

Classification of Mandarin Chinese Simple Adjectives: A Scale-Based Analysis of Their Quantitative Denotations*

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This work provides an analysis of the quantitative denotations of simple adjectives (base adjectival forms) in Mandarin Chinese following recent analyses of the ‘scale structure’ associated with English adjectives. Against a widely accepted assumption that simple adjectives unitarily denote an unbounded property, we assume that the property of boundedness in adjectives is situated in the notion of gradability, and identify a group of simple adjectives that are actually bounded. We further provide a finer-grained classification of Chinese simple adjectives based on the different scale structures associated with individual adjectives: non-scale adjectives, open-scale adjectives, lower-closed-scale adjectives, upper-closed-scale adjectives and totally-closed-scale adjectives. Each type is linguistically distinguishable in natural Chinese data. Our classification provides a unified account of the distinctive syntactic and semantic characteristics of individual adjectives that cannot be explained by previous studies. This study also demonstrates a cross-linguistic and cross-categorical application of the scale-structure-based analysis.

Key words: Mandarin Chinese, quantitative denotations, scale structure, simple adjectives

1. Introduction

Chinese adjectives are traditionally classified into two types based on how they are formed: simple adjectives and complex adjectives (Zhu 1999[1956]; see also Lü 1984; Paul 2006, among others).¹ Simple adjectives refer to adjectives in their bare form such as monosyllabic adjectives 大 *dà* ‘big’, 紅 *hóng* ‘red’, 快 *kuài* ‘fast’, 好 *hǎo* ‘good’ and disyllabic adjectives 乾淨 *gānjìng* ‘clean’, 大方 *dàfāng* ‘generous’, 偉大 *wěidà* ‘great’, whereas complex adjectives refer to adjectives formed through some morphological derivation such as 冰涼 *bīngliáng* ‘ice-cool’, 乾乾淨淨 *gāngānjìngjìng*

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¹ These two types of adjectives are also called 性質 *xìngzhì* or 狀態 *zhuàngtài* adjectives in related studies.

‘complete’, 糊裡糊塗 *hūlǐhútú* ‘muddle-headed’, 黑乎乎 *hēihūhu* ‘dark’, or adjectival phrases such as 很大 *hěn dà* ‘very big’, 非常漂亮 *fēicháng piàoliang* ‘very beautiful’, 那麼長 *nàme cháng* ‘that long’ (Zhu 1999[1956]).

In this current study we mainly focus on simple adjectives, leaving a detailed analysis of complex adjectives for future work. This paper also leaves 區別詞 *qūbiécí* ‘distinguishing words’, a special grammatical category in Chinese, for future investigation. Complex adjectives and distinguishing words will only be mentioned in this paper to make a comparison with simple adjectives.²

Zhu (2001[1956]:175) points out that simple adjectives denote the qualities or properties of entities, whereas complex adjectives generally express the type of properties related to quantitative information or speakers’ subjective evaluations of such properties. Ever since Zhu’s (1999[1956]) seminal work on the two-way classification of adjectives in Mandarin Chinese, many studies (Piao 2009; Shen 1995; Shi 2001[1992], 2003; Zhang 2000, 2006a, 2006b) have agreed that simple adjectives denote an unbounded property, whereas complex adjectives express a bounded property.

However, against this widely accepted assumption, we shall identify a group of simple adjectives that are bounded. According to Paradis (2001:48–49), the denotation of adjectives is configured in two domains: the content domain in the foreground and the schematic domain in the background, where content domain is associated with ‘the meaning proper’ of adjectives, and the schematic domain includes the properties of *gradability*. Following this assumption, those simple adjectives that describe qualities of entities in the foreground should also convey quantitative denotations in the background.

The linguistic significance of quantitative denotations and gradability can be demonstrated in examples (1)–(3), where the simple adjectives 便宜 *piányi* ‘cheap’ and 直 *zhí* ‘straight’ show different compatibility with the degree adverb 更 *gèng* ‘more’ and different entailment with the negative adverb 不 *bù* ‘not’.

² Most Chinese complex adjectives are productions of morphological derivation based on simple adjectives, but they are inconsistent in terms of the derivation process involved and how their final meanings are generated out of the derivation. Take, for example, 雪白 *xuěbái* ‘snow white’ and 空蕩蕩 *kōngdàngdàng* ‘empty’. 雪白 *xuěbái* ‘snow white’ is derived from the simple adjective 白 *bái* ‘white’ through the prefixation of the noun 雪; referring to a particular kind of whiteness whose color is close to snow, 雪白 *xuěbái* ‘snow white’ semantically differs from 白 *bái* ‘white’. In contrast, 空蕩蕩 *kōngdàngdàng* is derived by adding the suffix 蕩蕩 *dàngdàng* (which by itself is not a word in Chinese) to the simple adjective 空 *kōng* ‘empty’, but the meaning of 空蕩蕩 *kōngdàngdàng* is hard to distinguish from 空 *kōng* in that both describe a property of being empty. Like adjectives, distinguishing words (e.g. 國營 *guóyíng* ‘state-run’ and 新式 *xīnshì* ‘new-type’), also function as attributives. However, distinguishing words cannot be used as predicates (for example they cannot be negated by 不 *bù*, as in *不國營 *bù guóyíng* and *不新式 *bù xīnshì*, whereas 不白 *bù bái* ‘not white’ and 不空 *bù kōng* ‘empty’ are grammatical).

