

“Wanting” the future: The case of future *yao*

Nick Huang, Annemarie van Dooren, and Gesoel Mendes
National University of Singapore, University of Maryland

This paper addresses questions about the status of future *yao* “will, going to, about to” in Mandarin Chinese. Using evidence from future *yao*’s synchronic distribution and interpretation, we argue that it has the syntax and semantics typical of a root modal or aspect marker, rather than those of an epistemic modal. Our proposal bears on a recent debate over how future *yao* should be analyzed (Ren 2008, Wu & Kuo 2010, T.-H. J. Lin 2012, Santana Labarge 2016, etc.) as well as on questions about grammaticalization, since *yao* is said to have developed from either a desire verb (“want”) or deontic / teleological modal (“must, need to”). We suggest that these properties of future *yao* reflect an initial formal alignment between its desire or deontic/teleological precursors and root modals (or aspect markers).

0. Introduction¹

Although Chinese does not have tense morphology, it has various overt markers for indicating future events and states, for example, *jiang*, *hui*, and *yao*. This paper focuses on *yao* “will, be going to, be about to” (1), which many have claimed is an epistemic modal (e.g. Ren 2008, Wu & Kuo 2010, Santana Labarge 2016). We evaluate this claim from a distributional angle. We present novel evidence that *yao* behaves syntactically more like a root modal or an aspect marker (building on the aspectual analysis in T.-H. J. Lin 2012) and argue that it is likely to have both modal and aspect semantics.

- (1) Lisi yao shuìjiào (le).
 Lisi YAO sleep LE
 Future *yao*: ‘Lisi is going/about to sleep.’²

Our analysis and diagnostics add to a recent literature concerned with the expression of temporal relations in Mandarin Chinese (e.g. Smith & Erbaugh 2005, J.-W.

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² Abbreviations used in glosses: CL: classifier; LE: change-of-state particle *le*; PFV: perfective; PROG: progressive; PRT: particle

Lin 2006, Ren 2008, Wu & Kuo 2010, Sun 2014, Huang 2015, Chen & Husband 2018, among others). It also contributes to work on the range of ways in which the future is expressed across languages (see Bochnak 2019 for an overview).

Beyond questions about tense, modality, and aspect, our conclusions about *yao* also have implications for diachronic change. *Yao* has several uses in modern Mandarin: in addition to being a future marker, it marks desire (“want”) and deontic or teleological modality (“must, need”). As many have observed, these uses are diachronically related (Ota 1987, Wang 1989, Lu 1997, Santana Labarge 2016, among others). *Yao* began as a verb with request or demand-like semantics and acquired a deontic or teleological reading (“must, need to VP”) by around 200 C.E. *Yao* as a desire verb (“want to VP,” “want NP”) appears later, by the Tang period (600-900 C.E.). Clear evidence of a non-deontic/teleological, non-desire future use appears even later, although it is unclear whether the future use developed directly from the desire use (Lu 1997) or directly from the deontic/teleological use (Santana LaBarge 2016). By studying what properties *yao* currently has as a future marker, we are better placed to address questions about how it might have changed diachronically, and how the case of *yao* informs general theories about the grammaticalization of desire or obligation verbs into future markers (Bybee et al. 1994, Harris & Campbell 1995, etc.).

The paper is organized as follows. Section 1 provides background on cross-linguistic variation in how the future is expressed grammatically and how *yao* bears on this issue. Section 2 lays out some arguments that the future *yao* and the other uses of *yao* constitute a case of ambiguity, rather than semantic generality. Section 3 provides distributional evidence for a root modal or aspect analysis of *yao*. Section 4 discusses aspects of the semantics of future *yao*, pointing out that it has properties characteristic of modals. Section 5 offers speculations on why *yao* might have developed into a root modal or aspect marker, but not into an epistemic modal. Finally, Section 6 concludes.

