{Mary comes at } i_1 > i \rrbracket \in w_1$.

Assume that p is $\llbracket \text{Mary comes at } i_1 > i \rrbracket$. $wE_i w_1$ refers to an accessibility relation, where w_1 is epistemically⁴ accessible to the actual world w at the given time i , which means w_1 is consistent with what is known in w at i . Given W^* , *Mary will come* is true in w for the following reasons: In W^* , w_1 is epistemically accessible to the actual world w because what is known in w at i , i.e. p , is also true in w_1 , that is, what is known at w at i is consistent with w_1 . Because only w_1 is accessible to w in W^* , it is true that for every possible world w_1 such that $wE_i w_1$, $\llbracket \text{Mary comes at } i_1 > i \rrbracket \in w_1$.

On the other hand, sentences like *(for all that we know) it is possible_{epistemic} that Mary will come* are true as well, given W^* . The sentence is given in (4a) and its semantics in (4b).

4. a. *(For all we know), it is possible_{epistemic} that Mary will not come.*
 b. $\llbracket \text{(for all that we know) it is possible}_{epistemic} \text{ that Mary will not come} \rrbracket$ is true in w iff there is at least one possible world w_1 such that $wE_i w_1$ and such that, for every possible world w_2 , such that $w_1 E_i w_2 \rightarrow \llbracket \text{Mary comes at } i_1 > i \rrbracket \in w_2$.

Assume that *Mary will come* is represented as p and therefore *Mary will not come* is represented as $\neg p$. We have demonstrated that w_1 is epistemically accessible to w . w_2 is also epistemically accessible to w_1 because p is not true in w_2 but is known to be true in w_1 . Hence (4a) is true, given W^* .

Here comes the logical inconsistency. If p and q are both true, $p \wedge q$ is also true. Since (3a) is true and (4a) is true, $(3a) \wedge (4a)$ is supposed to be true as well. However, this is not the case, as in (5).

⁴ Following Enç (1996), Kissine notes that the accessibility relation here can be either epistemic or doxastic. He uses an istemic accessibility relation as an example and proposes that the same, as discussed above, also holds for a doxastic accessibility relation.

5. ?Mary will come and (for all we that we know) it is possible_{epistemic} that she won't come.

(5) is obviously semantically contradictory. That is, a modal analysis of *will* results in logical inconsistency as discussed above. Kissine suggests that making the epistemic accessibility relation transitive can avoid this problem.

However, he finds another set of possible worlds that leads to fatal logical inconsistency. Suppose $W^{**} = \{w_1, w_2, w_3\}$. The accessibility relation here is non-Euclidean, and in W^{**} , wE_iw_1 , wE_iw_2 , but $\neg(w_1E_iw_2)$. What is known in the possible worlds and the real situations are given in (7).

6. W^{**}
- | | |
|-----------------------|------------------------|
| $w = \{q, \neg r\}$ | $K_w i = \{q\}$ |
| $w_1 = \{r, q, p\}$ | $K_{w_1} i = \{p, r\}$ |
| $w_2 = \{\neg p, q\}$ | |

Assume that $p = \llbracket \text{Mary comes at } i_1 > i \rrbracket$. The semantics of a sentence such as *it is not the case that Mary will come*, listed as (7a), is given below as (7b). The semantics of *(for all we know) it is possible_{epistemic} that Mary will come*, listed as (8a), is given as in (8b).

7. a. It is not the case that Mary will come.
 b. $\llbracket \text{It is not the case that Mary will come} \rrbracket$ is true in w iff there is at least one possible world w_1 such that wE_iw_1 and $\neg \llbracket \text{Mary comes at } i_1 > i \rrbracket \in w_1$.
8. a. (For all that we know) it is possible_{epistemic} that Mary will come.
 b. $\llbracket (\text{for all we know}) \text{ it is possible}_{\text{epistemic}} \text{ that Mary will come} \rrbracket$ is true in w iff there is at least one possible world w_1 such that wE_iw_1 and such that, for every possible world w_2 such that $w_1E_iw_2$, $\llbracket \text{Mary comes at } i_1 > i \rrbracket \in w_2$.

