THE SYNTAX AND SEMANTICS OF CHANGING AND BECOMING

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Abstract: This paper aims to investigate the difference between two Mandarin light verbs: *bian* 'change' and BECOME, in syntax and semantics. Based on the observation of the constructions with *bian* 'change' and without *bian* 'change', we find that the telicity of the same degree achievement predicates varies in different constructions. The light verb *bian* 'change' needs the measure of change function on DAs to return a non-zero degree. Hence, a predicate with *bian* 'change' is atelic denoting a comparative reading. On the other hand, BECOME requires a maximal degree, resulting in a telic predicate which denotes a positive reading. This proposal illustrates that *bian* 'change' is indeed a light verb denoting changing which only specifies the initial state.

1. Introduction

In previous studies of English degree achievements (DAs), it has been known that the telicity of the DA corresponds to the scalar structure of adjectival base: when DAs are derived from open adjectival bases, they have an atelic interpretation and denote a comparative reading; DAs with closed adjectival bases have a telic interpretation and a positive reading (see e.g., Dowty 1979; Levin and Rappaport Hovav 1995; Hay, Kennedy, and Levin 1999). In Mandarin, DAs occur in two different constructions: sentences with *bian* 'change' and those without *bian*:

(1) Pinguo   hong   le.
     apple   red   SFP
     'The apple got red.'

(2) Pinguo   bian   hong le.
     apple   CHANGE   red SFP
     'The apple got redder.'

We observe that in different constructions the telicity of the predicate is different. Based on various types of evidence, we argue that the telicity is not solely based on the adjectival base in Mandarin for a DA predicate: the telic interpretation of DAs with a closed scale is nullified if *bian* 'change' is used, and all predicates following *bian* 'change' only have a comparative reading, as in (1). On the other hand, constructions without *bian* 'change' always denote the positive reading (conventional or contextual), even if the predicate contains a DA derived from an open scale, as in (2). This observation cannot be accounted for by Kennedy and Levin's (2008) analysis, because English DAs only appear in sentences such as *The gap widened* and the telicity is exclusively determined by the scalar

structure of the adjectival base. In order to provide an explanation for this phenomenon, we investigate the difference between the light verb *bian* 'change' and BECOME. Our proposal is that different light verbs select predicates with different properties in telicity. We argue that *bian* is a light verb with an overt lexical form, and it differs from BECOME in that it only specifies the initial state of the change, resulting in a comparative reading.

This paper is organized as follows. Section 2 introduces the scalar structures of DAs and standards of comparison. Section 3 reviews Kennedy and Levin's (2008) analysis of English DAs and compares it with the Mandarin examples. Section 4 proposes an analysis to account for the telicity of DAs in different constructions in Mandarin, and examines the difference between the light verbs *bian* 'change' and BECOME. Section 5 discusses five scalar structures of Mandarin DAs and applies our analysis to these examples. Section 6 concludes the paper.

2. The scalar structures of DAs and the standards of comparison

According to Beavers (2008), change of state verbs fall into two classes. The first is those associated with two-point scales. For instance, *dead* describes having or not having a particular property, and the scale associated with *dead* only has two values. The second is those associated with multiple-point scales including many values. Multiple-point scales include those with bounds called closed scales, such as *empty, bent* and *straighten*, and those without bounds called open scales (e.g., *cool* and *lengthen*). The difference between *bent* and *straighten* is that the former is based on a lower closed scale while the latter is based on an upper closed scale. One way to make sure whether an adjective is a gradable adjective is that gradable adjectives are acceptable with comparative morphology while non-gradable adjectives generally are not (Beavers 2008):

(3) *dirtier, wetter, straighter, more bent, #deader, #more dead*

Earlier studies come up with five possible scalar structures by identifying whether they contain the minimum and/or the maximum. Since an open scale does not have limits on either sides of the scale, it lacks both the minimum and the maximum. A lower closed scale contains a single bound which is the minimum, while an upper closed scale is in the opposite situation, such that the only bound is the maximum. A totally closed scale contains two bounds at the beginning and the end of the scalar structure, hence containing the minimum and the maximum. The difference between closed scales and two-point scales is that although they both contain the minimum and the maximum in the scalar structures, in the closed scales there are many values between these two bounds, but there is none in the two-point scales. The generalization is as follows:

Scale \\ Degree	minimal	maximal
Open scale	×	×
Lower closed scale	√	×
Upper closed scale	×	√
Totally closed scale	√	√
Two-point scale	√	√

In order to determine the truth value of a sentence containing a DA, we have to know the standard of comparison of the adjectival base. In the case of DAs, different kinds of scalar structure are associated with different standards of comparison. Rotstein and Winter (2004), Kennedy and McNally (2005), and Kennedy and Levin (2008) mention that there are two types of standard in comparatives. First, when an adjective is based on a closed scale, the standard of comparison invariably corresponds one of the endpoints of the scale. This is called the conventional (lexical) standard: *bent, open,* and so forth compare with the minimum, while others compare with the maximum (*straight, closed,* etc.). In contrast, open scale adjectival predicates are context-dependent (*tall* and *expensive*), hence they require a context for the determination of their value. Their interpretations vary from context to context.