1. Desire, future, and modality

There is substantial variation in the analysis of items expressing a future-like meaning (Bochnak 2019). Take for instance English *will*. Is *will* a tense marker, in that it shifts the time of evaluation of the sentence forward with respect to the utterance time (Kissine 2008)? Some have instead argued that *will* is not the exact mirror image of the past tense (Palmer 1987, Klecha 2014, among others): The future, in contrast to the past, is unknown, and a way to incorporate this notion of uncertainty is to assume a modal analysis for *will*, in which it is treated as a quantifier over possible worlds.

A further factor in the debate is that future markers within the same language have different meanings: In English, *will* has been argued to be different from *going to*, which Copley (2001, 2009) claims is a combination of a modal and an aspect (a progressive). Cross-linguistically, finally, future markers show variable behavior, with some markers behaving parallel to tenses, while others behave more parallel to modals (see Bochnak

2019). More specifically, some proponents of a modal analysis of future markers claim that the modal flavor is epistemic (Giannakidou & Mari 2014), in that it deals with our knowledge about future events. An interesting piece of support for this analysis is that *will* in English can be used both as a future marker and an epistemic modal (2).

- (2) a. I will go home now. (Future)
b. That will be the postman. (Epistemic: “Given our knowledge, ...”)
(from Palmer 1987)

Ren (2008), Wu & Kuo (2010), and Santana Labarge (2016), among others, also propose that *yao* is an epistemic modal. In this paper, we argue against this proposal. We claim that *yao* is a root modal that deals with future *circumstances*, or an aspect (as claimed by T.-H. J. Lin 2012), or a combination thereof. We use root modality as a term that covers all non-epistemic modalities, i.e., deontic, teleological, ability, and other modalities (3). It has long been known that epistemic and non-epistemic modalities differ quite radically in the syntactic and semantic environments they occur in (Ross 1969, Brennan 1993, Hacquard 2006, 2010, Kratzer 2013, among others). An example is that non-epistemic modals are generally future-oriented (they combine with an event in their preajacent that lies in the future of the evaluation time of the modal), while epistemic modals are not (e.g. Condoravdi 2002, Klecha 2016, though see Thomas 2014 for some modifications). We will discuss ways in which epistemic and non-epistemic modals differ in Mandarin, and argue that *yao* patterns with the non-epistemics.

- (3) Root modal (English *have to*)
a. I have to pay taxes. (Deontic: “According to the law, ...”)
b. I have to drink a glass of water. (Teleological: “To stay hydrated, ...”)

Our analysis of *yao* is also predicated on the assumption that future *yao* is grammatically distinct from the other uses associated with *yao*. That is, there isn’t just a single *yao* that is semantically general enough to accommodate the various uses. Arguments against semantic generality and for ambiguity can be found in Li & Thompson (1981), who showed clearly that desire and future *yao*s have different distributions. In the next section, we briefly present two arguments to establish the point.

2. *Yao*: a case of ambiguity

Here, we compare future *yao* with desire *yao* “want” and deontic/teleological *yao* “must, need to,” from which future *yao* has been claimed to descend (Lu 1997, Santana LaBarge 2016).

Li & Thompson (1981:175-176) describe a simple test to distinguish between desire and future *yao*: desire *yao* can be negated with *bu*, but future *yao* cannot be (4). We note here that deontic/teleological *yao* cannot be negated either.

- (4) Tamen bu yao he kafei.
 they NEG YAO drink coffee
 i. Desire *yao*: ‘They don’t want to drink coffee.’ (‘They want to not drink coffee.’)
 ii. #Future *yao*: ‘They are not going to drink coffee.’
 iii. #Deontic *yao*: ‘They are required to not drink coffee’/ ‘They are not required to drink coffee.’