Kissine suggests that given W^{**} both (7a) and (8a) are true. However, the coordination of (7a) and (8a) are contradictory, as in (9).

9. ?It is not the case that Mary will come and (for all that we know) it is possible_{epistemic} that Mary will come.

In order to resolve the contradiction revealed by (9), Kissine suggests that we can make E Euclidean, which means that $\neg \text{will}(p) \rightarrow \Box[\neg \text{will}(p)]$. However, in the first place, E has been defined to be non-Euclidean. This is an unsolvable contradiction because E certainly cannot be Euclidean and non-Euclidean simultaneously.

Given the above discussion, following Abusch (1998), Kissine proposes that *will* has only a temporal semantics and not a modal meaning. Following Kratzer (1991), Kissine

suggests that the epistemic reading of *will* actually comes from a covert epistemic necessity operator.

Kissine's (2008) research is interesting in that he clearly demonstrates the possible logical flaws if *will* is treated as a modal. But, can his proposal be applied to Mandarin Chinese?

We are convinced that the answer is negative for two reasons. First, as discussed in Kissine (2008: 130), *will* has various meanings, including a future/prediction meaning, a generic meaning, a habitual meaning, an epistemic meaning, a volitional meaning, etc., and he proposes that these meanings are determined by pragmatic principles. However, in Mandarin, these meanings are expressed by different future-denoting words. For example, as discussed in Chang (2000), Hsieh (2002), Liu (1996: 40-51), etc., *hui* expresses a future/prediction meaning, a generic meaning, a habitual meaning and an epistemic meaning. *Yao* has a volitional meaning. That is, the four future-denoting words have their own meanings and their meanings are not determined by pragmatic principles. Second, one may observe that *hui* has various meanings, similar to *will*. However, even though there is similarity between *hui* and *will*, they still differ. For example, Kissine (2008: 146-147) points out that *will* cannot be used when the speaker is witnessing an event. That is why (10a) is not good. However, under the same circumstance, *hui* can be used, as in (10b).

10. a. [pointing at an instance of oil floating on water]
 ?As you can see, oil will float on water.
- b. [pointing at an instance of oil floating on water]
 jiu xiang ni keyi kandao de you hui fu zai shu shang
 just like you can see Prc oil *hui* float at water top
 'As you can see, water will float on water.'

Given the two reasons above, Kissine's proposal, while working well for *will* in English as far as we can tell, cannot be applied to the four future-expressing words in Mandarin. Therefore, the semantics of the four future-denoting words require attention.

3. Semantic Differences of *jiang*, *hui*, *yao* and *yao ... le*

Among the four expressions, the most attention has been paid to *hui*. Some studies agree that *hui* denotes future, e.g. Chang (2000), Li (1985: 47), Tang (1979: 5), Wang (1947: 136), Zhu (1982: 63), whereas others claim that *hui* is not related to future, such as Alleton (1994: 9), Cheng (1989: 22), Lü (1980: 245), etc. Not as much attention is paid to *yao*. Tsang (1981) suggests that *yao* can describe a future situation, in addition to a deontic meaning. Very little attention has been paid to *jiang*, which is commonly regarded as the Mandarin counterpart of *will*. Neither does *yao ... le* receive much attention.

The examples in (1) seem to suggest that the four expressions are interchangeable. But, this is not an accurate observation. They are not really interchangeable. Look at the examples below.

11. a. *mintian yangminshan jiang/hui/*yao xiayu*
 tomorrow Mt. Yangmin will rain
 ‘It will rain at Mt. Yangmin tomorrow.’
 b. *xuexiao jiang/hui/*yao zai xia ge yue kaixue*
 school will at next CL month start
 ‘The school will start next month.’

Hui has long been argued to be epistemic, e.g. Chang (2000), Liu (1996), Hsieh (2006a, 2006b), etc. This is why *hui* is compatible in both examples in (11). (11a) means that based on his/her knowledge the speaker asserts that the event *it rains at Mt. Yangmin* occurs tomorrow. (11b) means something similar: based on his/her knowledge the speaker asserts that the event *the school starts* occurs next month.