This generalization corresponds to Kennedy and Levin's (2008) proposal of *Interpretive Economy*: one should maximize the contribution of the conventional meanings of the elements of a sentence to the computation of its truth conditions, which means to make the contextual standard a 'last resort'. Since the closed scale adjective invariably corresponds to an endpoint of the scale, it is always based on the conventional standard. On the other hand, open scale adjectives have no endpoint in the scale; hence, as a last resort, the contextual standard is employed.

In Mandarin, DAs also exhibit these five possible scalar structures. For instance, *shou* 'ripe', *kong* 'empty' may occur with *wanquan* 'completely, fully', so they are DAs based on a totally closed scale.

(4) Yumi wanquan   shou   le.
    corn fully   ripe   SFP
    'The corn ripened completely.'

Since *zhi* 'straighten' and *gan* 'dry' behaves the same as their English counterparts and take the maximal standard, they are DAs derived from an upper closed scale. On the other hand, *wan* 'bent' and *shi* 'wet' take the minimal standard, so they are associated with a lower closed scale. Finally, *xia* 'blind' and *si* 'dead' describe a point on a binary scale, so the scale associated with

them is a two-point scale.

3.   Kennedy and Levin's analysis of English Das

Kennedy and Levin (2008) assume that English DAs have the measure of change function directly lexicalized in the suffix –*en* or $\emptyset$. Gradable predicates do not themselves express properties, but rather encode measure functions which associate objects with ordered values on a scale. They begin with a detailed examination of variable telicity in English DAs. The following examples are for illustration.

(5) The rope straightened.
(6) The gap widened.

In (5), since the adjectival base of *straighten* contains an upper closed scale, the truth condition is similar to the 'positive' reading, and the interpretation is telic, corresponding to the lexical semantic representation of the form [BECOME(adj(x))]. For instance, *straighten* is true of an object and an event just in case the value which the measure of change function returns is equal to the maximal degree of the *straight* scale and the predicate reaches a telic end. On the other hand, the DA in (6) is associated to an open scale and there is no telic end for the function to reach. This is why *widen* has a context dependent standard of comparison. Hence, the 'comparative' truth condition and atelic interpretation obtain, and yielding [BECOME(adj-er(x))].

One crucial point should be emphasized here: the definition of telicity in DAs is different from the telicity of an event. The telic interpretation and the positive reading of a DA with a lower closed scale is true of an object just in case the measure of change function returns a nonzero degree (e.g., *wetten*), and those based on an upper closed scale and totally closed scale is true of an object as long as it has a maximal degree of the measured property (e.g., *straighten, empty*). On the contrary, since the DAs with an open scale are based on context dependent standards and the scale lacks minimal and maximal ends, there is no telic interpretation of this kind of DAs.

With Kennedy and Levin's system, we would want to investigate whether Mandarin DAs fall under the same situation of English DAs; that is, the telicity is determined by the scalar structure of the adjectival base. Moreover, DAs in Mandarin can appear in two different constructions: the sentence without *bian* 'change' and those with *bian* 'change'. What is the effect that *bian* 'change' has on the telicity? The following examples illustrate these two constructions containing Mandarin DAs:

(7)   a.   Hedao   kuan   le.
              river   wide   SFP
              'The river got wide.'

b. Hedao bian   kuan le.
  river CHANGE wide SFP
  'The river got wider.'

(8) a. Zhe tiao   shengzi zhi   le.
    this strip   rope straight   SFP
    'This rope got straight.'
  b. Zhe tiao   shengzi bian   zhi le.
    this strip   rope CHANGE straight SFP
    'This rope got straighter.'

Sentences (a) have a telic interpretation, while sentences (b) have an atelic interpretation. There are two crucial differences between the DAs in Mandarin and those in English: First, while English and many other languages relate words denoting states to words denoting changes of state via some morpholexical process (e.g., -*en* in English), this is not so in Mandarin.[1] Second, we can add an additional word *bian* 'change' into sentences containing DAs, while we cannot say *become straighten* in English. These two differences are illustrated as follows.

   Talmy (1985), Croft (1990), and Levin (2001) propose that all languages have words that, for a given state, describe the aspectual notions in (9) with a common root.

(9) (a) being in a state (state)
   (b) coming to be in a state (non-causative change of state)
   (c) causing to come to be in a state (causative change of state)

Koontz-Garboden (2007) provides the following English examples for illustration.