Distinguishing between deontic/teleological and future *yao* is a little more complex. We use a standard test of semantic generality and ambiguity (Zwicky & Sadock 1973). Take for example English *teacher* (or Mandarin *laoshi* / *jiaoshi* “teacher”), which is semantically general in that it is compatible with any subject of instruction. When a semantically general predicate like *teacher* takes two conjoined NPs as its argument, the resulting sentence is compatible with what we call a uniform or a mixed reading (5a).

To the extent that *yao* is semantically general between deontic / teleological and future uses, mixed readings should also be available. This is not the case, however: mixed readings are decidedly infelicitous (5b). From this, we conclude that *yao* is not only ambiguous between desire and future, but that distinction between future *yao* and deontic/teleological *yao* is an instance of another ambiguity.

- (5) a. Mary and John are teachers.
 i. Uniform reading: ‘Mary is a math teacher. John is also a math teacher.’
 ii. Mixed reading: ‘Mary is a math teacher. John is a physics teacher.’
 b. Lisi he Zhangsan mingtian yao qu Chengdu le.
 Lisi and Zhangsan tomorrow YAO go Chengdu LE
 i. Uniform deontic/teleological reading: ‘It is now the case that Lisi and Zhangsan must go to Chengdu tomorrow.’ (Scenario: This morning, Lisi and Zhangsan were ordered by their boss to go to Chengdu tomorrow.)
 ii. Uniform future reading: ‘Lisi and Zhangsan are going to go to Chengdu tomorrow.’ (Scenario: Lisi and Zhangsan made plans a long time ago to go to Chengdu tomorrow.)
 iii. #Mixed reading: ‘It is now the case that Lisi must go to Chengdu tomorrow, and Zhangsan is going to Chengdu tomorrow.’ (Scenario: This morning, Lisi was ordered to go to Chengdu tomorrow, while Zhangsan had made plans a long time ago to Chengdu tomorrow.)

3. Future *yao* as a root modal or aspect marker

In this section, we critically examine recent claims that future *yao* is an epistemic modal. We make use of the fact that in Mandarin, epistemic modals, like *keneng* “maybe, might,” *kending* “must,” and *yinggai* “should, probably,” have a different distribution from root modals (e.g. deontic, teleological, bouletic, circumstantial modals) and aspect markers. The relevance of this distributional difference has generally gone underappreciated in previous work on *yao*. Here, we use it to provide independent evidence that *yao* behaves more like a root modal or an aspect marker.

Ideally, we would like to be more specific about whether *yao* patterns with root modals or with aspect markers. However, modality and aspect can be closely intertwined, for instance, in the case of the progressive and prospective aspects (Dowty 1977, Portner 1998, Copley 2001, 2009, among others). Furthermore, to the best of our knowledge, there is no definitive morphosyntactic diagnostic for differentiating between these two categories, whether for Mandarin or for other languages. For these reasons, we will primarily be concerned with how root modals and aspect markers as a whole are different from epistemic modals.

First, epistemic modals can freely take a complement with the copula *shi* “be” (6a). In contrast, there are restrictions on root modals co-occurring with the copula (6b-c),³ and aspect markers in general cannot occur with the copula at all (6d).

- (6) a. Lisi *keneng* / *kending* / *yinggai* *shi* *gongmin*.
 Lisi might must should be citizen
 ‘Lisi might / must / should be a citizen.’ (Scenario: We know that Lisi’s children are citizens and citizenship is inherited from one’s parents.)
- b. *Lisi *keyi* / *nenggou* *shi* *gongmin*.
 Lisi can can be citizen
 Intended: ‘Lisi is allowed to be(come) a citizen.’ (Scenario: Lisi has met the requirements for naturalization.)
- c. ??Lisi *xuyao* / *bixu* *shi* *gongmin*.
 Lisi need need be citizen
 Intended: ‘Lisi needs to be(come) a citizen.’ (Scenario: Lisi is a non-citizen but wishes to run for election.)
- d. *Lisi *zai* *shi* *gongmin*.
 Lisi PROG be citizen
 Intended: ‘Lisi is currently a citizen.’

