Mandarin de-adjectival degree achievements as inchoative statives

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Mandarin degree adjectives can give rise to a degree achievement reading with the perfective marker *le*. In this paper, I argue that de-adjectival degree achievements in Mandarin are inchoative statives, whose core meaning component is a reflexive comparative that compares the present state with a previous state in some property of the same individual. My new analysis better captures the facts that de-adjectival degree achievements show variable telicity, that they give rise to stative readings with duration phrases, and that they are compatible with time as a comparative standard. Because the comparison is between two states at different times, a degree-achievement reading can be inferred even though the predicate is stative in semantics.

Keywords: degree achievements, inchoative statives, reflexive comparatives, scale-structure

1. Introduction

Degree achievements (DA), such as *lengthen, cool, warm*, and *sink*, do not seem to fit well into Vendler's (1957) four verbal classes, showing both telic and atelic properties (Dowty 1979; Hay et al. 1999; Kennedy & Levin 2008; Piñón 2008). As in (1), *cool* is compatible with both a *for*-phrase and an *in*-phrase, which test for atelicity and telicity respectively (Dowty 1979). In (1a), it has an atelic reading that the soup becomes cooler at the end of ten minutes, but is not necessarily completely cool. In (1b), *cool* has a telic reading that the soup becomes completely cool.

(1) a. The soup cooled for ten minutes. atelic
b. The soup cooled in ten minutes. telic
(Kennedy & Levin 2008: 156)

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However, not all degree achievements allow both telic and atelic readings on their own. As in (2), *darken, dry*, and *empty* are interpreted telically by default, as it is infelicitous to negate the state of the associated adjective. On the other hand, *widen* and *deepen* are interpreted atelically in (3), as the individual does not reach the state of the associated adjective. The two groups crucially differ in the semantics of their adjectival cores: (2) are absolute gradable adjectives with a maximum or minimum value, whereas (3) are relative gradable adjectives without such values. (cf. Kennedy & McNally 2005; Kennedy 2007).

(2) a. The sky darkened (?but it didn't become dark).
b. The shirt dried (??but it didn't become dry).
c. The sink emptied (??but it didn't become empty).
(Kennedy & Levin 2008: 159)

(3) a. The gap between the boats widened, but it didn't become wide.
b. The recession deepened, but it didn't become deep.
(Kennedy & Levin 2008: 160)

According to Kennedy & Levin (2008), telicity of degree achievements mostly depends on the properties of the scale associated with the adjectival core, because a conventional maximal or minimal standard is preferred if available, due to pragmatic strengthening. Given that absolute gradable adjectives have a closed scale, their associated degree achievements are interpreted telically by default, choosing an endpoint as the standard. By the same token, those derived from relative gradable adjectives have atelic interpretations due to the lack of such endpoints.

Several interesting questions arise then for cross-linguistic semantic comparisons of degree achievements. One question is whether finer differences in the structures of the closed scales matter for the *aktionsart* of degree achievements. As Kearns (2007) points out, degree achievements may have two telic senses: achievement with a comparative reading 'become minimally A-er', and accomplishment with a positive reading 'become A'. According to McNally (2017), unlike degree achievements with an upper-boundary endpoint, those with a lower-boundary endpoint only allow a telic achievement reading, without the option of an atelic reading with a comparative difference.

Another question is whether the *aktionsarts* of degree achievements vary cross-linguistically (Tsujimura 2001; Lin 2004; Bochnak 2015; Soh & Nomoto 2015). Some studies (Lin 2004; Soh & Nomoto 2015) claim that degree achievements, in languages such as Mandarin and Malay, are in fact lexicalized as true achievements that denote a minimal change in degree. An atelic comparative reading is derived by coercion through the reiteration of minimal change events. For example, Lin (2004) shows that de-adjectival degree achievements in Mandarin disallow a dynamic change reading with a durative phrase as in (4).

(4) *yifu gan le san xiaoshi.*
clothes dry PERF three hour.
#'The clothes dried/ have been drying for three hours.'
OK 'The clothes have been dry/were dry for three hours'

However, Lin's (2004) description is not entirely precise, as (4) in fact licenses a stative reading instead that the clothes have been dry for three hours. This is because the so-called "degree achievements" in Mandarin actually result from the inchoative use of the stative adjective in the perfective (Comrie 1976; Smith 1994, 1997; Sybesma 1997; Lin 2003a). The duration phrase measures a result state of being dry rather than a dynamic change event of getting dry.

In this paper, I argue against Lin's (2004) telic achievement analysis. Following Kennedy & Levin (2008), I propose that degree achievements in Mandarin also show variable telicity for different scale structures. I distinguish between de-verbal degree achievements such as *chen* 'sink' and de-adjectival ones. While de-verbal degree achievements show similar variable telicity patterns like their English counterparts, de-adjectival ones disallow an eventive meaning with a duration phrase as shown above. Crucially, I show that the de-adjectival ones still exhibit similar variable telicity patterns with the *in*-phrase test, as illustrated by the contrast in (5). If indeed the achievement analysis is correct, we would expect that all Mandarin degree achievements can co-occur with an *in*-phrase. However, those derived from relative adjectives mostly are not as in (5). This suggests that the incompatibility of the dynamic reading with a *for*-phrase test cannot be attributed to the telicity of the predicate.

(5) a. *yifu san xiaoshi nei gan le.*
clothes three hour in dry PERF
'The clothes dried in three hours.'
b. #*he-dao san nian nei kuan le.*
river-course three year in wide PERF
'The river course widened in three years.'

Notice that it is not the case that the achievement analysis may apply to some of the cases such as *gan* 'dry', but not to others such as *kuan* 'broad', because both predicates like *gan* 'dry' and those like *kuan* 'broad' have a stative reading with a *for*-phrase as in (4) and (6). If *gan* 'dry' is an achievement, it is puzzling why it has a stative reading with a *for*-phrase. The minimal pair (6) and (7) below shows nicely that *kuan* 'broad' is incompatible with an *in*-phrase, but compatible with a *for*-phrase with a stative reading.

(6) *he-dao kuan le san nian.* open scale
river-course wide PERF three year
#'The river course widened for three years.'
Actual Reading 'The river course was wide for three years.'

(7) ??*he-dao san nian nei kuan le.* open scale
river-course three year in wide PERF
'The river course widened in three years.'

To account for their incompatibility with duration phrases, I suggest that these de-adjectival degree achievements are in fact inchoative statives that are primarily non-dynamic, but with an inchoative meaning because of a left boundary happening (Marín & McNally 2011). I analyze these inchoative statives as special reflexive comparatives (Zwarts et al. 2005) that denote a state in comparison with a previous state of the same individual. Thus, my paper exemplifies another pattern of how languages may lexicalize the de-adjectival degree-achievement type of meaning differently. Rather than lexicalizing a dynamic degree change event as in English, a language may choose to primarily lexicalize a reflexive comparative state after a dynamic change event, so that an eventive meaning is only inferred by comparison of a later state with a previous state of the same individual.

Analyzing the change-of-state versus state ambiguity as part of the lexical semantics rather than coercion or lexical ambiguity has the advantage of offering a more principled way of accounting for the inconsistency of when a change-of-state reading may arise, which is subjected to the scale-structure of a predicate itself and semantics of other parts of a sentence. Neither a coercion analysis nor a lexical ambiguity analysis would be able to explain the influence of scale-structures of predicates, and furthermore these two types of analyses need to explain why certain readings are blocked, while others are allowed. At first glance, it might seem that Mandarin stative predicates could all be analyzed as change-of-state verbs under the right contexts. And yet, certain statives, such as *zuo* 'sit', on their own do not have inchoative readings with *le*, but additionally require inchoative particles, such as *qilai* 'up' or *xiaqu* 'down', while other statives more naturally give rise to inchoative readings. This suggests that certain statives in Mandarin may semantically encode inchoativity, such that an inchoative reading arises more readily in suitable contexts than those without such a component (cf. Marín & McNally 2011). Consequently, encoding inchoativity in the semantics of certain predicates seems to be a more desirable alternative.

This paper is organized as follows: in § 2, I first describe how state, intransitive and transitive change-of-state predicates are derived morphologically in Mandarin. Based on these patterns, I distinguish de-adjectival and de-verbal degree achievements in Mandarin. In § 3, I show that Mandarin degree achievements

exhibit the same type of variable telicity patterns with the *in*-phrase test, even though de-adjectival degree achievements are generally incompatible with duration phrases. Then in § 4, I review and argue against a telic achievement analysis by Lin (2004), and then present Kennedy & Levin's (2008) analysis on English degree achievements and Marín & McNally's (2011) analysis on inchoative statives in Spanish. In § 5, I combine and adapt Kennedy & Levin's (2008) and Marín & McNally's (2011) analyses to account for Mandarin degree achievements. I conclude this paper in § 6, offering some implications for future studies.