(10) (a) The knot is loose. (state)
   (b) The knot loosened. (non-causative COS)
   (c) Alex loosened the knot. (causative COS)

If Mandarin does not have overt morphology deriving COS, how can we get the meaning of COS? In Tongan (Koontz-Garboden 2007), there is no COS morphology, as in (11), just like Mandarin DAs in (12).

(11) Tongan

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[1] See the following examples of O'odham (COS: change of state) (Hale & Keyser 1998: 92):

	ADJECTIVE	NON-CAUSATIVE COS	CAUSATIVE COS	
(a)	(s-)weg i	weg-i	weg-i-(ji)d	'red'
(b)	(s-)moik	moik-a	moik-a-(ji)d	'soft '
(c)	(s-)'oam	'oam-a	'oam-a-(ji)d	'yellow'

(a) 'Oku loloa   ho   'ulu.
    IMP long   your   hair
    'Your hair is long.'
(b) 'Oku loloa   vave   ho   'ulu.
    IMP long   fast   your   hair
    'Your hair is quickly getting long.'

(12) Mandarin
(a) Zhangsan   de   toufa hen   chang.
    Zhangsan   DE   hair   very long
    'Zhangsan's hair is very long.'
(b) Zhangsan   de   toufa changle.
    Zhangsan   DE   hair   long SFP
    'Zhangsan's hair got long.'

While *loloa* 'long' in (11a) has a stative denotation, *loloa* 'long' in (11b) has a COS denotation. Different from the situation in languages like English, there is no morphology that signals this fundamental difference in meaning. In Tongan, a single word is polysemous between a state meaning and a COS meaning.

Dowty's (1979) idea about the COS is that there is a particular operator, BECOME. When combining with a stative proposition, it forms a COS predicate.

(13) [BECOME [x <STATE>]]

In investigating how Tongan encodes COS meaning based on property concepts, Koontz-Garboden (2007) examines two constructions: the *kuo* construction and the *'oku* construction, and finds that the viewpoint aspect markers play an important role in determining whether the property concept word is interpreted as denoting a state or COS.[2] Suppose a context in which Sione is introduced to Mele, and he observes that she has long hair. Sione can say (14a), but (14b) is unacceptable in this context.

(14) (a) 'Oku loloa   ho   'ulu.
          IMP long   your   hair
          'Your hair is long. '

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[2] In Reichenbach's (1947) terms, viewpoint aspect associates the event (situation) time with the reference time. Verbs marked with the imperfective viewpoint present ongoing events, while those marked with the perfective present completed events. To be more precise, a situation is viewed as unbounded without an endpoint in the imperfective, and as bounded with endpoints in the perfective.

(b) Kuo loloa ho 'ulu.
PRFCT long your hair
'Your hair has grown (lengthened).

In contrast, if Sione first meets Mele when she has short hair and Sione then meets Mele again and her hair has grown significantly, (14b) is acceptable in this context.

The function of *kuo* in Tongan is the same as the meaning of BECOME; that is, a state-denoting word can be coerced to a word denoting change of state by the addition of *kuo*. It is reasonable that this coercion happens because it is consistent with the resultative perfect semantics of *kuo*. On the other hand, state denoting words are true at all moments in the interval at which they are evaluated, and therefore the resultative reading will fail to occur.

Koontz-Garboden's (2007) observation of Tongan is exactly what we see in Mandarin. In Mandarin, there is crucially no morpheme, overt or covert, that derives a COS from a state (see (12)). Rather, COS meaning arises as a result of the interaction of a state-denoting word with some other aspectual element in the syntactic context that is incompatible with the state meaning. In our observation, only with the appearance of le_2 is the change of state meaning derived. Shen (2004) mentions that le_2 denotes perfect aspect, which is similar to *kuo* in Tongan. A detailed discussion of the relationship between le_2 and Mandarin DAs will be given in the next section.

The second difference between Mandarin and English is the co-occurrence of *bian* 'change' and a DA. In the sentence (8), *zhi* 'straighten' is a DA derived from an upper closed scale, and it does not tolerate any degree of curvature. However, when combining with *bian* 'change', (8b) can be acceptable even if the rope is a little bit bent rather than completely straight. [3] In the *bian*-construction, the meaning does not guarantee that an upper limit on the scale is still reached. In the next section, we will postulate an analysis that accounts for the differences between the two types of DA constructions.

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[3] Combining with a word to yield an interpretation different from the original scalar structure is not unusual in Mandarin. Liu (2006) observes that when *gou* 'enough' combines with adjectives of different types, the scalar structures of these adjectives will be altered.

(i) Yuehan *gou* gao.
John enough tall
'John is tall enough.'