³ The restriction against root modals and *shi* is lifted when the subject is generic (i), although we do not have an account for why there is such an exception.

- (i) Houxuanren *bixu* *shi* *sanshi-wu-sui* *yishang de* *gongmin*.
 candidate must be thirty-five-years.old above MOD citizen
 ‘Candidates must be citizens above the age of 35.’

(7) shows that future *yao* also cannot take a complement with the copula.

- (7) * Lisi yao shi gongmin (le).
 Lisi YAO be citizen LE
 Intended: ‘Lisi going to be(come) a citizen.’ (Scenario: Lisi is just about to take the oath of allegiance.)

To be clear, this argument can be seen as a narrower version of T.-H. J. Lin’s (2012) claim that epistemic modals can have “stative” complements and future *yao* cannot. We avoid appealing to stativity because it might cover too broad a class of predicates: some arguably stative predicates, like *you* “have, to exist,” can appear with *yao* (8).

- (8) Kanlai zhe bu dianying yao you xuji (le).
 looks.like this CL movie YAO have sequel LE
 ‘It looks like this movie is going to have a sequel.’

Our second argument involves the change-of-state particle *le*, which can be translated along the lines of “It is now the case, when it was not before, that...” For the sake of argument, we adopt the generalization that epistemic modals scope above *le* (9a), while root modals and aspect markers scope under it (9b-c) (Santana LaBarge 2016, also see more discussion in T.-H. J. Lin 2012).

- (9) a. Zhangsan keneng/ kending / yinggai qu Taipei le.
 Zhangsan might must should go Taipei LE
 Epistemic > *le*: ‘It is possible / necessary / probable that it is now the case that Zhangsan went to Taipei.’ (#‘It is now the case that Zhangsan might / must / should go to Taipei.’)
 b. Zhangsan neng qu Taipei le.
 Zhangsan able go Taipei LE
Le > root: ‘It is now the case that Zhangsan is able to go to Taipei.’
 c. Zhangsan qu-le Taipei le.
 Zhangsan go-PFV Taipei LE
Le > aspect: ‘It is now the case that Zhangsan has now gone to Taipei.’

Santana LaBarge (2016:413) claims that *yao* scopes above *le* like an epistemic modal, pointing to the interpretations given in (10a-b) as evidence. The intuition is that if Zhangsan had always had plans to go to Chengdu tomorrow, then the *le* > *yao* reading (10a) should be pragmatically odd, since this reading implies that Zhangsan had no plans to go to Chengdu until much more recently.

- (10) Zhangsan mingtian yao qu Chengdu le.
 Zhangsan tomorrow YAO go Chengdu LE
 Scenario: Zhangsan made plans a long time ago to go to Chengdu tomorrow.
 a. #*Le* > *yao*: ‘It is now the case that tomorrow, Zhangsan will go to Chengdu.’
 b. *Yao* > *le*: ‘Tomorrow, it will be the case that Zhangsan goes to Chengdu.’
 (adapted from Santana LaBarge 2016:413 ex. 33)

We have no issues with the form of Santana LaBarge’s claim, as presented in (9) and (10). However, we would like to argue that there is actually a viable *le* > *yao* reading available for (10). For this alternative analysis to work, one needs to assume, following Li & Thompson (1981:175), that *yao* marks an immediate future, i.e., *yao* is semantically more like English *about to* than *will*. (11) provides support for this assumption: the occurrence of *mingnian* “next year” instead of *mashang* “right away” with *yao* reduces acceptability.

- (11) Mashang / #Mingnian yao rishi le.
 right.away next.year YAO solar.eclipse LE
 Intended: ‘There will be a solar eclipse right now / next year.’