Jiang is used to report that a situation will occur in the future, without saying anything about the source of judgment. This ‘pure’ future sense of *jiang* is best illustrated by the example below. We often hear anchors on TV news report new events. When an anchor says:

12. *jiayi daxue jiang yu changshang hezuo kaifa xin xiangshui*
 Chiayi university *jiang* with industry cooperate develop new perfume
 ‘Chiayi University will_{pur} cooperate with industries to develop new perfumes.’⁵

[t]he audience understands that the anchor does not need to know anything about this situation and that he/she simply reports a future event. This is why *jiang* is compatible in both (11a) and (11b). In these two examples, *jiang* expresses a future very different from what *hui* expresses. *hui* denotes an epistemic future, that is, the speaker makes the statement presented by *hui* based on his/her knowledge. On the other hand, *jiang* expresses a pure future, that is, the speaker simply presents a situation that will occur in the future. The speaker does not provide any information how he/she learns about the future occurrence of the situation.

A reasonable question to ask is whether *jiang* describes a fact, i.e. whether a situation presented by *jiang* is bound to occur in the future. The answer is no because a situation presented by *jiang* can end up not occurring at all, as in (13).

⁵ From this section on, when *jiang*, *hui* or *yao* is used individually in a sentence, they are translated as *will_{pur}*, *will_{epi}*, and *will_{vol}* respectively.

13. xuexiao benlai jiang zai xia xingqi kaixue dashi yinwei H1N1 da liuxing
 school originally *jiang* at next week start but because H1N1 big prevail
 zhengfu jueding yanhou kaixue riqi
 government decide postpone start-school date
 ‘Originally, the school will_{pur} start next week. But, because H1N1 prevails, the
 government decided to postpone the date.’

In (13), although the situation *xuexiao zai xia xingqi kaixue* ‘the school start next week’ is presented by *jiang*, the future occurrence of the situation is still canceled, i.e. the school will not start on the originally scheduled date. This example shows that pure future does not indicate the certainty of future occurrence of a situation. Instead, pure future still has the uncertainty property of future. The future *jiang* expresses is referred to as ‘pure’ because neither the speaker nor the subject specifies his/her attitude or opinion toward the situation. In Hsieh’s (2006a, 2006b) terms, *jiang* can be categorized as [–source], which means that the modal does not need the information based on which the speaker makes a statement.

Contrary to *jiang*, *hui* denotes an epistemic future. The speaker uses *hui* when he/she reports a future event based on his/her knowledge. Again, in Hsieh’s terms, *hui* can be categorized as [+source], which means that the modal needs the information based on which the speaker makes an assertion.

As for *yao*, we suggest that *yao* denotes a volitional future. This is why *yao* can not be used in (11a) and (11b). The subjects in (11a) and (11b) are both inanimate and inanimate subjects do not have volition. When the subject is animate, such as (1), *yao* is compatible.

Two questions about *yao* immediately arise. The first is: is *yao* an abbreviated form for *xiangyao* ‘to want’? The second is: does *yao* express obligation, instead of volitional future? For the first question, we argue that *yao* is not an abbreviated form for the verb *xiangyao* ‘to want’. The evidence is the examples below.

14. a. xiaozhang mintian yao chuxi zhe ge huiyi !buguo keneng jin-bu-qu⁶
 Xiaozhang tomorrow *yao* attend this CL meeting but possible enter-not-go
 ‘Xiaozhang will_{vol} attend this meeting tomorrow, !but it is possible that he
 cannot go in.’

⁶ An exclamation mark on a sentence indicates that the marked sentence renders the discourse incoherent.

- b. xiaozhang mintian xiangyao chuxi zhe ge huiyi buguo keneng jin-bu-qu
 Xiaozhang tomorrow *want* attend this CL meeting but possible
 enter-not-go
 ‘Xiaozhang wants to attend this meeting tomorrow, but it is possible that he
 cannot go in.’

The examples in (14) show an appealing contrast. In (14), if it is a volitional future, then it is not possible not to allow the subject to go into the meeting, as (14a) shows. However, if it is simply a wish, then it is possible not to allow the subject to go into the meeting, as (14b) shows. In short, (14) support that *yao* is not an abbreviated form for *xiangyao* ‘to want’ and that a volitional future is different from a wish.⁷

yao does not always denote obligation, though it can, and the following example can support this argument.