When combining *gou* 'enough' with an open scale adjective, the expectation of the speaker sets a certain standard value as its lower limit. (i) denotes the meaning that John is tall enough to play basketball or John is tall enough to get a book on the top of the shelf. When *gou* 'enough' combines with upper closed scales, it adjusts the scalar structure, too.

(ii) Zhe gen gunzhi *gou* zhi.
This CL stick enough straight
'This stick is straight enough.'

Zhi 'straight' is an adjective with an upper closed scale, but the sentence implies the stick is not completely straight if we add *gou* 'enough' to it. The original inherent standard of the adjective does not obtain anymore. From what we see above, *gou* 'enough' not only modifies adjectives structurally, but also adjusts the scalar structures of those adjectives semantically.

4.   Analysis: The telicity requirements of two different light verbs

As shown in (15) and (16), if (7a) and (8a) do not contain le_2 in the sentences, the sentences are ungrammatical:

(15) *Hedao   kuan   Ø .[4]
       river   wide   Static
       'The river got wide.'

(16) *Zhe tiao   shengzi   zhi   Ø .
       this strip   rope   straight   Static
       'This rope got straight.'

Shen (2004) proposes that the predicates and the sentence final particles (SFP) in Mandarin sentences must agree in the [±dynamic] features in syntax. (15) and (16) is unacceptable when the static SFP Ø occurs, which means that there is indeed a dynamic light verb, *dlv*, in the sentence, and this *dlv* should agree with the dynamic SFP le_2.

Liu (2010) also mentions that when a simple gradable adjective occurs with le_2, it can independently be a predicate. However, only adjectives denoting inchoative readings are acceptable. (17) and (18) shows the contrast.

(17) a.   Tian hei/liang   le.
              sky   black/bright   SFP
              'It got dark/dawned.'
       b.   Hua   hong/huang le.
              flower   red/yellow SFP
              'The flower got red/yellow.'

(18) a.   *Zhangsan congming/ben   le.
              Zhangsan   smart/stupid   SFP
              '*Zhangsan got smart/stupid.'
       b.   *Zhangsan zhengzhi/chengshi   le.
              Zhangsan   upright/honest   SFP
              '*Zhangsan got upright/honest.'

As a result, we propose that a Mandarin 'adjective' that denotes an inchoative state actually has been incorporated with BECOME, and agrees with the SFP le_2. Hence, there is no need for this 'adjective' to be modified by a degree term (Liu 2010), as shown in (19).

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[4] Shen (2004) represents a phonetically null SFP with the symbol Ø , and suggests that this phonetically unrealized/covert element denotes the aspectual value of stativity.

(19) *Hua   hen   hong/huangle.
     flower   very red/yellow SFP

Next, we argue that different light verbs require different values returned by the measure of change function. Semantically, (20) entails that the external argument (*zhe tiao shengzi* 'this rope') owns a property (*zhi* 'straight'), while (21) does not.

(20) Zhe   tiao   shengzi   zhi   le.
     this strip   rope   straight   SFP
     'This rope got straight.'
→   Zhe   tiao shengzi   shi   zhi   de.
     this strip rope   is   straight   DE
     'This rope is straight.'

(21) Zhe   tiao   shengzi   bian   zhi   le.
     this strip   rope   CHANGE straight   SFP
     'This rope got straighter.'
↛   Zhe   tiao shengzi   shi   zhi   de.
     this strip rope   is   straight   DE
     'This rope is straight.'

In other words, (20) has a positive reading, and *bian* 'change' in (21) causes the predicate to have a comparative reading. The inherent property of DA does not obtain any more.[5] Hence, we need to illustrate the difference between BECOME and *bian* 'change'. Please see the meaning of *give* in (22) (Butt and Geuder 2001):

(22) DO (x, [x CAUSE CHANGE <HAVE (x,z), HAVE (y,z)>])

As shown in (22), instead of the usual result function BECOME, CHANGE is posited because it specifies the initial state. CHANGE denotes that the agent transfers an object from his own sphere of possession (the initial state). DAs with *bian* 'change' is compatible with this notion: it compares the result with the initial degree of the event.

Another empirical difference in the syntactic aspect is that *bian* 'change' can be used as a verb without taking an internal argument, while BECOME (e.g., *cheng* in Mandarin) cannot.

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[5] Some native speakers accept that *Toufa bian zhi le* 'The hair got straighter' entails *Toufa shi zhi de* 'The hair is straight'. Since we only argue that *bian* 'change' causes the predicate to have a comparative reading, the predicate is true as long as the final degree of the event exceeds the initial degree. Whether it will reach the maximum in the scale is not guaranteed or entailed.