On the assumption that *yao* expresses an immediate future, (10) can receive a paraphrase where *le* scopes over *yao*, along the lines of “It is now the case (= *le*) that there is an immediate future (= *yao*) event tomorrow of Zhangsan going to Chengdu.” More specifically, previously, Zhangsan’s trip was deemed to be too far in the future, so describing it with *yao* would have been inappropriate. However, enough time has since passed, so there has been a change of state at the time of speech: the trip is now only a day away, so it can be described as imminent. *Yao* is therefore licensed.

Time adverbs provide a third argument. Mandarin modals – epistemic or root – can appear in modal-time adverb-verb word order (12); (12c) shows that this is the case for the various root readings of *yao*. Time adverbs can also precede modals, although this fact is irrelevant for our purposes.

- (12) a. Zongtong keneng mingtian jiejian dashi.
 president might tomorrow meet ambassador
 Epistemic *keneng*: ‘The president might meet the ambassador tomorrow.’
 (Scenario: there are rumors of a meeting.)
 b. Zongtong keyi mingtian jiejian dashi.
 president able tomorrow meet ambassador
 Root (circumstantial) *keyi*: ‘The president is able to meet the ambassador tomorrow.’ (Scenario: the president just had a meeting cancelled, and so can meet the ambassador.)

- c. Zongtong yao mingtian zhiqian jiejian dashi.
 president YAO tomorrow before meet ambassador
 Root *yao* (desire *yao* “want” or deontic *yao* “must”): ‘The president wants/has to meet the ambassador before tomorrow.’

In contrast, for the progressive aspect *zai*, the word order is time adverb-*zai*-verb (13). (The other aspect markers are irrelevant for this discussion because they are all verbal suffixes. It is not possible at all for them to precede a time adverb.)

- (13) a. * Zongtong zai {xianzai / nashi} jiejian dashi.
 president PROG now that.time meet ambassador
 Intended: ‘The president is meeting the ambassador now / was meeting the ambassador at that time.’
 b. Zongtong {xianzai / nashi} zai jiejian dashi.

Future *yao* patterns more like *zai*: as (14) shows, time adverbs as a rule precede *yao*, with only two exceptions: *mashang* “right away” (Yuhan Zhang, p.c.) and *suishi* “at any moment.” This parallel with *zai* is suggestive that *yao* is aspectual (as claimed by T.-H. J. Lin 2012), although the exceptions mean that we should be careful about interpreting it as clear evidence that *yao* is an aspect marker. (This word order difference between future *yao* and desire and deontic/teleological *yao* also provides additional evidence in favor of an ambiguity analysis.)

- (14) a. * Zongtong yao {guohou / wu fenzhong hou} jiejian dashi (le).
 president YAO later five minute after meet ambassador LE
 Intended: ‘The president is going to meet the ambassador later / in five minutes.’
 b. Zongtong {guohou / wu fenzhong hou} yao jiejian dashi le.

To summarize, we have pointed out several ways in which epistemic modals like *keneng* “maybe,” *kending* “must,” and *yinggai* “should” differ systematically from root modals and aspect markers in Mandarin. To the extent that future *yao* is an epistemic modal, we predict that its distribution should pattern with *keneng*, *kending*, or *yinggai*. However, this prediction is not borne out, *contra* Ren 2008, Wu & Kuo 2010, and Santana LaBarge 2016. Instead, the evidence is compatible with *yao* being a root modal or an aspect marker, along the lines of T.-H. J. Lin 2012.

4. Remarks on future *yao*'s semantics

Our conclusion about the syntax of future *yao*, namely, it has the distribution of a root modal or aspect marker, and not that of an epistemic modal, raises an important question about *yao*'s semantics: does it have root modal or aspect semantics?

This is admittedly a difficult question to answer, for two reasons. First, as far as we know, there is no widely-accepted test for positively identifying aspect semantics. Second, the question presupposes that a lexical item can have either aspect or root modal semantics, but not both. However, this assumption might be too strong: the progressive aspect marker *be going to* in English has been argued to exhibit both aspectual and modal semantics (Dowty 1977, Portner 1998, Copley 2001, 2009, among others).