- (1) a. 坐飛機更便宜了³
zuò fēijī gèng piányi le
 take plane more cheap LE
 ‘Taking airplanes became cheaper.’
 (http://news.ifeng.com/a/20140812/41547427_0.shtml)
- b. ??這根棍子更直了
zhè gēn gùnzi gèng zhí le
 this CLF rod more straight LE
 ??‘This rod became straighter.’
- (2) a. 坐飛機不便宜 !→ b. 坐飛機貴
zuò fēijī bù piányi !→ *zuò fēijī guì*
 take plane NEG cheap take plane expensive
 ‘It’s not cheap to take airplanes.’ ‘It is expensive to take airplanes.’
 (<http://www.ahcaijing.com/news/2014/0212/369364.shtml>)
- (3) a. 這根棍子不直 → b. 這根棍子彎
zhè gēn gùnzi bù zhí → *zhè gēn gùnzi wān*
 this CLF rod NEG straight this CLF rod bent
 ‘This rod is not straight.’ ‘This rod is bent.’
 (<http://club.ent.sina.com.cn/viewthread.php?action=printable&tid=105597>)

Although both are simple adjectives, 便宜 *piányi* ‘cheap’ can be modified by the degree adverb 更 *gèng* ‘more’ and expresses a decreased value of price ((1a)), whereas 直 *zhí* ‘straight’ is not compatible with 更 *gèng* ‘more’ to express the increased value of straightness of the entity ‘stick’. In addition, the negated property of 便宜 *piányi* ‘cheap’ of an entity does not entail the property described by its antonym 貴 *guì* ‘expensive’ ((2b)), whereas the negated property of 直 *zhí* ‘straight’ (3a) does entail the property of its antonym 彎 *wān* ‘bent’ ((3b)).

Our study will provide a systematic account of the varying syntactic behavior and semantic entailments of Chinese simple adjectives, including the phenomena in (1)–(3) and more that have been left unobserved in previous studies (Piao 2009; Shen 1995; Shi 2001[1992], 2003; Zhang 2000, 2006a, 2006b; Zhu 1999[1956], among others). In particular, we argue that the distinctive features of different adjectives as in (1)–(3) are determined by the properties of boundedness that are inherent in gradability in the schematic domain of adjectives. Following Paradis (2001), Kennedy & McNally (2005), and Kennedy (2007) among others, we assume that the property of boundedness

³ Throughout this paper, ‘??’ is used to mark unnatural collocations between specific syntactic constructions (or degree modifiers) and adjectives, for example ??張三比李四錯 ??‘ZhangSan is more wrong than LiSi’; the asterisk < * > is used to mark an unacceptable use, for instance *不國營 *bù guóyíng* and *不新式 *bù xīnshì*. Abbreviations: CLF = classifier; POSS = possessive marker; REL = relativizer; NEG = negator; COMP = comparative marker, meaning ‘more than’.

in adjectives is situated in the notion of gradability, the same way that the property of boundedness in nouns is associated with the notion of countability and that of verbs with the notion of aktionsart, and that the different properties of boundedness constrain the syntactic and semantic behaviors of simple adjectives (see Shen 1995; Shi 2001[1992], 2003).⁴ Furthermore, following recent studies of scale structures associated with adjectival meanings (Kennedy 2007; Kennedy & McNally 2005; Paradis 2001; Rotstein & Winter 2004, among others), this study will classify Chinese simple adjectives in a more unified and finer-grained way than previous works. We shall show that the finer-grained classification of simple adjectives based on the boundedness features embedded in the notion of gradability is linguistically relevant in natural Chinese data.

The structure of this paper is as follows. Section 2 examines the previous analyses that attempt to classify adjectives based on their properties of gradability. In §3, we provide our analysis of different properties of gradability denoted by simple adjectives. In §4, we propose a finer-grained classification of Mandarin simple adjectives and further discuss the differences in the notion of ‘boundedness’ between our study and previous studies, as well as the problems that previous studies have in using degree adverbs to identify Chinese simple adjectives. Section 5 summarizes this paper.