(23)   Zhangsan   bian   le.
        Zhangsan   CHANGE   SFP
        'Zhangsan changed.'
(24)   *Zhangsan   cheng   le.
        Zhangsan   BECOME   SFP
(25)   Zhangsan   cheng   le   zongtong.
        Zhangsan   BECOME   SFP   president
        'Zhangsan has become the president.'

Our proposal, then, goes as follows. The covert light verb BECOME needs the predicate to be true as long as the measure of change function returns a maximal degree and the predicate has a telic interpretation. Conversely, the light verb *bian* 'change' needs the predicate to be true just in case the measure of change function returns a non-zero degree when applied to the object compared with the initial degree of the event, resulting in an atelic interpretation and a comparative reading.

5.   Discussion

According to our proposal above, it seems that only the closed scale DAs can occur with BECOME. On the contrary, the open scale DAs have no telic end for determining the maximum, so such DAs with BECOME will end up ungrammatical. On the other hand, we predict that both DAs with an open and a closed scale can occur in the *bian*-construction. However, some examples do not behave as predicted and need further explanation. In what follows we introduce how our analysis works in detail.

5.1 DAs based on the open scale
First, the consequences of the open scale DAs combining with BECOME and with *bian* 'change' are shown as follows.

(26)   a.   *Zhangsan gao   le.
                Zhangsan   tall   SFP
                'Zhangsan got tall.'
        b.   Zhangsan   bian   gao   le.
                Zhangsan   CHANGE   tall SFP
                'Zhangsan got taller.'

In (26a), the DAs based on an open scale cannot occur with BECOME, since the measure of change function cannot return a maximal degree to satisfy the truth value. On the other hand, (26b) is grammatical, since the open scale DA satisfies a non-zero degree required by *bian* 'change'. This analysis can be supported by the following fact. When a measure phrase occurs as (27), the sentence becomes grammatical:

(27) Zhangsan   gao le   san   gongfen.
      Zhangsan   tall SFP   three   centimeter
      'Zhangsan got three centimeters taller.'

Since BECOME needs the predicates to be telic, the measure phrase explicitly introduces a bound that serves as a maximal value (Hay, Kennedy, and Levin 1999).

(28) a. They widened the road 5 m.
      b. The lake cooled 4 degrees.

In (28b), the predicate is true only when the endpoint of the cooling event (increase of 4 degrees) is reached. The tests of (29) and (30) prove that (28b) is indeed telic:

(29) a. Kim is lengthening the rope. → Kim has lengthened the rope.
      b. Kim is straightening the rope. ↛ Kim has straightened the rope.
      c. The lake is cooling 4 degrees. ↛ The lake has cooled 4 degrees.
(30) a. The lake almost cooled 4 degrees. (AMBIGUOUS)
      b. The lake almost cooled. (UNAMBIGUOUS)

The progressive forms of atelic predicates entail the perfect form, while telic predicates are not (Vendler 1957, Dowty 1979). The verb *lengthen* in (29a) appears to display atelic behavior, so when someone is lengthening the rope, it means that he actually has lengthened the rope (no matter how long the rope is lengthened and whether this lengthening event will continue or not). On the other hand, the verb *straighten* in (29b) appears to be telic, so when the sentence contains a verb in progressive form, it means that the event still continues and is not completed. Hence, the progressive form cannot make sure that the rope becomes completely straight and the prefect form is not entailed. Hence, (29c) shows that the progressive form of the DA with a measure phrase does not entail the perfect form, so the predicate is telic. Another test is illustrated by (30a). A telic predicate modified by *almost* is ambiguous: the first reading is that the event has occurred, but not quite completed, and the second one is that the event have not occurred at all. But an atelic predicate in (30b) only has the latter reading.

In Mandarin, the sentence is ambiguous as well when *jihu* 'almost' occurs:

(31) a. Liang   shengao   zhiqian,   Zhangsan   kanqilai
          measure   height   before   Zhangsan   seem
          jihu   gao le   3   gongfen,   dan que
          almost   tall SFP   3   centimeter   but
          meiyou.
          not

'Before measuring the height, it seemed that Zhangsan should have almost gotten 3 centimeters taller, but actually he didn't.'

b.

Liang	shengao	zhiqian,	Zhangsan	kanqilai
measure	height	before	Zhangsan	seem

jihu	gao	le	3	gongfen,	dan	zhi	gao
almost	tall	SFP	3	centimeter	but	only	tall

le	1.5	gongfen.
SFP	1.5	centimeters

'Before measuring the height, it seemed that Zhangsan should have almost gotten 3 centimeters taller, but actually he only got 1.5 centimeters taller.'

If the predicate lacks the measure phrase, it becomes atelic and unambiguous:

(32) a.