15. xiaozhang mintian yao chuchai dao riben suiran ta bubu qu
 Xiaozhang tomorrow *yao* have a business trip to Japan though he need not go
 ‘Tomorrow, Xiaozhang will_{vol} have a business trip to Japan though he does not
 need to.’

If *yao* denoted only obligation, (15) would be incoherent, because in the *although* clause it is made explicit that the subject does not need to go on the business trip. Since (15) is coherent, *yao* cannot denote obligation here.⁸

One possible counterexample to *yao* denoting volitional future is as below. In (16), *yao* is used to denote a future change of state. Since the subject can be inanimate, *yao* in these examples cannot be volitional.

16. a. mintain yangminshan yao xiayu le
 tomorrow Mt. Yangmin *yao* rain Prc
 ‘It will rain at Mt. Yangmin tomorrow (contrary to the previous condition).’

⁷ There might be some grammaticalization process involved when *yao* evolves into a modal and this process leads to the semantic differences demonstrated in (14a) and (14b). But we will not go into this issue in this paper.

⁸ One might argue that in other circumstances *yao* can be an abbreviated form for *xiangyao* ‘to want’ or can denote obligation. This is an accurate statement. But the examples presented here show that, in addition to the two readings mentioned above, *yao* can also denote volitional future. This paper focuses on how *jiang*, *hui*, *yao* and *yao... le* can be semantically distinguished from each other and what their semantics are, when they are used to denote future. The issues are left for further study how to distinguish the different readings of *yao* and of *hui*.

- b. xuexiao yao zai xia ge yue kaixue le
 school yao at next CL month start Prc
 ‘The school will start next month (a change from a break).’

Both of the examples in (16) express a future change of state meaning. It should be clear that both of the examples are future situations. They also express a change of state. (16a) can be used when it has been sunny at Mt. Yangmin area for a while and it is about to change. (16b) is usually uttered by a student who has enjoyed a long break and cannot accept the fact that the school will start next month.

We would like to argue that the usage of *yao* in (16) is actually a semantic extension of volitional future. Volition certainly involves change of state because one’s desire for something entails his/her lack of that something and a change of the lack. That is, change is an essential part in the semantics of volition/desire.

The obligatoriness of the sentential *le* in these examples brings out the change of state meaning of *yao*. It is widely accepted that the sentential *le* expresses change of state among other readings, such as Li and Thompson (1981: 238-300). The combination of *yao* and the sentential *le* guarantees the future change of state reading. One interesting contrast to show the semantic contribution of the sentential *le* to the future change of state reading comes from the slang:

17. tian yao xia yu niang yao jia ren shei dou mei banfa zuzhi
 sky yao fall rain mother yao marry people who all no method stop
 ‘The sky wants to rain. A mother wants to re-marry. Nobody can stop it.’

In (17), there is no sentential *le* in *tian yao xia yu* ‘sky yao fall rain’ and under this circumstance *tian* ‘sky’ is personified and *yao* no longer denotes volitional future. Instead, *yao* here equals to *xiangyao* ‘to want’. (17) demonstrates the importance of the sentential *le* in the future change of state reading denoted by the *yao... le* combination: without the sentential *le* *yao* alone cannot express the future change of state reading. That is, in terms of semantic function, *yao... le* serves as a word, which expresses a future change of state.

Two questions about *yao* can be asked. The first is whether *yao* expresses the speaker’s volition/desire or the subject’s. Our intuition suggests that it is the subject’s, instead of the speaker’s, volition/desire that *yao* requires in its semantics. When one utters (18),

18. xiaomin yao canjia jing nian de xialingying
 Xiaomin yao participate this year DE summer camp
 ‘Xiaomin will participate in this year’s summer camp.’

[h]e can be reporting the subject's volition or he is telling others that Xiaomin is obliged to participate in this year's summer camp. The former is a volitional future reading. The latter is a deontic reading and *yao* in this reading means 'have to', or 'must', i.e. an obligation. This example shows that when *yao* expresses volitional future it talks about the subject's volition, not the speaker's.

The second question is what kind of future *yao... le* expresses, in addition to change of state. That is, based on what can the speaker use *yao... le* to describe a future change of state? Is it knowledge, volition or something else?