2. Morphology of Mandarin degree achievements

Originally in Dowty (1979), degree achievements are loosely defined as "some cases of verbs which would seem to be achievements on some semantic and syntactic grounds but which nevertheless allow durational adverbs (Dowty 1979: 88)." Although later studies of degree achievements primarily focus on intransitive de-adjectival degree achievements such as *cool* and *darken* (Hay et al. 1999; Kennedy & Levin 2008, among others), Dowty (1979) does mention some other cases such as *sink* and *age*. In this section, I discuss how the Mandarin morphology of states, intransitive change-of-states (COS) and transitive change-of-states is situated in the broader morphosemantic typology (Koontz-Garboden 2007a; 2007b). I show that because Mandarin de-adjectival degree achievements share the same form with stative adjectives, de-adjectival degree achievements can be better analyzed as inchoative statives (cf. Sybesma 1997).

According to Koontz-Garboden (2007b), morphological derivations between states and change-of-states in a language have consequences for the semantics of these categories. He distinguishes two types of morphological relationships: the type of languages such as O'odham and Warlpiri as shown in (8) and (9), where the non-causative intransitive change-of-state and the causative transitive change-of-state are both morphologically marked differently from the state, and there are languages such as Tongan, as shown in (10), where the state and the change-of-state are not morphologically distinct from each other, using the same bare root.

(8) O'odham (Hale & Keyser 1998: 92)

	ADJECTIVE	NON-CAUSATIVE COS	CAUSATIVE COS	
a.	(s-)wegi	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'

(9) Warlpiri (Hale & Keyser 1998: 93)

	ADJECTIVE	NON-CAUSATIVE COS	CAUSATIVE COS	
a.	wiri	wiri-jarri-	wiri-ma-	'red'
b.	*maju*	*maju-jarri-*	*maju-ma-*	'big'

(10) Tongan

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.' (Koontz-Garboden 2007b: 117)

According to Koontz-Garboden (2007b), for O'odham/Warlpiri-type of languages, given an overt derivational marker, the change-of-state meaning can be derived from the state meaning through regular semantic compositions. However, for the Tongan-type without such overt markers, the change-of-state meaning should be instead analyzed as aspectual coercion of the state meaning in the perfective.

Given Koontz-Garboden's (2007b) typology, Mandarin is closer to the Tongan-type, as intransitive change-of-state de-adjectival degree achievements are morphologically not distinguishable from stative adjectives. Mandarin directly uses the stative adjectives with the perfective marker *le*, without any suffix like *-en* in English. As the following examples show, the same form *gao* 'tall' is used in the stative adjective in (11) and the change-of-state in (12) (cf. Smith 1994; Sybesma 1997; Lin 2003a, 2006; Tham 2013). Furthermore, the comparative in (13) is also not distinguishable from the positive in (11). As a result, there are cases in the discussions in the following subsections, where instead of a dynamic degree achievement reading, we find a stative reading instead.

(11) *Baiyun hen gao.*
Baiyun very tall
'Baiyun is (very) tall.'

(12) *Baiyun gao le.*
Baiyun tall PERF
'Baiyun has become (became) taller.'

(13) *Baiyun bi Yunzi gao.*
Baiyun than Yunzi tall
'Baiyun is taller than Yunzi.'

In comparison, de-verbal degree achievements exhibit slightly different derivation patterns by having the intransitive COS as the basic form. As illustrated in Table 1 below, whereas both types may derive the transitive COS by adding a manner verb in front, they differ in whether the state or the intransitive change-of-state is more primitive. Whereas for the de-adjectival ones, the state is more primitive; for de-verbal degree achievements such as *chen* 'sink', the state is derived from the intransitive COS verb by appending a perfective marker *le*.

Table 1. Mandarin degree achievement morphology

	State	**Intransitive COS**	**Transitive COS**
kuan 'wide'	*kuan*	*kuan*	*jia-kuan* 'add-wide'
re 'hot'	*re*	*re*	*(jia)-re* 'add-hot'
gan 'dry'	*gan*	*gan*	*(hong)-gan* 'tumble-dry'
chen 'sink'	*chen-le*	*chen*	*(ji)-chen*

Because of this difference in morphological derivations, I show for the rest of the paper that the de-adjectival degree achievements are primarily stative, whereas de-verbal degree achievements are dynamic. More specifically, I analyze Mandarin de-adjectival degree achievements as inchoative statives (cf. Marín & McNally 2011), which are stative predicates with an inchoative meaning component. As in (14), even without a perfective marker *le*, adjectives on their own can have a change-of-state reading especially in modal sentences (Sybesma 1997; Tham 2013), suggesting that inchoativity is part of the semantics of the adjectives themselves, not a result of coercion by the perfective marker as suggested by Koontz-Garboden (2007b). Although one might argue that there is a possibility that both the perfective marker *le* and modals in Mandarin are triggers for coercion of adjectives into a change-of-state reading, these alternatives are admittedly plausible and yet less natural in comparison. Besides modals and the perfective marker, as cited in Tham (2013: 666), this change-of-state reading is also present for some adjectives in the presence of the negation particle *mei* 'not-have', which is usually used for negation in the perfective for verbs as in (15). Therefore, there are quite a few environments, where the change-of-state reading is present. Thus, a coercion analysis seems to be less convincing, given these various environments. Ideally, coercion should be restricted, and highly predictable, and seen as a last resort rather than a free-pass. A more likely analysis is that the change-of-state semantic component is inherent in the predicate itself and surfaces in certain environments.

(14) a. *ta neng gao*
3SG can tall
'He can become tall.'
b. *ta hui pang*
3SG can fat
'He may become fat.'

(15) *ta kan-shangqu yi dian dou mei lao*
3sg look-appear one little all neg old
'He hasn't become old at all in appearance.' (Lin 2003b: 437)

Because inchoative statives are primarily statives with a left-boundary rather than change-of-state achievements, these predicates most of the time are interpreted with a stative reading by default, with the inchoative meaning surfacing in certain environments (cf. Marín & McNally 2011). Analyzing de-adjectival degree achievements as inchoative statives does not mean that the predicates can freely have an inchoative meaning on their own without appropriate contexts, but rather means that the inchoativity component of the semantics of the predicates can license change-of-state readings in the appropriate contexts, as compared with a more unrestricted coercion analysis.

3. Scale structure and telicity

In this section, I show that whereas Mandarin de-verbal degree achievements pattern like their English counterparts, the de-adjectival ones are generally incompatible with a duration phrase for a dynamic reading, but demonstrate similar variable telicity patterns with an *in*-phrase. This suggests that not all Mandarin de-adjectival degree achievements are true achievements (contra Lin 2004).

3.1 Scale structure and positive/comparative readings

Before discussing tests for telicity and *aktionsart*, let us first examine what readings are available for degree achievements with different scale structures in Mandarin. I show in this subsection that, just as in English, degree achievements with an open-scale give rise to a comparative reading "become A-er", whereas those with a close-scale have a default positive reading "become A", but still allow a comparative reading under the right contexts, regardless of the upper or lower boundary difference (cf. Kearns 2007; McNally 2017).

For English, it is well established that the scale structure of an adjectival property or an implied path (Yoon 1996; Rotstein & Winter 2004; Wechsler 2005)

influences whether a degree achievement gets a positive reading of "become A" or a comparative reading of "become A-er" (Kennedy & Levin 2008). Scales can be open without a minimum or maximum, fully closed with both, upper closed with a maximum, and lower closed with a minimum (Rotstein & Winter 2004). Gradable adjectives can thus be divided into two categories: relative adjectives with a relative standard based on an open scale, and absolute adjectives with an absolute standard based on a partially or fully closed scale (Kennedy & McNally 2005). Within absolute gradable adjectives, some have a maximum standard with an upper boundary on the scale, such that the predicate is not true of an entity unless the maximum degree is present, whereas others denote the minimum standard with a lower boundary on the scale, such that that the presence of some minimal degree is sufficient. For example, something is full when it is maximally full, while something is dirty as long as it has a minimal degree of dirtiness.

(16) a. open scale: tall, short, wide …
b. upper boundary: dry, full, empty …
c. lower boundary: wet, dirty …

Generally speaking, for English degree achievements, the default reading is atelic comparative reading "become A-er" for those based on relative adjectives such as *widen*, and a telic positive reading "become A" for those based on absolute adjectives such as *dry* (Kennedy & Levin 2008).