Given these claims about English *be going to*, it is not implausible that *yao* also has both aspectual and modal semantics. We tentatively suggest that *yao* encodes prospective aspect, locating the event denoted by the VP in the future of a reference time (Reichenbach 1947) or topic time (Klein 1994).

We can show with more certainty that *yao* passes two diagnostics of modal semantics. The first diagnostic, proposed by Klecha (2014), is that a lexical item with modal semantics should support a counterfactual, nonveridical reading. This property follows easily from a classical analysis of modal operators as quantifiers over possible worlds (e.g. Kratzer 1991). (15a) illustrates this point for the modal *yinggai* "should," while (15b) makes the same point for *yao*.

- (15) a. Kafei benlai yinggai he-wan de.
 coffee originally should drink-finish PRT
 'The coffee should have been finished.' (There is still some coffee left.)
 b. Kafei benlai yao he-wan de.
 coffee originally YAO drink-finish PRT
 'The coffee was going to be finished.' (There is still some coffee left.)

The second diagnostic is polysemy. Cross-linguistically, a modal can be associated with several modal flavors. For instance, English *must* can have epistemic (necessarily true given one's knowledge), deontic (necessary given certain rules), or teleological flavors (necessary given one's goals). Mandarin *neng* and *hui* are also polysemous: *neng* has deontic and ability flavors (16a), while *hui* has ability and future readings (16b). The same is true for *yao*, as mentioned previously. In addition to the future use, *yao* is also associated with bouletic (desire), deontic, teleological, and circumstantial readings (17).

- (16) a. Lisi neng kai che.
 Lisi can drive car
 Deontic modal: 'Lisi is allowed to drive a car.'
 Ability modal: 'Lisi is able to drive a car.'

- b. Lisi hui tan gangqin.
Lisi can play piano
Ability modal: 'Lisi is able to play the piano.'
Future modal: 'Lisi will play the piano.'
- (17) a. Qiangxie yao cunfang hao.
firearm YAO store good
Deontic / teleological modal: 'Firearms must be stored well.' (if one wishes to avoid accidents, to comply with laws, etc.)
- b. Dongtian guoqu, xueren zongshi yao ronghua de.
winter pass snowman always YAO melt PRT
Circumstantial modal: 'When winter ends, snowmen always melt.'

5. Why is future *yao* a root modal or aspect marker?

Given that future *yao* is a root modal or aspect that developed out of a desire or deontic/teleological use, we consider why it should have grammaticalized in this way. This question is relevant because there are other directions that *yao* could have taken. For instance, consider English *will*, which developed from a desire verb in Old English. As mentioned earlier, *will* has arguably epistemic properties (18a). *Yao* could have developed into an analogue of *will*, but it did not. Besides the distributional arguments presented above, we can show that (18b), the equivalent of (18a) with *yao*, is unacceptable.

- (18) a. Oil will float on water. (Given our knowledge about how oil and water behave.)
- b. *You yao fu zai shui-mian shang (de / le).
oil YAO float at water-surface above PRT LE
Intended: 'Oil will float on water.'

Obviously, it is difficult to give a definitive answer to why *yao* developed the way it did. What we will do here instead is to offer a formal perspective on the problem, integrating formal approaches to grammaticalization (e.g. Lightfoot 1979, Roberts & Roussou 2003, Hacquard & Cournane 2016; see also Santana LaBarge 2016 for a different framework) with observations about *yao*'s development (e.g. Ota 1987, Wang 1990, Lu 1997, Santana LaBarge 2016). Although it is unclear whether the future use developed directly from the desire use (Lu 1997) or directly from the deontic/teleological use (Santana LaBarge 2016), we suggest that either development trajectory helped ensure that future *yao* has root modal or aspect properties.