Liang	shengao	zhiqian,	Zhangsan	kanqilai
measure	height	before	Zhangsan	seem

jihu	bian	gao	le,	dan	que
almost	CHANGE	tall	SFP	but	

meiyou.
not

'Before measuring the height, it seemed that Zhangsan should have almost gotten taller, but actually he didn't.'

b.

#Liang	shengao	zhiqian,	Zhangsan	kanqilai
measure	height	before	Zhangsan	seem

jihu	bian	gao	le,	dan	gue
almost	CHANGE	tall	SFP	but	

zhi	gao	le	2.5	gongfen.
only	tall	SFP	2.5	centimeters

'Before measuring the height, it seemed that Zhangsan should have almost gotten taller, but actually he only got 2.5 centimeters taller.'

If our analysis is correct, the same logic may apply in the case of (33) and (34), as they are also cases of DAs with an open scale. Such expectation, however, is not met.

(33) a.

Pinguo	hong	le.
apple	red	SFP

'The apple got red.'

b.

Pinguo	bian	hong	le.
apple	CHANGE	red	SFP

'The apple got redder.'

(33a) is unexpectedly grammatical. This problem can be solved by Hay, Kennedy, and Levin's (1999) proposal that some open scale DAs are identified to be telic not because they are based on a closed-range base adjective (since

they are open scale DAs), but instead is determined from other contextual cues. This is called context-dependent telicity. (34) shows that the assumed telic end is not based on the knowledge about the scalar structure of the adjective base, but rather the knowledge about the conventional properties of pants. Since real-world knowledge informs us that there is a conventional maximal length for pants, a telic end is provided. The test in (35) proves that this sentence is telic, while the example in (36) is atelic, because there is no conventional bounded length for a commute.

(34) The tailor lengthened my pants.
(35) The tailor is lengthening my pants. ↘ The tailor has lengthened my pants.
(36) The traffic lengthened my commute.
(37) The traffic is lengthening my commute. →
    The traffic has lengthened my commute.

In Mandarin, we observe that with different theme arguments, the DA *hong* 'red' has different meanings:

(38) a.   Pinguo   hong   le.
            apple   red   SFP
            'The apple got red.'
      b.   Hua   hong le.
            flower   red   SFP
            'The flower got red.'

In (38a), there is an implication that the apple is ripe, whereas this implication does not exist in (38b). To illustrate different meanings of *hong* 'red', we should first investigate the scalar structure of color terms. Color-term DAs cannot simply be grouped into a single scalar structure because it varies according to different theme arguments. When color terms describe the degree of colors, we group them as gradable adjectives with open scales bcause the color term DAs cannot be modified by *wanquan* 'completely, fully'.[6]

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[6] Kennedy and McNally (2010) observe that color terms can also have the nongradable sense. Since color is an easily observable identifier of the property, nongradable color terms are used for classifying objects. In the case of the traffic signal, the property of different colors is to indicate that one must stop or may go; it is not a matter of degree but existence of the property. When we try to tell the difference between the two traffic signals, it would be extremely odd to utter (i):
(i)   a. #This signal is redder than that.
         b. #That signal is not as red as this one.
This nongradable reading is also observed in Mandarin. See the following examples:
(ii)   a.   (Honglu) deng   hong   le.
               traffic   lights   red   SFP
               'The traffic lights got red.'
         b.   *(Honglu) deng   bian   hong   le.
               traffic   lights   CHANGE   red   SFP
               'The traffic lights got redder.'
Based on our analysis, (iib) is ungrammatical because *hong* 'red' here is a nongradable (two-point

(39) *Hua   wanquan   hong le.
     flower   completely   red   SFP
     'The flower got red completely.'

However, some native speakers mention (39) is not so much bad; that's because they use *wanquan* 'completely' to modify the parts of the flower but not the degree of redness. Kennedy and McNally (2010) mentions that there are two distinct readings in color terms: **color quantity** and **color quality**. The sentence (39) can be grammatical in quantity reading which expresses a measure of how much of the object is of the relevant color. In this kind of reading, the color terms can be modified by proportional modifiers: *Pia painted the leaves half/completely/100% green.* The scalar structure of the color quantity is associated with a totally closed scale: it contains both the minimal (no part of the object is of the relevant color) and the maximal (all part of the object is of the relevant color) degrees. We will not go further into color quantity in this paper.

We find if we simply group color-term DAs as cases of open scale, this cannot account for the implication of *being ripe* in (38a). Since color quality includes degree of hue, color saturation, and brightness (Kennedy and McNally 2010), and according to our knowledge about conventional properties of apples, an apple reaching the maximal degree means that the saturation of the apple achieves the maximum which corresponds to the SATURATION scale. The scale is selected in order to satisfy the truth value required by BECOME, because only SATURATION scale is closed and contains the maximum. When *bian* 'change' occurs, the HUE scale is employed because it is open, resulting in the atelic interpretation which means 'get redder', and there is no implication of ripeness. More examples are given in (40)-(42):

(40) a.   Tian hei   le.
            sky   dark   SFP
            'The sky got dark.'
      b.   Tian bian   hei   le.
            sky   CHANGE   dark   SFP
            'The sky got darker.'