According to Kearns (2007), two telic senses should be further distinguished: a more established accomplishment sense of "become (maximally) A", and a less noticed achievement sense of "become (minimally) A-er", which can be reiterated into an atelic sense of "become A-er" with some non-minimal change of degree. In their influential study, Kennedy & Levin (2008) have only treated the accomplishment sense, without discussing the achievement sense, verbs based on absolutive adjectives with a lower boundary, such as *awake* (McNally 2017). McNally (2017) observes that these predicates are like true achievements with only a positive "become A" reading, lacking the comparative "become A-er" reading. As shown below, (17a) cannot be paraphrased as (17b). This lack of comparative reading is odd, because the scale structure of *awake* should theoretically allow a comparative reading, given that degrees of awakeness above the minimum on the scale are available.

(17) a. The baby awoke.
b. The baby became more awake. (McNally 2017: 179)

Given the two options for telic senses, some studies (Lin 2004; Soh & Nomoto 2015) have claimed that other languages primarily lexicalize the achievement telic sense for degree achievements rather than the accomplishment telic sense. Lin

(2004) argues that Mandarin degree achievements are all true achievement predicates denoting minimal change-of-degree events. If this analysis is correct, it is predicted that all types of degree achievements should have a default meaning of "become minimally A-er", showing no influence of the scale structure. However, this prediction is not borne out.

Mandarin degree achievements show similar influences from scale structures. An open scale gives rise to a comparative reading "become X-er" to some noticeable degree as in (18) and (19).

(18) *he-dao kuan le, danshi he-dao yiran bu kuan.*
river-course wide PERF, but river-course still not wide
'The river course widened, but the river course is still not wide.'

(19) *Xiaoming gao le, danshi yiran ting ai.*
Xiaoming tall PERF, but still quite short
'Xiaoming has grown taller, but he is still quite short.'

In contrast, a closed scale gives rise to a default positive reading, regardless of whether the endpoint is the lower boundary or the upper boundary. As illustrated below in (20–23), the default reading is 'become A', having entered the state of being sunk, dry, clean or wet. Crucially, it is infelicitous to deny the truth of the state in a following clause. This is the case for both those with maximal standards, such as *chen* 'sink', *gan* 'dry' and *ganjing* 'clean', and those with minimal standards, such as *'wet'*, showing no difference based on the upper or lower boundary distinction.

(20) #*chuan chen le, danshi hai fu-zhe*
Boat sink PERF, but still float-IMPF
Intended 'The boat sank, but it is still floating.' upper bound

(21) #*yifu gan le, danshi yifu yiran bu gan.*
clothes dry PERF but clothes still not dry
Intended 'The clothes dried but is still not dry.' upper bound

(22) #*diban ganjing le, danshi hai shi hen zang.*
Floor clean PERF, but still be very dirty
Intended 'The floor has become cleaner, but is still very dirty.' upper bound

(23) #*shoupa shi le, danshi yiran shi gan de.*
handkerchief wet PERF, but still be dry DE.
Intended 'The handkerchief has become wetter, but is dry.' lower bound

As in English, Mandarin degree achievements with a closed scale are compatible with a comparative reading of "become A-er" under the right circumstances. This reading is more accessible for those with an upper boundary denoting a maxi-

mal standard. As in the examples below, adding a differential measure phrase *yi dian-er* 'a little' to the main clause forces a comparative reading "become A-er" such that the state denoted by the adjective or the resultant state of the verb is not reached.

(24) *chuan chen le yi dian-er, danshi hai fu-zhe*
boat sink PERF a little, but still float-IMPF
'The boat sank a little, but it is still floating.' upper bound

(25) *yifu gan le yi dian-er, danshi yifu yiran bu gan.*
clothes dry PERF a little, but clothes still not dry
'The clothes dried a little, but is still not dry.' upper bound

(26) *diban ganjing le yi dian-er, danshi hai hen zang.*
floor clean PERF a little, but still very dirty
'The floor has become cleaner, but is still very dirty.' upper bound

As for degree achievements based on lower-boundary adjectives, such as *shi* 'wet' and *zang* 'dirty', it is indeed harder to obtain the comparative reading (cf. McNally 2017), because it only requires a minimal degree for the denoted state to be true, so that there is not an intermediary state of a lesser degree of wetness or dirtiness before the state is true, where the comparative reading is true but the positive reading is false. Nevertheless, it is possible to derive a comparative reading from "being A" to "being even A-er" as in (27). The floor was already dirty before, but it has become even dirtier. This reading is theoretically plausible given the scale-structure-based analysis in Kennedy & Levin (2008), but is claimed to be empirically absent by McNally (2017).

(27) *diban geng zang le.*
floor even dirty PERF.
'The floor got/is even dirtier (than before).' lower bound

Just as in English, the scale structure of the adjectival core or the path is relevant to how different kinds of Mandarin degree achievements are interpreted with respect to the positive and comparative readings. The generalizations in Kennedy & Levin (2008) are also valid for the Mandarin data. In the following subsections, I show that whereas de-verbal degree achievements in Mandarin are more or less the same, de-adjectival degree achievements behave very different from their English counterparts with respect to the *for*-phrase test. This pattern can be readily explained if we analyze the Mandarin de-adjectival ones as inchoative statives instead.

3.2 *For*-phrase and *in*-phrase tests

With respect to the *for*-phrase and *in*-phrase diagnostics, Mandarin de-verbal degree achievements show similar variable telicity. As illustrated by the examples below in (28), *chen* 'sink' can co-occur with both an *in*-phrase and a duration phrase with both atelic and telic interpretations just as expected.

(28) a. *chuan san xiaoshi nei chen le.*
Ship three hour in sink PERF
'The ship sank in three hours.'
b. *chuan chen le san xiaoshi, (hai mei chen-mo)*
ship sink PERF three hour, (still not sink-sunk)
'The ship sank for three hours, but it is still not (completely) sunk.'
'The ship is sunk for three hours.'

By default, *chen* 'sink' in the perfective has a telic reading as in (28a) that the ship submerged into the water. However, *chen* 'sink' allows to an atelic comparative reading, given that the ship was not completely sunk as in (28b). Notice that in (28b), the duration phrase can alternatively modify the result state instead of the event.

What is striking from a cross-linguistic perspective is that Mandarin de-adjectival degree achievements lack the intended dynamic degree achievement meaning with a duration phrase. Instead, the predicate only has a stative reading, where the duration phrase measures the state rather than the preceding change-of-state process as illustrated below, regardless of the scale structures.

(29) *he-dao kuan le san nian.*
river-course wide PERF three year
#'The river course widened for three years.'
Actual Reading 'The river course was wide for three years.' open scale

(30) *yifu gan le yi xiaoshi.*
clothe dry PERF one hour
#'The clothes dried for one hour.'
Actual Reading 'The clothes has been/was dry for three hours.' upper bound

(31) *diban zang le liang tian*
floor dirty PERF two day
#'The floor became dirtier for two hours.'
Actual Reading 'The floor has been/ was dirty for two days.' lower bound

There are apparent exceptions where a de-adjectival degree achievement seems to co-occur with the duration phrase with an eventive meaning. Consider the exam-

ple of *re* 'hot' below in (32). Both the reading that 'the water was hot' or that 'the water was heated for five minutes' are acceptable.

(32) *shui re le wu fenzhong.*
water hot PERF five minute
'The water was hot for five minutes.' or 'The water was heated for five minutes.'

I believe this counterexample is not problematic, because *re* 'hot' can be directly used transitively as an activity verb, so that the example should be better interpreted as a middle voice with an implicit agent, hence the translation 'was heated' rather than 'becoming hotter' (cf. Ting 2006). As a piece of evidence, in (33), the word 'self' cannot be added to the sentence in (32), indicating that the heating cannot be internally caused but must be externally caused by an agent.

(33) #*shui ziji re le wu fenzhong.*
water self hot PERF five minute
Intended 'The water got hotter on its own for five minutes.'

Because degree achievement readings are unacceptable with duration phrases, some previous studies have taken this as evidence that degree achievements are all instantaneous achievements in Mandarin (cf. Lin 2004). However, I contend that this argument is not sufficient for the following reasons:

First, although a dynamic degree achievement reading is absent with a duration phrase, a stative reading is still available. In other words, Mandarin de-adjectival degree achievements are in fact compatible with a duration phrase, just with an unexpected stative reading. Rather than instantaneity, the incompatibility with a regular dynamic change reading might be due to the lack of dynamicity of the predicate. This is exactly the position I take in § 4: I propose that de-adjectival degree achievements in Mandarin have inchoative stative semantics (cf. Marín & McNally 2011), that describes a beginning state with some difference from a previous state.