Yao... le cannot be based on the subject's volition because it is compatible with inanimate subjects, as in (16a) and (16b). It cannot be based on the speaker's volition because in examples such as (16a) there is no way that the speaker's volition has anything to do with a future raining event.

We propose that *yao... le* is used, based on the speaker's knowledge. When one utters (19), there must be something that triggers the speaker to say so. It can be a slight feeling of change of altitude. It can be that it is about time. That is, *yao... le* is a type of epistemic future and it is different from *hui* in that the former involves change of state, while the latter does not.

19. feiji yao xijiang le
 airplane *yao* descend Prc
 'The airplane will (start to) descend now.'

To sum up, when *jiang*, *hui*, *yao* and *yao... le* express future, they express different kinds of future. *jiang* expresses pure future, *hui* epistemic future, *yao* volitional future and *yao... le* an epistemic change of state future. A pure future means that the source based on which the speaker makes an assertion about a future situation is not specified. An epistemic future means that the source based on which the speaker makes a statement about a future eventuality is the speaker's knowledge. Volitional future means that the source based on which a statement is made about a future is the subject's volition.

4. Semantics of *Jiang*, *Hui*, *Yao* and *Yao... le*

Modal logic distinguishes the distinction between epistemic modality and deontic modality by means of accessibility relations.⁹ Kratzer (1977, 1981) utilizes conversational background to reach the same purpose. Kissine (2008) proposes that *will* in English is not a modal and has only a temporal semantics.

Given the discussions about the semantic differences among *jiang*, *hui*, *yao* and *yao... le* in Section 3, it is clear that these four future-denoting words in Mandarin cannot

⁹ For an excellent introduction to modal logic and to formal semantics of modality, readers are referred to Portner (2009).

only have temporal semantics because they require different ‘sources’ in Hsieh’s (2006a, 2006b) terms or conversational backgrounds in Kratzer’s (1977, 1981) terms. Therefore, Kissine’s (2008) semantics for *will* in English cannot be applied to *jiang*, *hui* and *yao* in Mandarin.

Based on Kratzer (1977, 1981), we propose that *hui* and *yao...le* have an epistemic conversational background and *yao* a bouletic conversational background. It is a little hard to decide an appropriate conversational background for *jiang*. We have argued that *jiang* expresses a pure future and that, when the speaker uses *jiang*, he/she simply reports that a situation will take place in the future, without revealing how he/she learns about the future occurrence of the situation. What type of conversational background does *jiang* need? We suggest that the conversational background for *jiang* is the union of all of the conversational grounds. The reason is that *jiang* can be used to report a future situation even though the speaker has knowledge about the situation or about the desire of the subject for the future situation.

Assume the following scenario. Zhangsan knows that Lisi loves sci-fi movies. He also knows that Lisi received a ticket to the preview of the new sci-fi movie Star Trek, and the preview is scheduled tomorrow. Based on the pieces of information, Zhangsan can use *hui* to report that Lisi will go the preview of Star Trek tomorrow, as (22a). However, he can also use *jiang* to report the same future situation, as (22b), without revealing his knowledge about the future situation.

Along the same line, assume that Zhangsan knows that Lisi likes sci-fi movies and the preview of Star Trek is tomorrow. He also knows that Lisi tried so hard and finally managed to get a ticket to the preview. Since Zhangsan knows about Lisi’s desire to go to the preview of Star Trek and about Lisi’s getting a ticket, he can use *yao* to report that Lisi will go to the preview of Star Trek tomorrow, as (20c). However, again, he can also use *jiang* to report the same situation, as (20b).

20. a. Lisi mintian hui qu canjia xinjizhengbazhan shouyin
 Lisi tomorrow *hui* go participate Star Trek preview
 ‘Lisi will_{eps} go to the preview of Star Trek tomorrow.’
- b. Lisi mintian jiang qu canjia xinjizhengbazhan shouyin
 Lisi tomorrow *jiang* go participate Star Trek preview
 ‘Lisi will_{pur} go to the preview of Star Trek tomorrow.’
- c. Lisi mintian yao qu canjia xinjizhengbazhan shouyin
 Lisi tomorrow *yao* go participate Star Trek preview
 ‘Lisi will_{vol} go to the preview of Star Trek tomorrow.’