2. Previous studies

There has been a variety of work that classifies adjectives in terms of the schematic domain which involves the notion of gradability (Li & Thompson 1981; Piao 2009; Shen 1995; Shi 2001[1992], 2003; Zhang 2000, 2006a, 2006b, among others). Although not explicitly spelled out in these previous studies, two notions are widely adopted: quantity (量 *liàng* by Shi 2001[1992]) and boundedness (有界性 *yǒujiè xìng* by Shen 1995).

2.1 Previous classification of Mandarin adjectives based on quantity

Among relevant analyses, earlier works such as Li & Thompson (1981) and Shi (2001[1992]) propose two-way classifications for Chinese adjectives. Li and Thompson (1981:141–142) classify adjectives into ‘scalar adjectives’ and ‘absolute adjectives’: the former (e.g. 高 *gāo* ‘tall’, 胖 *pàng* ‘fat’, 安靜 *ānjìng* ‘quiet’, and 美麗 *měilì* ‘beautiful’) describe ‘relative qualities, which may be attributed to an entity to a greater or lesser extent’, whereas the latter (e.g. 錯 *cuò* ‘wrong’, 圓 *yuán* ‘round’, 假 *jiǎ* ‘fake’, and 空 *kōng* ‘empty’) denote ‘a property that cannot be calibrated in degrees’. According to the authors, only the scalar adjectives, which are gradable, can appear in the comparative construction, as in (4):

- (4) a. 張三比他胖 (Li & Thompson 1981:142)
ZhāngSān bǐ tā pàng
 ZhangSan COMP him fat
 ‘ZhangSan is fatter than him.’

⁴ For a scalar analysis of the property of boundedness in incremental theme NPs and verbs of Mandarin Chinese, see Peck et al. (forthcoming) and Peck et al. (2013) respectively.

- b. ??張三比李四錯 (Li & Thompson 1981:142)
ZhāngSān bǐ lǐsì cuò
 ZhangSan COMP LiSi wrong
 ??‘ZhangSan is more wrong than LiSi.’

Shi (2001[1992]:120–121) classifies Chinese adjectives into unquantized (*fēi dìngliàng*) and quantized (*dìngliàng*) adjectives mainly based on the adjective’s compatibility with three degree adverbs: 有點 *yǒudiǎn* ‘slightly’, 很 *hěn* ‘very’, and 最 *zuì* ‘most’. Unquantized adjectives such as 大 *dà* ‘big’ and 漂亮 *piàoliang* ‘beautiful’ can be modified by any of these three adverbs, whereas quantized adjectives can be modified by at most two of these adverbs. For example, 中間 *zhōngjiān* ‘middle’, 心愛 *xīnài* ‘beloved’, 新式 *xīnshì* ‘new-type’, and 尖端 *jiānduān* ‘advanced’ can only be modified by 最 *zuì* ‘most’, and thus are quantized adjectives.

In a later study, Shi (2003) provides a finer-grained classification in which Chinese adjectives fall into four types: degree adjectives (老 *lǎo* ‘old’, 熱 *rè* ‘hot’, 紅 *hóng* ‘red’, 便宜 *piányi* ‘cheap’), percent adjectives (一致 *yízhì* ‘consistent’, 相同 *xiāngtóng* ‘identical’, 相反 *xiāngfǎn* ‘contrary’, 錯誤 *cuòwù* ‘wrong’), limit adjectives (中間 *zhōngjiān* ‘middle’, 上等 *shàngděng* ‘superior’, 新式 *xīnshì* ‘new-type’, 初級 *chūjí* ‘elementary’), and positive/negative adjectives (男 *nán* ‘male’, 女 *nǚ* ‘female’, 彩色 *cǎisè* ‘color’, 黑白 *hēibái* ‘black and white’).⁵ Unlike Shi (2001[1992]), Shi’s (2003) new classification is based on how the adjectives behave in five syntactic patterns, including negation, suffixation by the perfective marker 了 *le*, reduplication, attributive and predicative usages, and the comparative construction (see Shi 2003:24 for more detailed examples of the syntactic distributions). According to Shi (2003), the different syntactic behaviors of adjectives with these constructions are determined by the properties of quantity expressed by the adjectives.⁶

Other later studies (e.g. Li 1997, 2000; Piao 2009; Zhang 2000, 2006a, 2006b, among others) also attempt to classify Chinese adjectives into finer-grained classes in terms of the notion of quantity. For example, Piao (2009) classifies Chinese adjectives into five types according to how the adjectives collocate with four types of degree adverbs, as presented in Table 1.

⁵ As the examples show, Shi’s (2003) classification also includes distinguishing words, such as 男 *nán* ‘male’ and 新式 *xīnshì* ‘new-type’. Also in Piao’s (2009) work that will be introduced later, complex adjectives are included. Even though our current analysis is limited to the semantic property of simple adjectives, complex adjectives and distinguishing words will be mentioned when introducing previous analyses which cover these two types of words.