Stative readings with durational phrases present a problem for Lin's (2004) analysis, but can potentially be explained in the traditional view based on coercion or lexical ambiguity, that adjectives can be coerced into or change into a change-of-state achievement reading in certain contexts. Under the traditional view, the compatibility of adjectives with durational phrases follow naturally, because the basic meaning remains stative. However, what is left to be explained is why not every adjective is compatible with a change-of-state reading with an *in*-phrase in Mandarin as illustrated in my second point below. Because if Mandarin adjectives are ambiguous between a stative reading and an achievement reading or if coercion applies consistently, we should expect the achievement

reading to be freely available when the context favors such a reading, and yet this is simply not the case.

Second, without a differential measure phrase, not all degree achievements in Mandarin can co-occur with an *in*-phrase in Mandarin. If they are all instantaneous, we would expect them all to be compatible with *in*-phrases. And yet, as in English (cf. Kennedy & Levin 2008), open-scale *kuan* 'wide' cannot be used felicitously with an *in*-phrase on its own, but closed-scale *gan* 'dry' and *zang* 'dirty' can. As shown in (34), open-scale adjectives are infelicitous in this environment regardless of the length of the *in*-phrase, be it a short or long period of time. Neither a minimal-change reading nor a change-of-state reading seems to be available.

(34) ??*he-dao san xiaoshi/tian/nian nei kuan le.*
river-course three hour/day/year in wide PERF
Intended 'The river course widened in three hours/days/years.' open scale

(35) *yifu liang xiaoshi nei gan le*
clothes two hour in dry PERF
The clothes dried up in two hours.' upper closed

(36) *diban yi xiaoshi nei zang le*
floor one hour in dirty PERF
'The floor became dirty in an hour.' lower closed

Although it is very difficult to get the telic reading for *kuan* 'wide' on its own, it becomes felicitous once a differential measure phrase is supplemented to specify the degree difference. This pattern closely resembles the English pattern reported in Kennedy & Levin (2008).

(37) *he-dao san nian nei kuan le shi mi*
river-course three year in wide PERF ten meter
'The river course widened 10 meters in three years.'

In summary, although Mandarin de-adjectival degree achievements are incompatible with duration phrases with an intended degree achievement reading, they still show similar variable telicity with the *in*-phrase test. When a duration phrase is used with a de-adjectival degree achievement predicate, a stative reading arises. Therefore, there are solid reasons to believe that degree achievements in Mandarin are not inherently instantaneous achievements as some previous studies have claimed (cf. Lin 2004).

3.3 Further evidence for inchoative statives

Mandarin de-adjectival degree achievements can be analyzed alternatively as inchoative statives, because morphologically they take the form of stative adjectives that are primarily stative and atelic, but under certain conditions, they allow a change-of-state reading (Marín & McNally 2011). That is, the change-of-state reading is only secondary to the stative reading, given that the predicate itself seems to be non-dynamic, unable to function as a full-blown activity or accomplishment with a duration phrase. The Mandarin data closely resemble the inchoative statives reported in Marín & McNally (2011), the only difference being that some of the Mandarin de-adjectival degree achievements are compatible with an *in*-phrase under certain interpretations. In this subsection, I further support my analysis with several tests for *aktionsarts* (cf. van Valin & LaPolla 1997: 94–95) and an argument based on the compatibility with a time standard for comparison (Zwarts et al. 2005).

In Mandarin, both stative predicates and achievement predicates are incompatible with the progressive aspect. Because none of the de-adjectival degree achievements are compatible with the progressive, they can only be either statives or achievements (cf. van Valin & LaPolla 1997: 94–95). As shown in (38), even though *kuan* 'wide' can have a degree achievement reading, it nevertheless cannot be used in the progressive to express that a degree change is in progress, unless the verb *bian* 'change, become' is attached in front.

(38) *he-dao zai *(bian) kuan*
river-course PROG *(change) wide
'The river course is widening'

In the rare cases where a de-adjectival degree achievement predicate can be directly used dynamically as in (39), the verb must be interpreted as the middle voice instead of the intransitive active voice as discussed earlier (cf. Ting 2006). For example, (39) means that the water is being heated up by an implied agent, not that the temperature of the water is rising on its own.

(39) *shui zai (bian) re*
water PROG (become) hot
'The water is being heated up.'

Although the progressive test above cannot distinguish achievements from statives, the punctual adverb test indicates that at least some de-adjectival degree achievements are not achievements. As shown in (40), open-scale degree achievements, such as *pang* 'fat' or *gaoxing* 'happy', are not compatible with a punctual time adverbial as *san dian* 'three o'clock' in Mandarin. If indeed all Mandarin

degree achievements are achievement predicates (Lin 2004), then we would expect all of them to be able to co-occur with a punctual time adverbial. Together with the progressive test above, we can determine that de-adjectival degree achievements are stative predicates in Mandarin.

(40) a. *Xiaoming san dian dao le Beijing.*
Xiaoming three o'clock arrive PERF Beijing
'Xiaoming arrived in Beijing at three.' Achievement
b. #ta san dian pang/gaoxing le.
he three o'clock fat/happy PERF
Intended 'He became fatter/happier at three o'clock.'

However, a third test, namely pace adverbs such as the *quickly* and *slowly*, may present some challenges to my hypothesis. This test supposedly can distinguish statives from dynamic predicates crosslinguistically (van Valin & LaPolla 1997). As shown in (41), surprisingly Mandarin de-adjectival degree achievements are compatible with such pace adverbs, suggesting that they might be dynamic. I contend here that this test alone is not sufficient to disprove my inchoative stative hypothesis, as a regular stative verb in Mandarin can also take such adverbs with an inchoative meaning as in (42–44). That is the compatibility with *manman* 'gradually' alone does not directly prove that the predicate is an achievement by default, because well-established stative predicates in Mandarin (cf. Tai 1984) are also compatible with *manman* 'gradually'. If well-established statives predicates such as *zhidao* 'to know', *xiang* 'resemble', *xihuan* 'like' in Mandarin do not need to be reanalyzed as achievements as their basic meaning, by the same token there is no need to analyze degree adjectives as achievement predicates as proposed by Lin (2004). Therefore, this test does not work as well in testing for the non-statives in Mandarin as in other languages. This pattern can potentially be explained if we assume the left-boundary change-of-state happening may be accessible through coercion with some types of adverbs.

(41) *yifu manman gan/zang le*
clothes slowly dry/dirty PERF
'The clothes dried slowly/became dirty slowly.'

(42) *haizimen manman zhidao le youqing de zhongyaoxing*
children slowly know PERF friendship MOD importance
'The children slowly (came to know) knew the importance of friendship.'

(43) *erzi xingge manman xiang fuqin le*
son character gradually like father PERF
'The son's character gradually became like his father's'

(44) *Zhangsan manman xihuan lian qin le*
Zhangsan gradually like practice piano PERF
'Zhangsan gradually falls in love with practicing the piano.'

As Tham (2013) observes, an important difference between these regular statives and the de-adjectival degree achievements that we are concerned about here, is that regular stative verbs do not consistently have a change-of-state reading in the presence of *le* as in (45). This suggests that a simplistic coercion analysis that all change-of-state readings result from coercion would not be able to account for when a change-of-state reading is available, since a change-of-state reading is always present for certain predicates but not for others. By the same token, a lexical ambiguity analysis would also need to explain why certain ambiguities are allowed in one environment but not in others. My new analysis that de-adjectival degree achievements are inchoative statives would nicely predict that those with the inchoativity component will consistently show a change-of-state reading when necessary, if the scale structure permits such a reading as explained previously, while those without the inchoativity part vary and perhaps have their change-of-state readings arise truly from coercion.

(45) *jinrong jianguan dangju he Riben zhengfu guo duo baohu jinrong*
finance oversee authority and Japan government over many protect finance
jigou, renmen ***xiangxin-le*** *Riben jigou bu hui daobi de*
institution people believe-PERF Japan institution not will collapse ASSOC
shenhua
myth
'The financial oversight authority and the Japanese government overly protect financial institutions, people believed the myth that Japanese institutions will not collapse.'(PKU)[1] (Tham 2013: 670)

Given the evidence presented above, I argue that Mandarin de-adjectival degree achievements are inchoative statives that describe a current comparative state (cf. Kearns 2007) in comparison with some previous state. Thus, these predicates are in fact a type of reflexive comparatives (Zwarts et al. 2005) that compare two different states of a property in the same entity. Reflexive comparatives characteristically allow comparative standards of time (Zwarts et al. 2005). As in (46), a prior time can be explicitly introduced in the syntax as the standard for comparison in Mandarin. If the de-adjectival degree achievements in Mandarin are dynamic instead, the sentence should be infelicitous just like their English counterpart in (47).

1. This example is originally from the Peking University Center for Chinese Linguistics Corpus (http://ccl.pku.edu.cn:8080/ccl_corpus/index.jsp?dir=xiandai).