(41) a.   Duzi   da le.
            belly   big SFP
            'The belly got big.'
      b.   Duzi   bian   da le.
            belly   CHANGE   big SFP
            'The belly got bigger.'

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scale) DA and cannot occur with *bian* 'change'. The issue of DAs with two-point scales will be discussed in detail in section 5.3.

(42) a. Niunai   suan   le.
          milk   sour   SFP
          'The milk got sour.'
      b. Niunai   bian   suan   le.
          milk   CHANGE   sour   SFP
          'The milk got sourer.'

Hei 'dark' in (40a) actually has an implication of the brightness of the sky completely disappearing and reaching the telic end.[7] In (40b), *bian* 'change' takes an atelic predicate denoting the meaning of 'get darker', which is comparative. *Da* 'big' in (41a) indicates that the person is pregnant, not just means that the belly is big. Since 'pregnant' is a two-point scale with a telic interpretation, (41a) is grammatical. In (41b), *bian* 'change' employs the original scale of *da*, which means 'big' with an open scale, hence the predicate is atelic. (42) falls under the same condition: *suan* 'sour' in (42a) has the implication that the milk is spoiled, which is a DA with a two-point scale, while *suan* 'sour' in (42b) means the flavor of the milk becomes sourer than before.

   Return to our discussion in (38), although there is a conventional maximal ripeness for apples, there is no such bound for flowers. Hence, (38b) does not imply the meaning of ripeness and does not reach the maximum. (38b) is very much parallel to the situation of *cool* in English:

(43) a. The soup cooled for an hour. (ATELIC)
      b. The soup cooled in an hour. (TELIC)

Kearns (2007) proposes that verbs like *cool* are open scales, but *cool* has an accomplishment sense which entails a telic end. In (43b), the endstate of the event is provided by the context when the soup 'reaches room temperature' or 'has a stabilized temperature'. Thus, these DAs do not entail movement to a scalar maximum, unlike those based on a true closed scale. Similarly, in Mandarin, *hua hong le* 'The flower got red' have no maximal telic interpretation, but based on the presupposition that the flowers are red enough for sell or

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[7] Some native speakers accept that *Tian hei le* 'The sky got dark' denotes 'the sky got darker'. Kennedy and Levin (2008) mentions that the apparent non-maximality of the adjectival standards is because speakers get the comparative reading in quantity 'not all parts of the sky are dark'. This does not mean that the parts of the sky the verb apply to fail to become maximally dark. In order to make sure that it is the parts of the sky but not the degree of color to get the comparative reading, Kennedy and Levin make the DA *darken* to affect the explicitly entire object *all of the sky*, hence no factors of color quantity will affect the judgment. The sentence (i) can only get the telic reading, because it gets a contradiction with an adverb *not completely*, which modifies the maximal value on the scale.
(i)   #All of the sky darkened in an hour, but it wasn't completely dark.
In Mandarin, the contradiction also appears:
(ii)   #Zhengpian tiankong dou hei   le,   dan   hai   mei   quan   hei.
       whole   sky   all darken SFP   but   yet   not   completely darken
       'All of the sky got dark, but it wasn't completely dark.'
It shows that the comparative reading of some speakers does not counterexemplify our claims, and *Tian hei le* 'The sky got dark' entails the maximal degree.

viewing according to a gardener's knowledge, the flower has a stabilized color of redness and will not become redder.

5.2 DAs based on the closed scale
We predict that DAs based on a closed scale could occur in the construction without *bian* 'change', because they denote the value with the lexical standard. The following sentences are all grammatical:

(44) Totally closed scale
    a. Niupai shou   le.
       steak   cooked   SFP
       'The steak is well-done.'
    b. Jiuping kong   le.
       bottle   empty   SFP
       'The bottle is empty.'

(45) Upper closed sclae
    a. Zhe   tiao   shengzi   zhi   le.
       this   strip   rope   straight   SFP
       'This rope got straight.'
    b. Diban   ganjing   le.
       floor   clean SFP
       'The floor got clean.'

(46) Lower closed sclae
    a. Tangchi wan   le.
       spoon   bent SFP
       'The spoon got bent.'
    b. Diban   zang   le.
       floor   dirty   SFP
       'The floor got dirty.'

Kennedy and Levin (2008) mention that the positive form of DAs with an totally closed scale in (44) and those with an upper closed scale in (45) are true just in case the value reaches the maximum. On the other hand, the positive form of DAs with a lower closed scale in (46) is true of an object when it has a non-zero degree. Now let us consider the case of the *bian*-construction.