The speaker can rely on other conversational backgrounds, for example, stereotypical, circumstantial, and so on. to use *jiang* to describe a future situation.

Therefore, we propose that the conversational background for *jiang* is the union of all conversational backgrounds.

Based on the discussions above, the conversational backgrounds for *jiang*, *hui*, *yao* and *yao... le* are as follows:

21. Conversational backgrounds for *jiang*, *hui*, *yao* and *yao... le*:
 - a. *jiang*: the union of all possible conversational backgrounds
 - b. *hui* and *yao... le*: a set of facts known by the speaker in *w*.
 - c. *yao*: a set of desires of the speaker in *w*.

Conversational backgrounds can help to distinguish the semantic differences of *jiang*, *hu*, *yao* and *yao... le*. How can we represent the future sense of these modals in their semantics? The only part in Kratzer's theory of modality that can help here is the ordering semantics. Kratzer (1981) proposes that possible worlds of a conversational background are ordered so as to explain different degrees of possibility that modals can express. So, we have to determine whether *jiang*, *hui* and *yao* all express necessity before we can determine their semantics.

Do *jiang*, *hui*, *yao* and *yao... le* all express necessity? Based on the following examples, we argue that only *jiang* and *yao... le* expresses absolute necessity, and *hui* and *yao* only express defeasible necessity. By absolute necessity, we mean the necessity cannot be overridden. See the examples below.

22. a. zhangsan jiang jinru junxiao jiudu
 Zhansang *jiang* enter military school study
 'Zhangsan will_{pur} attend the military school.'
- b. *zhangsan yiding jiang jinru junxiao jiudu
 Zhansang definitely *jiang* enter military school study
- c. zhangsan hui/yao jinru junxiao jiudu
 Zhansang *hui/yao* enter military school study
 'Zhangsan will_{epi}/will_{vol} attend the military school.'
- d. zhangsan yiding hui/yao jinru junxiao jiudu
 Zhansang definitely *hui/yao* enter military school study
 'Zhangsan definitely will_{epi}/will_{vol} attend the military school.'
- e. *feiji yiding yao jiangluo le
 airplane definitely *yao* land Pre

As we can see from the examples in (22), *yiding* 'definitely' is compatible with *hui*

and *yao*,¹⁰ but not compatible with *jiang* or *yao... le*. *yiding* ‘definite’ is used for emphasis. In (22), it is used to enhance the degree of certainty and of desire for a future situation. Degrees of possibility are discussed in Kratzer (1981). Portner (2009: 73-81) discusses complex expressions of probability and possibility and suggests an approach similar to the way to deal with the degrees of adjectives for this kind of complex expressions.

However, as far as we know, few, if any, studies deals with degrees of certainty. Actually, the question is whether certainty (necessity) has different degrees. When one says that he is not that certain about something, he is not 100% certain about that thing, though there is possibility of that thing being true. When one says he is only 50% certain about something, actually he is saying that there is 50% possibility of that thing being true. But, when one says that he is certain, then here certainty equals necessity. It can be safely concluded that when the degree of certainty is specified, certainty refers to possibility, while certainty equals to necessity when no degree is explicitly mentioned. Given the discussion, we propose that certainty, by default, refers to necessity and it can be shifted to refer to possibility when the context specifies so.

The examples in (22) suggest that *jiang* and *yao... le* expresses absolute necessity while *hui* and *yao* denote defeasible necessity. *jiang* expresses necessity and this is not defeasible. Therefore, we cannot talk about the degrees of *jiang*. This is why *yiding* ‘definitely’ is not compatible with the pure future modal. The same reasoning applies to *yao... le*. On the other hand, *hui* and *yao* denotes defeasible necessity, that is, it can be overridden, similar to the discussion about *certain* above. This is why we can talk about the degrees of *hui* and *yao*, and why *yiding* is compatible with them. The example in (23) can further support this distinction between *jiang* and *yao... le* on the one hand, and *hui* and *yao* on the other, in terms of defeasibility of necessity.