(46) *he-dao bi yi nian qian kuan le*
river-course than one year ago wide PERF
'The river course has become wider than (it was) one year ago.'

(47) *The river course widened than one year ago.

The sentence in (46) means that compared to how wide it was a year ago, the river course has become wider than that. In English, however, (46) cannot be grammatically expressed by the degree achievement, presumably because the main clause is eventive but the comparative clause is stative.

Although the test above clearly shows that Mandarin de-adjectival degree achievements pattern like reflexive comparatives, an anonymous reviewer raises the concern that the *bi*-phrase constructions are compatible with certain dynamic predicates as in Li (2015), such as *du* 'read' as in (48) below. However, notice that the translation suggests that it is a comparison of two result states of past events. Moreover, such constructions are not compatible with a comparative standard of time without any differential measure phrase as in (49), in contrast with (46).

(48) *Zhangsan bi Lisi duo du-le liang ben xiaoshuo.*
Zhangsan than Lisi more read-PERF two CL book
'Zhangsan's reading exceeded Lisi's reading by 2 novels.' (Li 2015: 5)

(49) #*Zhangsan bi yi nian qian du le*
Zhangsan than one year ago read PERF
Intended 'Zhangsan read more than a year ago.'

In summary, just like English, Mandarin de-adjectival degree achievements also show variable telicity with regards to the *in*-phrase test, despite that most of these are not felicitous with a duration phrase in Mandarin with the eventive degree-change reading. With a duration phrase, only the stative reading is possible. I have argued that incompatibility with a duration phrase does not prove that Mandarin de-adjectival degree achievements are all instantaneous achievements, but rather shows that the degree achievement reading is only secondary to the primary stative reading.

4. Previous analyses

It is well documented in the literature that the meaning of de-adjectival degree achievements is closely related to the meaning of gradable adjectives (Dowty 1979; Hay et al. 1999; Kennedy & Levin 2008, among others). According to Kennedy & Levin (2008), English degree achievements denote measure-of-change functions that are related to the measure functions of their adjectival core.

To the best of my knowledge, although there is substantial work on Mandarin gradable adjectives (Lin 2009; Liu 2011; Grano 2012; Grano & Kennedy 2012; Li 2015; Erlewine 2018, among others), not that much has been researched formally for degree achievements except for Lin (2004). In this section, I first review Lin (2004) for some previous discussions on Mandarin degree achievements, and then I present Kennedy & Levin (2008) for variable telicity, and Marín & McNally (2011) for the inchoative stative semantics, upon which I build my proposal in § 5.

4.1 Lin (2004)

Lin (2004) analyzes Mandarin degree achievements as achievement predicates for the following reasons: first, Lin (2004) claims that Mandarin degree achievements without a differential measure phrase are not compatible with either the *in*-phrase or the *for*-phrase equivalents in Mandarin as in (50).

(50) a. ??*ta zai yi nian nei gao le*
he at one year in tall PERF
'He grew in a year.'
b. **ta gao le yi nian.*
he tall PERF one year.
'He grew for a year.' (adapted from Lin (2004: 3))

However, as I have discussed in the previous section, this generalization is not accurate, because degree achievements derived from absolute adjectives are in fact compatible with an *in*-phrase, and that a stative reading is allowed with a duration phrase.

Second, he claims that all Mandarin degree achievements are achievements, because degree achievements with differential measure phrases are not felicitous in the progressive aspect or as a complement for *tingzhi* 'stop' as illustrated in (51) and (52). In English originally, the progressive test can distinguish stative predicates from non-stative predicates and the complement of *stop* test can test for durativity. Lin (2004) claims that these two tests can also distinguish an achievement predicate from the rest in Mandarin, if the predicate fails both tests.

(51) a. **Lisi zhengzai pang le liang gongjing.*
Lisi in.process.of fat PERF two kilograms
Intended: 'Lisi is gaining two kilograms.'
b. **boli zhengzai sui le man di.*
glass in.process.of shatter PERF whole floor
Intended: 'The glass is shattering all over the floor.'
(adapted from Lin (2004: 5))

(52) a. **Lisi tingzhi pang le liang gongjing.*
Lisi stop fat PERF two kilograms
Intended: 'Lisi stopped gaining two kilograms.'
b. **boli tingzhi sui le man di*
glass stop shatter PERF whole floor
Intended 'The glass stopped shattering all over the floor.'
(adapted from Lin (2004: 5))

However, upon closer examinations, these examples prove to be somewhat problematic. First of all, even if these tests are valid for Mandarin, these examples only show that degree achievements with a differential measure phrase are telic, without proving whether the bare predicates themselves are telic or not. Second, the test sentences are not so well-constructed, and may be infelicitous for other reasons. The sentences in (51) sound odd already because both the progressive aspect and the perfective aspect are used simultaneously in the same sentence. If we take out the perfective marker *le* as in (53), then at least *sui man di* 'shatter (over the) whole floor'[2] can occur in the progressive, even though *pang liang gongjin* is still not felicitous, because *pang* 'fat' is not dynamic. (53) clearly shows that de-verbal degree achievements, such as *sui man di* 'shatter all over the floor', are not instantaneous achievements.

(53) a. *??Lisi zhengzai pang liang gongjing.*
Lisi in.process.of fat two kilograms
Intended: 'Lisi is gaining two kilograms.'
b. *boli zhengzai sui man di*
glass in.process.of shatter whole floor
'The glass is shattering all over the floor.'

Similarly, sentences in (52) with the *stop*-test are also not as valid for other reasons. Even the intended English translations sound odd already, because it is not predictable how much weight will be gained or how spread out the glass pieces will be. The verb *tingzhi* 'stop' somehow implies that the subject has the intention or the tendency to obtain the final result. Consequently, it is strange to utter sentences in (52), as if the speaker could predict the extent of change. As illustrated by the contrast in (54), *tingzhi* 'stop' can co-occur with *bian pang* 'become fat' without any differential measure phrase to mean that Lisi no longer becomes any fatter. However, with a differential measure phrase added, the sentence becomes

2. Lin (2004) treats "shatter (over the) whole floor" as a degree achievement rather than a regular achievement, probably because he considers that *shatter* have different degrees of "shatteredness" depending on how spread-out the broken pieces are.

infelicitous, because the speaker cannot plausibly predict how much weight could be gained eventually, if the weight gain were to continue.

(54) a. *Lisi tingzhi bian pang.*
Lisi stop become fat
'Lisi stopped becoming fatter.'
b. ??*Lisi tingzhi bian pang shi gongjin.*
Lisi stop become fat ten kilogram
'Lisi stopped gaining ten kilograms.'

Crucially, Lin's (2004) analysis predicts incorrectly that all Mandarin degree achievements to be compatible with punctual time adverbials, a hallmark of instantaneous achievements. As shown in (55), this prediction is simply not borne out.

(55) #*he-dao si dian kuan le*
river-course four o'clock wide PERF
Intended 'The river course widened at four o'clock.'

Therefore, Lin's (2004) arguments for the achievement analysis are inconclusive. Even though de-adjectival degree achievements disallow a duration phrase with a dynamic-change meaning, they are nevertheless not all telic, but rather show a pattern of variable telicity similar to English regarding the *in*-phrase test. In the rest of this subsection, I briefly describe how Lin's (2004) proposal attempts to describe the difference between Mandarin and English.

Lin's (2004) proposal mainly adapts Hay, Kennedy & Levin's (1999) analysis with a slight modification that the degree argument in Mandarin is claimed to be an unbounded variable δ that represents the minimum noticeable difference. In Hay et al. (1999), degree achievements are analyzed as describing events in which an individual undergoes some increase in a property. Hay et al. (1999) assume gradable adjectives to be measure functions from individuals and times to degrees as in (56), upon which the semantics of degree achievements is built as in (57). The formula in (57) says that the degree achievement, represented as the INCREASE function, is true of an event, iff the degree an individual x's property ϕ measured at the starting point of an event e plus the difference d equals the degree measured at the endpoint of the event e.

(56) $[\![wide(x)(t)]\!]$ = the degree to *which x* is wide at time *t* (Lin 2004: 6)

(57) $[\![INCREASE(\phi)(x)(d)(e)]\!] = 1$ iff $\phi(x)(Spo(e)) + d = \phi(x) > (Epo(e))$ (Lin 2004: 6)

As in (58), the difference argument d can be either existentially closed or explicitly saturated by a difference measure phrase.