More specifically, if future *yao* had developed from a deontic/teleological modal ("must, need to"), which is itself a type of root modal, then it would of course be unsurprising for it to retain root modal properties. But we would also like to suggest that even if future *yao* had developed directly from a verb with desire semantics ("want"), it

would also be quite natural for future *yao* to have root modal or aspect marker properties, because of formal similarities between verbs and root modals / aspect markers.

At a high level, the fact that the desire verb *yao*, which can take complement clauses, should develop into a functional head over time is unsurprising. For instance, Roberts & Roussou (2003) point out that biclausal (control) constructions are often susceptible to reanalysis as a monoclausal construction, especially if there is no clear morphosyntactic evidence that the complement of the control predicate is a clause. In the context of *yao*, this means that a string like (19) can be plausibly analyzed in two ways. The first is a biclausal analysis where *yao* is a control predicate and *shuijiao* its complement clause (19a). The second is a monoclausal analysis, where *shuijiao* is the main verb of the sentence, and *yao* a functional head in the clausal spine (19b).⁴

- (19) Lisi yao shuijiao.
 Lisi want sleep
 a. *Yao* + complement clause: [Lisi [_{VP} yao [_S PRO shuijiao]]
 b. *Yao* + VP: [Lisi [_{FP} yao [_{VP} shuijiao]]

However, this reanalysis proposal alone is not specific enough to explain why desire *yao* acquired root modal or aspect marker properties. We suggest that this development might follow because of the following cross-linguistic generalization: verbs scope under tense, as do aspect and root modals. Epistemic modals, on the other hand, scope over tense (Groenendijk & Stokhof 1975, Iatridou 1990, among others, but see Rullmann & Matthewson 2018 for a claim that root modals can scope over tense). This initial alignment between verbs and root modals / aspect might have helped ensure that future *yao* has root modal or aspectual properties.

Here, we abstract away from the contentious issue of how tense is represented in Chinese (see J.-W. Lin 2006, 2010, Sybesma 2007, T.-H. J. Lin 2012, Sun 2014, Huang 2015, Chen & Husband 2018, etc. for recent discussion) and whether to cash out this generalization about modality and tense in structural terms (cf. Cinque 2006, Hacquard 2006, Grano 2015). What is more relevant here is the cross-linguistic robustness of this generalization, illustrated in (20) and (21) for English and Mandarin: it suggests strongly that the same scope generalizations should hold in earlier varieties of Chinese, even though we obviously cannot access native speaker intuitions for these varieties.

- (20) a. John had to be at home last night.
 b. Yuehan zuowan yinggai zai jia.
 John last.night should be home

⁴ A similar intuition that control predicates can be instantiated as functional heads and/or take VP-like complements can be found in the literature on restructuring (e.g. Wurmbrand 2001, Cinque 2006, Grano 2015, Huang 2018).

- (i) Epistemic modal > past: ‘(Given what we now know,) it is now necessary/probable that last night, John was at home.’
 - (ii) Past > root modal: ‘Given the circumstances last night, there was a requirement then that John be at home.’ (e.g. it was John’s wife’s birthday.)
- (21) a. Last night, Zhangsan wanted to go home.
 b. Zuowan Zhangsan yao hui jia.
 last.night Zhangsan want return home
 (i) #*Want/Yao* > past: ‘It is now desirable that Zhangsan was home last night.’
 (ii) Past > *want/yao*: ‘Given the circumstances last night, it was then desirable for Zhangsan to be at home.’

More tentatively, we note that there are two other formal properties that modern Mandarin desire *yao* “want” shares with root modals but not epistemic modals. To the extent that these properties of desire *yao* and modals predate the development of future *yao*, they provide additional reasons for why future *yao* came to behave more like a root modal than an epistemic modal.

First, desire *yao* cannot have a complement with the copula *shi* (22). This fact parallels the copula facts shown earlier: root modal and aspect markers impose restrictions on whether the complement can have the copula, but epistemic modals do not.