23. zhangsan bu yiding hui/yao/ jinru junxiao jiudu
 Zhangsan not definitely *hui/yao/*jiang* enter military school study
 ‘Zhangsan not necessarily will_{epi}/will_{vol}/*will_{pur} attend the military school.’

(23) is the negation of (24d). But (23) does not mean that Zhangsan will definitely not attend the military school, and instead it means that it is not necessarily true that Zhangsan will attend the military school. That is, (23) is actually talking about the degrees of certainty. If *hui* and *yao* did not express defeasible necessity, it would be impossible to talk about their degrees.

In addition to necessity, one more piece in the semantics of *jiang*, *hui*, *yao* and *yao... le* needs to be discussed, i.e. their future meaning. Enç (1996) proposes a temporal

¹⁰ Kissine (2008: 150) observes a similarity of the (in)compatibility of *will* and *must* with *definitely*.

semantics for *will* in English and also suggests that *will* expresses necessity. Kissine (2008) finds out the logical inconsistency caused by Enç's proposal and proposes a pure temporal semantics for *will*. How about the three future modals *jiang*, *hui*, *yao* and *yao... le* in Mandarin?

We propose that as far as the ordering semantics for *jiang*, *hui*, *yao* and *yao... le* is concerned, in addition to being ordered relative to conversational backgrounds, the possible worlds are also ordered relative to time. The ordering of possible worlds relative to time is a special semantic property for future modals because they, after all, express future. Based on this idea, an ordering relative both to conversational backgrounds and a time $\langle_{g(w), t}$ can be defined as follows:

24. g is a conversational background, t is time and $\langle_{g(w), t}$ is an ordering generated by the set of propositions $g(w)$ and a time t . For any set of propositions $g(w)$, any world u, v , and any time t , $u \langle_{g(w), t} v$ iff:
- (i) for all $p \in g(w)$, if $v \in p$, then $u \in p$, and
 - (ii) for all $q, q' \in g(w)$, if $v \in q$ and $u \in q'$, then $q \pi q'$

(24i) is the regular definition of ordering, e.g. Kratzer (2003: 374),¹¹ Portner (2009: 64-65), which says in terms of $g(w)$, u is better than v . (24ii) deals with the temporal semantics of future. It says: for all propositions q and q' in $g(w)$, if q is true in v and q' is true in u , then q occurs before (= in the past of) q' . Since q and q' are temporally ordered, the two possible worlds in which they are true are also temporally ordered, i.e. v exists in the past of u or u exists in the future of v . That is, $u \langle_{g(w), t} v$ means that u is better than v and u is located in the future of v .

Two points about the ordering source in (24) are worth mentioning. First, both (24i) and (24ii) apply on the same two possible worlds. It needs to be so because we need two worlds ordered relative to a conversational background are also ordered relative to time. If they do not apply to the same two possible worlds, then it will be possible that two worlds ordered relative to time are not ordered relative to a conversational background, and this kind of ordering source cannot accurately capture the semantics of future modals. Second, usually an ordering source is represented by \leq , where $u \leq v$ is interpreted as u is at least as good as v . However, we use $<$ in (24) because in terms of future I do not want the possibility that u is simultaneous with v .

Given the definition of an ordering source relative both to a conversational background and a time (24), the semantics for *jiang*, *hui*, *yao* and *yao... le* are provided as in (25).

¹¹ This paper is actually a re-print of Kratzer (1981). Here I cite the page number of the 2003 print.

25. f is the modal base and is used to form a conversational background $I f(w)$. g is the ordering source.
- $\llbracket jiang(p) \rrbracket^{c,f,g} = 1$ iff all $u \in I f(w)$, there is a $v \in I f(w)$ such that (i) $v <_{g(w), t} u$, and (ii) for all $z \in I f(w)$: if $z <_{g(w), t} v$, then $z \in p$.
 - $\llbracket hui(p) \rrbracket^{c,f,g} \approx 1$ iff all $u \in I f(w)$, there is a $v \in I f(w)$ such that (i) $v <_{g(w), t} u$, and (ii) for all $z \in I f(w)$: if $z <_{g(w), t} v$, then $z \in p$.
 - $\llbracket yao(p) \rrbracket^{c,f,g} \approx 1$ iff all $u \in I f(w)$, there is a $v \in I f(w)$ such that (i) $v <_{g(w), t} u$, and (ii) for all $z \in I f(w)$: if $z <_{g(w), t} v$, then $z \in p$.
 - $\llbracket yao\ le(p) \rrbracket^{c,f,g} = 1$ iff all $u \in I f(w)$, there is a $v \in I f(w)$ such that (i) $v <_{g(w), t} u$, and (ii) for all $z \in I f(w)$: if $z <_{g(w), t} v$, then $v \in \neg p$ and $z \in p$.