(58) a. The road widened.
∃*e, d*[*INCREASE*(*wide*(road))(*d*)(*e*)]
b. The road widened 5 cm.
∃*e*[*INCREASE*(*wide*(road))(5 cm)(*e*)] (Lin 2004: 6)

To explain why degree achievements in Mandarin are instantaneous achievement predicates, Lin (2004) argues that the difference argument is a variable δ that "represents the minimum difference in degree such that a comparative judgment can be made (Lin 2004, 7)." As in (59), the sentence is true as soon as Lisi gained the minimum noticeable weight. Because a minimum change occurs instantaneously, the predicate is an achievement rather than an accomplishment.

(59) *Lisi pang le.*
Lisi fat PERF
'Lisi gained weight'
∃*e*[*INCREASE*(*weight*(Lisi))(δ)(*e*)] (adapted from Lin (2004: 7))

As Lin (2004) admits, this modification runs into problems, when trying to explain the co-occurrence with duration phrases such as in (60) for English. Lin (2004) resorts to a coercion analysis that the achievement predicate is coerced into an accomplishment predicate, either by adding the preparatory phrase or adding an implicit iteration operator, when the predicate type and the time adverbial clash in their durative properties.

(60) The soup cooled for an hour.

However, Lin's (2004) analysis cannot account for variable telicity in Mandarin. For one, the difference between *gan* 'dry' and *kuan* 'wide' in their compatibility with an *in*-phrase is left unexplained. For another, the primary meaning for sentences, such as 'the clothes dried' in Mandarin, is not that some minimal noticeable change has taken place, but rather that the clothes are completely dry.

In short, Lin (2004) argues that degree achievements in Mandarin are instantaneous achievements denoting eventualities with a minimum noticeable change in some property. However, as discussed above, this conclusion is not convincing because some of his examples are problematic, and his analysis also falls short of explaining the variable telicity patterns that I have presented in the previous section.

4.2 Kennedy & Levin (2008)

To account for variable telicity, Kennedy & Levin (2008) argue that a simple achievement type of analysis or a comparative type of analysis along the lines of Hay et al. (1999) is not enough, because the role of the scale structure of the adjec-

tival core is not made relevant. Instead, Kennedy & Levin (2008: 172) propose that "the adjectival core of a DA is a special kind of derived measure function that measures the degree to which an object changes along a scalar dimension as the result of participating in an event." This derived measure function can access different scale structures of the adjectival cores, inheriting the maximal points from the adjectival scales if there are any.

As their theoretical set-up, Kennedy & Levin (2008) assume that gradable adjectives are measure functions of type <*e*,*d*>. The positive semantics of a gradable adjective is derived from composing its measure function with a *pos* operator as in (61), which returns a predicate of a property of an individual at a given time as in (62).

(61) $\mathbf{pos} = \lambda g \in D_{<e,\, d>}\, \lambda t \lambda x.\ g(x)(t) \geqslant \mathbf{stnd}(g)$ (Kennedy & Levin 2008: 168)

(62) $\mathbf{pos(wide)} = \lambda t \lambda x.\ \mathbf{wide}(x)(t) \geqslant \mathbf{stnd}(wide)$ (Kennedy & Levin 2008: 168)

Then, Kennedy & Levin (2008) define a difference function as a derived function from the measure function. As shown in (63), the derived difference function $m_d^{\uparrow}$ is just like its corresponding regular measure function m, except that $m_d^{\uparrow}$ maps point d as the zero point, and measures the difference from this point d.

(63) Difference functions
For any measure function **m** from objects and times to degrees on a scale S, and for any $d \in S$, $m_d^{\uparrow}$ is a function just like **m** except that:

i. its range is $\{d' \in S | d \leqslant d'\}$, and
ii. for any x, t in the domain of **m**, if $\mathbf{m}(x)(t) \leqslant d$ then $m_d^{\uparrow}(x)(t) = d$

(Kennedy & Levin 2008: 172)

The semantics of English degree achievements has at its core a measure-of-change function that is built on this difference function. As shown in (64), a measure-of-change function m_{Δ} measures the difference that an individual undergoes in some property m from the initial point of the event e to the final point of e. Just like a regular measure function, the measure-of-change function also needs to compose with a modified pos_v suitable for the event domain as in (65). (66) shows that the change must be equal or greater than a standard determined by that measure-of-change function.

(64) Measure of change
For any measure function **m**, $\mathbf{m}_{\Delta} = \lambda x \lambda e.\ m^{\uparrow}_{m(x)(init(e))}(x)(fin(e))$

(Kennedy & Levin 2008: 173)

(65) $\mathbf{pos_v} = \lambda g \in D_{m_{\Delta}} \lambda x \lambda e.\ g(x)(e) \geqslant \mathbf{stnd}(g)$ (Kennedy & Levin 2008: 174)

(66) $\mathbf{pos_v}(\mathbf{m}_\Delta) = \lambda x \lambda e.\ \mathbf{m}_\Delta\,(x)(e) \succcurlyeq \mathbf{stnd}(\mathbf{m}_\Delta)$ (Kennedy & Levin 2008: 174)

Because measure-of-difference functions are based on measure functions of gradable adjectives, these measure-of-difference functions inherit the maximum points conventionally associated with the scale of the adjectives. For degree achievements derived from closed-scale gradable adjectives such as *dry*, the measure-of-change function dry_Δ inherits the maximum point from the scale of *dry*. In contrast, degree achievements derived from open-scaled gradable adjectives, such as *widen*, have no maximal point to inherit.

Kennedy & Levin (2008) account for variable telicity through a pragmatic principle called Interpretive Economy as in (67). Because Interpretive Economy requires that the contribution of the conventional meanings be maximized, the maximum will be chosen over an arbitrary standard if available. Consequently, *dry* has a telic reading that the maximum point is reached, while *widen* does not.

(67) Interpretive Economy
Maximize the contribution of the conventional meanings of the elements of a sentence to the computation of its truth conditions.
(Kennedy & Levin 2008: 36)

Before we move on to discuss how to apply this analysis to Mandarin, let us quickly discuss how it handles a differential measure phrase. Due to type mismatch, to properly compose with a differential measure phrase, a degree achievement predicate needs to first compose with an μ_v operator in (69), modeled after the special degree morpheme μ operator in (68) as proposed in Svenonius & Kennedy (2006), that introduces an external argument for a differential measure phrase. Therefore, for the sentence "the soup cooled 17 degrees", the semantic representation after all the composition would be something like in (70).

(68) $[\![\ \mu\ ]\!] = \lambda g_{<e,d>} \lambda d \lambda x.\ g(x) \succcurlyeq d$ (Kennedy & Levin 2008: 179)

(69) $[\![\mu_v]\!] = \lambda g \in D_{\mu_\Delta} \lambda d \lambda x.\ g(x) \succcurlyeq d$ (Kennedy & Levin 2008: 179)

(70) $\lambda e.\ \mathbf{cool_\Delta}(\mathbf{the\ soup})(e) \succcurlyeq \mathbf{17\ degrees}$ (Kennedy & Levin 2008: 180)

Kennedy & Levin's (2008) analysis successfully explains variable telicity in an intuitive way. This analysis can be almost directly applied to de-verbal degree achievements, but needs to be modified for de-adjectival degree achievements in Mandarin, because the de-adjectival ones are inchoative statives. In the next subsection, I briefly present Marín & McNally's (2011) analysis of inchoative statives.

4.3 Marín & McNally (2011)

Marín & McNally (2011) argue that Spanish reflexive psychological verbs (SRPV), such as 'get angry' and 'get bored', denote the onset of a state without referring to a preceding change-of-state happening. The change-of-state reading is only pragmatically deduced in virtue of the left boundary happening in the semantics of the inchoative stative. Crucially, they observe that inchoativity and telicity are easily confused and yet separate concepts. They argue that SRPV verbs are inchoative but atelic. There are two sub-classes of SRPVs: the first *aburrirse* class references the state and is non-punctual as in (71a), and the latter *enfadarse* class does not make reference to the associated state and is punctual as in (71b). Both classes can have a change-of-state inchoative reading.

(71) a. *Marta se ha aburrido*
Marta SE has bored
'Marta has gotten bored.'
b. *Josep se ha enfadado.*
Josep SE has angered.
'Josep has gotten angry.' (Marín & McNally 2011: 469)

Despite being inchoative, these two classes are both atelic because they are not compatible with an *in*-phrase, but compatible with a *for*-phrase in Spanish. Like other atelic predicates, as shown in (72), SRPVs cannot be modified by *en* 'in' adverbials, but can be instead modified by *durante* 'during' adverbials. Notice that (72b) has a stative reading instead of a change-of-state reading.