(47) Totally closed scale
    a. *Niupai bian   shou   le.
       steak CHANGE   cooked   SFP
    b. *Jiuping bian   kong   le.
       bottle CHANGE   empty   SFP

(48) Upper closed scale
    a. Zhe   tiao   shengzi   bian   zhi   le.
        this   strip   rope   CHANGE   straight   SFP
        'This rope got straighter.'
    b. Diban   bian   ganjing   le.
        floor   CHANGE   clean   SFP
        'The floor got cleaner.'

(49) Lower closed scale
    a. Tangchi bian   wan   le.
        spoon   CHANGE   bent SFP
        'The spoon got more bent.'
    b. Diban   bian   zang   le.
        floor   CHANGE   dirty   SFP
        'The floor got dirtier.'

Since *bian* 'change' needs the predicate to be true as long as the measure of change function returns a non-zero degree compared with the initial degree of the event, it should be grammatical when the DAs based on a closed scale occur with *bian* 'change', like (48) and (49).

However, we find the DAs with a totally closed scale cannot occur with *bian* 'change'. This can be attributed to Dowty (1979) and Abusch (1986), who say that the preference for a telic interpretation can be explained in terms of pragmatic principles: since the maximum standard, telic interpretation entails the minimum, atelic one, it is more informative, and is therefore preferred. Because only the DAs with a totally closed scale contain both the maximum and the minimum in their lexical meaning, the telic interpretation is preferred. Hence, (47) is ungrammatical.

5.3 DAs based on the two-point scale

(50) a.   Dianfengshan   huai   le.
           electric fan   broken   SFP
           'The electric fan is broken.'
    b.   *Dianfengshan   bian   huai   le.
           electric fan   CHANGE   broken   SFP

(51) a.   Zhangsan   xia   le.
           Zhangsan   blind   SFP
           'Zhangsan is blind.'
    b.   *Zhangsan bian   xia   le.
           Zhangsan   CHANGE blind SFP

Since the DAs in (50) and (51) are associated with a two-point scale, the scale

leaves no room for adjustment. *Bian* 'change' needs the predicate atelic and denoting comparative reading, so the function should return a non-zero value. However, there is no value between the minimum and the maximum. Therefore, once *bian* 'change' occurs, the requirement of this light verb is in conflict with the inherent property of the DAs with a two-point scale, yielding unacceptability.

5.4 DAs varied in meaning

In Mandarin, an identical DA could have multiple meanings. For instance, *huai* 'bad' has the following different meanings:

(52) a. *Zhangsan huai le.
          Zhangsan   bad   SFP
          'Zhangsan got bad.'
      b. Zhangsan bian   huai le.
          Zhangsan CHANGE bad   SFP
          'Zhangsan got worse.'

(53) a. Dianfengshan   huai   le.
          electric fan   broken   SFP
          'The electric fan is broken.'
      b. *Dianfengshan   bian   huai   le.
          electric fan   CHANGE broken   SFP

(54) a. Pinguo   huai   le.
          apple   rotten   SFP
          'The apple got rotten'
      b. *Pinguo   bian   huai   le.
          apple   CHANGE   rotten   SFP
          'The apple got rottener.'

(52) - (54) are a further evidence for our analysis. As the theme argument varied, the meaning of *huai* is different. When the theme argument is a person, *huai* means someone is 'morally degraded', which is based on an open scale. It cannot occur in the sentence without *bian* 'change'. The sentence is grammatical when *bian* 'change' occurs, because this light verb only needs a non-zero degree to make the predicate true. If an appliance is the theme argument, *huai* means 'broken'. When a fruit is the subject, *huai* means 'rotten'. Both 'broken' and 'rotten' are DAs based on a two-point scale. (53a) and (54a) are grammatical because the maximal value is returned, while (53b) and (54b) are ungrammatical since *bian* 'change' must take an atelic predicate denoting a comparative reading, but a two-point scale lacks any value between the minimum and the maximum.

6.   Conclusion

In this paper we argued that the different telicity of two constructions, a DA with *bian* 'change' and without *bian* 'change', is accounted for with two different light verbs. B*ian* 'change' nullifies the telic interpretation of DAs with a closed scale, and all the predicate following *bian* 'change' only has a comparative reading. On the other hand, the construction without *bian* 'change' always denotes positive reading. It is proposed that the light verbs *bian* 'change' and BECOME are responsible for the differnet telicity of the sentences containing DAs. The difference between these two light verbs is that *bian* 'change' only specifies the initial state, while BECOME does not. As long as the returned value is non-zero compared with the initial degree, the truth value of the predicate following *bian* 'change' is satisfied.

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