The semantics in (25) look the same because, after all, *jiang*, *hui*, *yao* and *yao... le* all express necessity. In terms of ordering source, they are the same, except for two points. As discussed previously, we have established that *jiang* denotes necessity, while *hui* and *yao* by default express necessity. In (25b) and (25c), \approx is used to represent the ‘default semantics’ for *hui* and *yao*.¹² Moreover, since *yao... le* also expresses change of state, in (25d), it is specified that p is true in z while p is not true in v , given $z <_{g(w), t} v$.

In addition, although the semantics in (25) look identical, actually they are not identical because $I f(w)$ are different: *jiang* uses an union of all possible conversational backgrounds, *hui* uses an epistemic background and *yao* uses a bouletic conversational background. The semantics for *jiang*, *hui*, *yao* and *yao... le* proposed here do not have the problem Kissine (2008) points out. The set of possible worlds Kissine uses to demonstrate the logical inconsistency caused by a modal analysis of *will* is give below as (26).

$$\begin{array}{ll}
 26. W^* & w = \{p\} & K_w i = \{p\} \\
 & w_1 = \{p, \neg r\} & K_{w_1} i = \{\neg r\} \\
 & w_2 = \{\neg r, \neg p\} &
 \end{array}$$

The ordering source (24) rules out the possibility that W^* is a valid for the three future modals in Mandarin discussed in this paper. (24) explicitly states that, if q is true in a world v and q' is true in a world u , then q occurs in the past of q' . Though it is not specified that q and q' are not the same proposition, yet since q occurs in the past of q' , they cannot be the same proposition. In W^* , p is true in both w and w_1 and therefore these two worlds are not valid for the ordering source (24). In this way, our proposal can avoid the problem Kissines (2008) discusses, even if his criticism is accurate.

¹² One interesting issue is how this default semantics can be overridden. This issue will be not discussed here and is left for future study.

5. Conclusion

In this paper, we attempt to examine whether the four future-denoting words in Mandarin, *jiang*, *hui*, *yao* and *yao... le*, are modals and what their semantics are. Contrary to Kissine's (2008) criticism against *will* in English being a modal, we argue that *jiang*, *hui*, *yao* and *yao... le* are modals because their semantics rely both on conversational backgrounds and ordering sources. We propose that *jiang* expresses a pure future, *hui* an epistemic future, *yao* a volitional (bouletic) future and *yao... le* a change of state epistemic future. The conversational background for *jiang* is an union of all possible conversational backgrounds, *hui* and *yao... le* requires an epistemic conversational background and *yao* requests a bouletic conversational background. The ordering source required by *jiang*, *hui*, *yao* and *yao... le* is different from a usual ordering source as discussed in Kratzer (1981) and Portner (2009: 64-65) in that it is ordered relative to time, in addition to a conversational background. In this way, the temporal semantics of *jiang*, *hui*, *yao* and *yao... le* are captured in terms of ordering source. We also argue that *jiang* and *yao... le* expresses necessity, whereas *hui* and *yao* defeasibly denote necessity. With appropriate conversational backgrounds, a new ordering source relative to both conversational backgrounds and time, and (default) necessity, we propose semantics for these three future modals.

It is true that *hui* and *yao* can express more than future. In this paper, we do not commit ourselves to whether *hui* and *yao* are ambiguous or polysemous. Though *hui* and *yao* have several meanings, it is certain that one of their meanings is future. In this paper, we provide semantics for the future meaning of *jiang*, *hui*, *yao* and *yao... le*, which can serve as a base for comparison. We hope that this study can contribute to the research toward a complete understanding of the semantics of *jiang*, *hui*, *yao* and *yao... le* and of future and modality in general.

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