(72) a. *Se aburrió/divirtió durante/*en toda la tarde.*
SE bored/amused during/in all the afternoon
'He was bored/amused (continuously) the whole afternoon.'
b. *Se asustó/enfadeó durante/*en toda la tarde.*
SE frightened/angered during/in all the afternoon.
'She got frightened/angry (repeatedly) the whole afternoon.'
(Marín & McNally 2011: 476)

However, these two classes differ from each other in a few ways. For example, when combining with the progressive in Spanish, the non-punctual *aburrirse* class has a stative reading as in (73), the punctual *enfadarse* class as in (74) has an about-to-happen reading.

(73) *Juan se está aburriendo.*
Juan SE is boring
'Juan is (already) bored.' (Marín & McNally 2011: 475)

(74) *El perro se está asustando.*
the dog SE is frightening
'The dog is getting (but is not yet) frightened.' (Marín & McNally 2011: 475)

To account for atelicity and inchoativity of SRPVs, Marín & McNally (2011) propose that these predicates denote the initial interval of a state. Through inference, the initial interval of a state also implicates a preceding change-of-state happening, which is not part of the semantics of the predicate. The authors implement their analysis by adopting Piñón's (1997) aspectual framework, which distinguishes between boundary happenings and regular happenings. In Piñón's (1997) analysis, boundary happenings, such as the beginning and the ending of a regular happening, are truly instantaneous happenings that do not have duration, as opposed to regular happenings that do take up time. The formalisms are as follows: The beginning function **Beg** and the ending function **End** describe respectively the left boundary and the right boundary of a happening.

(75) **Beg**:= $\lambda e \lambda e' \lambda P$[**Boundary – Happening**(e) ∧**Eventuality**(e') ∧ **Left–Boundary**(e, e') ∧ $P(e')$ ∧ ¬∃e''[$e'' \ll e' \wedge P(e'' \oplus e')$]]

(76) **End**:= $\lambda e \lambda e' \lambda P$ [**Boundary–Happening**(e) ∧**Eventuality**(e') ∧ **Right–Boundary**(e, e') ∧ $P(e')$ ∧ ¬∃ e'' [$e' \ll e'' \wedge P(e' \oplus e'')$]]
(Marín & McNally 2011: 491)

With the beginning function, Marín & McNally (2011) analyze SRPV verbs as follows: *enfadarse* verbs describe the beginning of a psychological state, whereas *aburrirse* verbs include both the beginning of a psychological state and the state itself. Although the *aburrirse* class appears to describe compound eventualities, the class still counts as just a state, because according to Piñón's (1997) ontology, the left boundary (the beginning) plus the happening proper (the psychological state) counts as a happening, not as a complex eventuality.

(77) enfadarse: $\lambda x \lambda e \exists e'$[**Beg**($e$, e', $\lambda e''$ [**angry**(e'', x)])]

(78) aburrirse: $\lambda x \lambda e \exists e', e''$[**Beg**($e$, e'', $\lambda e'''$[**bored**(e''', x)]) ∧ $e = (e'' \oplus e')$]
(Marín & McNally 2011: 491)

Mandarin de-adjectival degree achievements closely resemble the *aburrirse* class, because the state is accessible to duration phrases, except for being sometimes compatible with the *in*-phrases, when the adjective is closed-scale. In the next section, I present my analysis based on Kennedy & Levin (2008) and Marín & McNally (2011).

5. Analysis

I argue that de-verbal degree achievements in Mandarin denote dynamic degree-change eventualities just like their English counterparts, whereas de-adjectival degree achievements are non-dynamic inchoative statives that denote a beginning state of an individual with an increase of degree in some dimension as compared to a prior state.

For a de-verbal degree achievement *chen* 'sink', although it is not associated with a gradable adjective, it is nevertheless associated with a path scale from the afloat state to the fully submerged state. Following Kennedy & Levin (2008), I define a measure-of-change function $\mathbf{sunk}_{\Delta}$ based on this path scale. This $\mathbf{sunk}_{\Delta}$ function measures to zero at the beginning of a sinking event, and measures how much the object has gone down vertically at the end of the event, as compared to its initial point as in (79). The derived scale of $\mathbf{sunk}_{\Delta}$ does have a maximum point when the object is fully submerged, so that the default reading is a telic one according to the Interpretive Economy.

(79) $[\![\mathbf{sunk}_{\Delta}]\!] = \lambda x \lambda e.\ \mathbf{sunk}^{\uparrow}_{\mathbf{sunk}(x)(init(e))}\ (x)(fin(e))$

For de-adjectival degree achievements, a major crosslinguistic difference we need to account for is why they lack an eventive meaning with duration phrases, even though they still show similar variable telicity patterns with *in*-phrases in Mandarin. In the previous sections, I have argued against a telic achievement analysis and shown that de-adjectival degree achievements closely resemble the inchoative statives as in Marín & McNally (2011).

Following Marín & McNally (2011) and Kennedy & Levin (2008), I propose that de-adjectival degree achievements in Mandarin are inchoative statives that denote beginning states with an increase of degree along some dimension as compared to a previous state. More specifically, instead of dynamic degree change events as in English, these predicates lexicalize the associated result states of these dynamic events.[3] Although de-adjectival degree achievements are not dynamic

3. An anonymous reviewer points out that in Marín & McNally's (2011) proposal, inchoative statives denote the beginning of states, whereas in my proposal de-adjectival degree achievements denote the beginning of the states resulting from some previously associated dynamic-change events, which might be contradictory because result states usually mark the end of an event. Although indeed, in a complex event, result states usually represent telicity, in my proposal, the prior dynamic event is not encoded in the semantics. Therefore, the "result states" are merely pragmatically associated with an understood prior event that might lead to this state. In fact, result states also have beginnings and there is no contradiction between the beginning of a result state and the result state itself. Result states on their own can be atelic, as they can last for an indefinite amount of time.

per se, by virtue of the comparison with some previous state, they imply that a dynamic degree achievement event has taken place. The dynamic change reading is disallowed with duration phrases, precisely because the dynamic change event is absent in the semantics, so that the duration phrase can only access the comparative state. My proposal is reminiscent of Tai's (1984: 295) analysis of resultative compound predicates (RVC) in Mandarin, in that RVCs in Mandarin are bipartite, "the first indicating a presupposed activity and the second an asserted result". In both my proposal and Tai's analysis of resultative compound predicates, the activity part is presupposed and does not function as the core semantics for the predicate. Therefore, my inchoative stative analysis is supported by evidence from other parts of the grammar as well in Mandarin.

To implement this idea, I make several theoretical assumptions. First, following Katz (2000), I assume that eventualities can be subdivided into dynamic eventualities represented by the variable *e* and states represented by the variable *s*. For any state *s*, I assume that a property of an individual remains more or less constant throughout the run time of *s*. Following Grano (2012) and Grano & Kennedy (2012), I assume that gradable adjectives in Mandarin denote measure functions of type <*e*,*d*> relativized to time.

Assuming the above and the difference function in Kennedy & Levin (2008), I propose a derived measure function called "Measure of Difference from a Prior State" as in (80). This measure function measures the difference between a state *s* and some salient prior *s'* in an individual *x*. The CH function chooses a relevant point from the runtime $\tau(s)$ of the state *s* so that a value of the degree can be calculated. Similarly, analogous to the measure-of-change function in Kennedy & Levin (2008), we also need to adapt a version of the **pos** operator as in (81).

(80) Measure of Difference from a Prior State
For any measure function $\mathbf{m}_{comp-\sigma} = \lambda x \lambda s' \lambda s.\ \mathbf{m}^{\uparrow}_{m(x)(CH(\tau(s')))}(\boldsymbol{CH}(\tau(s)))$
where $s' \preccurlyeq s$, and s' is a salient relevant state prior to *s*.

(81) $\mathbf{pos}_{m_{comp-\sigma}} = \lambda g \in D_{m_{comp-\sigma}} \lambda x \lambda s' \lambda s.\ \mathbf{m}^{\uparrow}_{m(x)(\boldsymbol{CH}(\tau(s')))}\ (\boldsymbol{CH}(\tau(s))) \geq \mathbf{stnd}(g)$

I propose that Mandarin de-adjectival degree achievements have this measure of difference from a prior state as its semantics core. For example, the semantic core of *pang* 'fat' is shown in (82), which measures the difference of fatness of an individual as compared to a prior state. Composing this function with the $pos_{m_{comp-\sigma}}$ and existentially closing the previous state argument, we get a stative predicate that an individual *x* is in a state such that the individual is fatter than some previous state by some relevant standard $stnd(fat_{comp-\sigma})$ as in (83). Finally, following Marín & McNally (2011), I model inchoativity by adding a left-boundary happening as in (84), analogous to the *aburrirse* class discussed in the previous section.