- (22) *Lisi yao shi gongmin.
 Lisi want be citizen
 Intended: ‘Lisi wants to be(come) a citizen.’

Second, in terms of interpretation, desire *yao* is incompatible with a present temporal orientation: the time of the event in *yao*’s complement cannot be simultaneous with the time of the desire (23). Likewise, root modals in Mandarin are generally incompatible with a present temporal orientation: the time of the event expressed by the main verb cannot be simultaneous with the time of the modal (24).⁵

- (23) ??Lisi yao xianzai zai jia.
 Lisi want now be home
 Intended: ‘Lisi wants / needs to be at home now.’
- (24) ??Lisi bixu / keyi xianzai zai jia.
 Lisi need can now be home

⁵ Like the restriction on root modals and the copula *shi* (footnote 3), this restriction on root modals and temporal orientation is lifted when the subject is generic (i).

- (i) Shenqingzhe bixu xianzai zai Meiguo.
 applicant must now be United.States
 ‘Applicants must now be in the United States.’

Intended: ‘Lisi needs / is allowed to be at home now.’

Unlike desire *yao* or root modals, epistemic modals can have a nonfuture temporal orientation, as (25) illustrates.

- (25) Lisi {keneng / kending / yinggai} xianzai zai jia.
 Lisi might need should now be home
 ‘Lisi might / must / should be at home now.’

As further support for our analysis, in other work (van Dooren et al. 2019), we note that desire verbs in at least two other languages – Brazilian Portuguese and Dutch – have independently undergone a very similar grammaticalization process, acquiring root modal uses. Notably, the desire verbs also pattern like root modals in these two languages.

Our emphasis on formal properties contrasts with meaning-based or functionalist approaches regarding how desire verbs grammaticalize into future markers. These approaches tend to highlight the conceptual overlap between a desired or intended action and the action happening in the future (Bybee et al. 1994, also Sweetser 1987, 1990, Traugott 1989, Hengeveld 2011). To the extent that these accounts discuss finer-grained distinctions in the development of future markers, they are often framed in terms of general “paths” or “stages” of diachronic change (e.g. Bybee et al. 1994, Hengeveld 2011, among others). In such a framework, the fact that future *yao* has root modal or aspect properties simply reflects a tendency for verbs to proceed through such a stage before acquiring an epistemic use. While insightful from a descriptive and typological perspective, we argue that such frameworks have a more limited explanatory value, in that their claims only cover semantic change. It leaves unexplained why future *yao* is also syntactically different from desire *yao*, for instance, as we observed with the negation facts in Section 1 and the temporal adverb facts in Section 2. In contrast, the account we sketched above – which explicitly assumes a categorical change from verb to functional head, based on formal similarities and differences – offers a way to understand how such distinctions might arise.

6. Conclusion

We showed in the sections above that future *yao* and the other uses of *yao* (e.g. “want”, “must, need to”) are a case of ambiguity, rather than semantic generality. Building on T.-H. J. Lin 2012, we provided evidence from the distribution and interpretation of future *yao* to show that *yao* behaves syntactically like an aspect marker or a root modal, and not an epistemic modal, as claimed by Ren (2008), Wu & Kuo (2010), Santana LaBarge (2016), among others. We also argued that *yao* might have both aspectual and modal semantics.

Beyond addressing a debate about the status of future *yao*, our study of its synchronic properties bears on the grammaticalization of desire verbs or

deontic/teleological modals into future markers, a process that is well-attested across languages (e.g. Bybee et al. 1994). In principle, the future can be expressed through a variety of ways: tense, epistemic modals, root modals, aspect, and so on. The fact that *yao* has not developed into an epistemic modal calls for a principled explanation. Our contribution here has been to point out that there are syntactic and semantic properties that desire *yao* shares with root modals, but not with epistemic modals. This alignment, we suggest, makes it less likely that desire *yao* grammaticalizes into an epistemic modal.

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