(82) $\lambda x \lambda s' \lambda s.\ \mathbf{fat}_{comp\text{-}\sigma}(x)(s')(s)$

(83) $\lambda x \lambda s \exists s'.\ \mathbf{fat}_{comp\text{-}\sigma}(x)(s')(s) \geqslant \boldsymbol{stnd}(\mathbf{fat}_{comp\text{-}\sigma})$

(84) $\lambda x \lambda s \exists e, s', s''[\mathbf{Beg}(s, e, \lambda s'''[\ \mathbf{fat}_{comp\text{-}\sigma}(x)(s')(s''')]) \wedge \mathbf{fat}_{comp\text{-}\sigma}(x)(s')(s'') \geqslant \mathbf{stnd}(\mathbf{fat}_{comp\text{-}\sigma}) \wedge s = (e \oplus s'')]$

According to my new analysis, a sentence such as *Xiaoming pang le* 'Xiaoming has grown fatter' in Mandarin is asserting that Xiaoming has reached a state where he is fatter than some previous state by a relevant standard. Out of the blue, the sentence is not informative about when the change in weight happened and which exact previous state the current state is being compared to. All we know is that the speaker is asserting that Xiaoming is fatter than some time before and this comparative state began sometime in the past.

Because in my analysis, just like in Marín & McNally (2011: 493–498), inchoative statives semantically encode the left boundary of the state and the state itself, depending on the semantics of other constituents in the sentence, either a change-of-state reading or a stative reading may arise, though the default is the stative reading proper most of the time. In Mandarin, when composing with modals, the perfective marker *le*, and the negation marker *mei* 'not have', these inchoative statives have a change-of-state reading, because these constituents crucially specifies that the left-boundary of the state at least or the entire situation happens (or does not happen in the case of *mei* 'not have') within a certain reference time, hence the change-of-state reading (cf. Smith 1994,1997; Lin 2006). For example, as shown in (85), the semantics of *le* requires that the initial part of a situation e' has its temporal trace within a reference time t_2, and consequently given the semantics of the inchoative stative, the state does not hold at first, but then the left-boundary ensues, giving rise to a change-of-state reading. However, the semantics of these operators are complicated in and of themselves, and would be beyond the scope of this paper; readers are referred to the works of Lin (2003b, 2006) on Mandarin aspects for more detailed discussions about other cases, such as the modals and *mei* 'not have'.

(85) $\lambda P \lambda t_2 e \exists e'[P(e) \wedge P(e') \wedge e' \leq_{\mathrm{E}} e \wedge \tau(e') \subseteq t_2 \wedge t_2 \leq \tau(e_{pro})]$ (Lin 2003b: 272)

On the other hand, when composing with durational phrases, the semantics of the duration phrases requires that the temporal trace of the situation have a certain length, so that the reading that emerges is a stative reading instead (cf. Marín & McNally 201:493). For example, the semantics of *yue* 'month' in Mandarin would be roughly a measure function of events E, standing for either dynamic event e or stative event s, such that the temporal trace of that event or state equals to n months as in (86). Because this temporal trace function is really concerned about the interval of time rather than points of time, it is meaningful only when

it composes with the state itself rather than the left-boundary of the state, because boundaries are instantaneous whose temporal trace does not last for a period of time.

(86) $[\![\ yue\ ]\!] = \lambda n \lambda E[\tau(E) = \boldsymbol{n - month}]$

First, let me explain how this new analysis accounts for the absence of dynamic readings with duration phrases. It follows naturally from my analysis, because the semantics denotes an inchoative comparative state rather than a dynamic change eventuality. Consequently, a duration phrase can only modify this inchoative comparative state. For example, a sentence with an open-scale adjectival core as in (87), besides the regular stative reading that 'Xiaoming was fat for a month', could also have the meaning that 'Xiaoming was fatter (than sometime before) for a month'.

(87) *Xiaoming pang le yi-ge yue.*
Xiaoming fat PERF one-CL month.
'Xiaoming was fat/was fatter (than before) for a month.'
$\lambda s \exists e, s', s''[\mathbf{Beg}(s, e, \lambda s'''[\mathbf{fat}_{comp\text{-}\sigma}(Xiaoming)(s')(s''')]) \wedge \mathbf{fat}_{comp\text{-}\sigma}$
$(x)(s')(s'') \geqslant \mathbf{stnd}(\mathbf{fat}_{comp\text{-}\sigma}) \wedge s = (e \oplus s'') \wedge \tau(s) = \mathbf{1 - month}]$

In contrast, as shown in (88), for those with a closed-scale, such as *gan* 'dry', the default reading is that the clothes have been completely dry for three hours, not that they were dryer than before for three hours. Again, through Interpretive Economy, the maximal point on the scale is selected as the standard, so that a positive reading arises rather than a comparative reading.

(88) *yifu gan le san xiaoshi.*
clothes dry PERF three hour.
'The clothes were/have been dry for three hours.'
$\lambda s \exists e, s', s'' \iota x[\mathbf{Beg}(s, e, \lambda s'''[\mathbf{clothes}(x) \wedge \mathbf{dry}_{comp\text{-}\sigma}(x)(s')(s''')]) \wedge \mathbf{dry}_{comp\text{-}\sigma}$
$(x)(s')(s'') \geqslant \mathbf{stnd}(\mathbf{dry}_{comp\text{-}\sigma}) \wedge s = (e \oplus s'') \wedge \tau(s) = \mathbf{3 - hour}]$

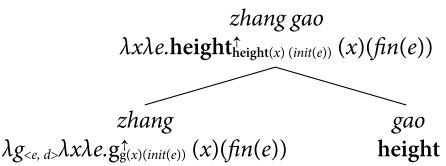
But given my current analysis, how can we account for the compatibility of closed-scale de-adjectival degree achievements, such as *gan* 'dry', with *in*-phrases in Mandarin? I argue that the presence of the left-boundary in fact allows an *in*-phrase, but the left-boundary is more locatable for those with a closed scale than those with an open scale. Given my current semantics, the standard is not fixed for open-scale de-adjectival degree achievements, so that the exact start time of the comparative state is not locatable. In contrast, for the closed-scale ones, it is easier to determine the start time because the standard is fixed. The inchoative state starts as soon as the clothes are completely dry. The sentence with the *in*-phrase asserts that this state starts within a given amount of time from the last

time we are concerned about the dryness of an object. By the same token, when a differential measure phrase is present, it has the effect of closing the scale to that measure, i.e. the degree of change is fixed, and consequently we see that differential measure phrases make those de-adjectival degree achievements derived from open-scale compatible with *in*-phrases.

One may still wonder how Mandarin expresses the dynamic process of changing a property associated with a given adjective. I suggest that in Mandarin, there is a morphological mechanism that adjectives can choose to combine with suitable verbs in front to derive a dynamic degree achievement meaning. For example, the predicate *gao* 'tall' can attach to the end of the verb *zhang* 'grow' to meaning 'grow taller'. I suggest a meaning for *zhang* 'to grow' as in (89) and the composition of *zhang-gao* as in (90). With this process, the predicate can have the same meaning as a dynamic English degree achievement.

(89) $[\![zhang]\!] = \lambda g_{<e,\,d>} \lambda x \lambda e.\ \mathbf{g}^{\uparrow}_{\mathbf{g}(x)(\mathrm{init}(e))}(x)(\mathit{fin}(e))$

(90)



As shown in (91), just as expected, the verbal compound *zhang-gao* is compatible with a duration phrase with a dynamic degree achievement reading that the tree sapling grew for three months, but stopped afterward.

(91) *shu-miao zhang-gao le san-ge yue, jiu bu zhang le.*
tree-sapling grow-tall PERF three-CL month then not grow PERF
'The tree sapling grew taller for three months, and then stopped growing.'

This shows that Mandarin is capable of expressing the same eventive degree achievement reading for de-adjectival degree achievement with the proper morphology.

6. Conclusion

To conclude, in this paper, we have discussed the semantics of Mandarin degree achievements. Just like their English counterparts, Mandarin degree achievements also show similar variable telicity. One particularity of Mandarin degree achievements is that de-adjectival degree achievements cannot co-occur with the *for*-phrase equivalent in Mandarin, although the de-verbal ones can. To account for this particular fact, I have proposed that while de-verbal degree achievements

describe dynamic degree change processes, de-adjectival ones are essentially semantically inchoative statives.

From a cross-linguistic comparison perspective, my paper exemplifies another type of morpho-semantics of expressing degree change. Rather than a dynamic change event as in English, Mandarin lexicalizes a comparative state such that the dynamic change meaning is inferred and secondary. This new inchoative stative analysis may be applied to other languages which use stative adjectives in the perfective to express the degree achievement meaning.

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Abbreviations

COS	change-of-states	RVC	resultative compound predicates
DA	degree achievements	SRPV	Spanish reflexive psychological verbs

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