⁶ Shi (2003:13) also argues that the property of quantity is related not only to the notion of boundedness of quantity, but also to the ‘volume of quantity’ and the ‘property of quantity’, although he provides little explicit explanation of the latter two notions.

Table 1: Piao's (2009) five-way classification of Chinese adjectives

	稍 <i>shāo</i> 'slightly'	比較 <i>bǐjiào</i> 'comparatively'	最 <i>zuì</i> 'most'	很 <i>hěn</i> 'very'
Type A: 漂亮 <i>piàoliang</i> 'beautiful', 空 <i>kōng</i> 'empty'	✓	✓	✓	✓
Type B: 完全 <i>wánquán</i> 'complete', 恰當 <i>qiàdàng</i> 'appropriate'	✗	✓	✓	✓
Type C: 美好 <i>měihǎo</i> 'glorious', 難看 <i>nánkàn</i> 'ugly'	✗	✗	✓	✓
Type D: 錯誤 <i>cuòwù</i> 'wrong', 名貴 <i>míngguì</i> 'famous & precious'	✗	✗	✗	✓
Type E: 雪白 <i>xuěbái</i> 'snow white', 通紅 <i>tōnghóng</i> 'thoroughly red'	✗	✗	✗	✗

Piao (2009) points out that the five types of adjective form a continuum in terms of their quantitative denotations and their syntactic distribution. For example, the Type A adjective is the most typical simple adjective (see Zhu's 1999[1956] simple versus complex adjectives), and is syntactically the most flexible, including occurrence in attributive/predicative positions, compatibility with aspectual markers (e.g. perfective 了 *le*, experiential 過 *guò*, continuous 著 *zhe*), ability to be reduplicated, and so on. Those of Type E are the most typical complex adjectives (see Zhu's 1999[1956] simple versus complex adjectives), and they are the most restricted in terms of syntactic distribution (see Piao 2009 for a detailed description of the syntactic distribution of each adjectival type).

2.2 Quantitative differences between simple adjectives unobserved in previous classifications

In §2.1, we introduced the major previous classifications of Chinese adjectives in relation to the notion of gradability. From a semantic perspective, previous studies tend to agree that, in contrast to complex adjectives, simple adjectives are uniformly unbounded. However, a more consistent analysis is still necessary because these previous classifications are unable to distinguish some important quantitative differences reflected in the syntactic and semantic behaviors of simple adjectives.

To illustrate this point, we shall first present two types of syntactic or semantic inconsistencies of simple adjectives that are grouped into the same class by previous works. For example, the adjectives 熱 *rè* 'hot', 髒 *zāng* 'dirty', 空 *kōng* 'empty', and 直 *zhí* 'straight' are usually treated as one group (Piao 2009:177; Shi 2003:17; Zhu 1999[1956], among others), based on the observation that these adjectives are all compatible with degree adverbs such as 稍 *shāo* 'slightly', 比較 *bǐjiào* 'comparatively', 最 *zuì* 'most', 很 *hěn* 'very'; can be negated by 不 *bù* 'not'; and can

be suffixed with the perfective 了 *le*.⁷ However, closer examination reveals that the four adjectives respond differently to the comparative degree adverb as in (5) and (6), and negation as in (7)–(10).

First, 熱 *rè* ‘hot’, 便宜 *piányi* ‘cheap’, 空 *kōng* ‘empty’, and 直 *zhí* ‘straight’ do not show the same compatibility with the comparative degree adverb 更 *gèng* ‘more’. Even though the four adjectives can all appear in the comparative construction with the preposition 比 *bǐ* ‘more than’ as observed in previous work, only 熱 *rè* ‘hot’ and 便宜 *piányi* ‘cheap’ are compatible with 更 *gèng* ‘more’ to describe a higher degree of the given property denoted by the adjectives ((5)), whereas the latter two are not ((6)).

- (5) a. 天氣變得更熱了
tiānqì biàn dē gèng rè le
 weather become DE more hot LE
 ‘The weather became hotter.’
 (<http://zhidao.baidu.com/question/428297318.html>)
- b. 地板更髒了
dìbǎn gèng zāng le
 floor more dirty LE
 ‘The floor became dirtier.’
 (<http://bbs.tianya.cn/post-41-1040951-1.shtml>)
- (6) a. ??這個杯子變得更空了
zhè ge bēizi biàn de gèng kōng le
 this CLF cup become DE more empty LE
 ??‘This cup became emptier.’
- b. ??這根棍子變得更直了
zhè gēn gùnzi biàn de gèng zhí le
 this CLF rod become DE more straight LE
 ??‘This rod became straighter.’

Second, 熱 *rè* ‘hot’, 便宜 *piányi* ‘cheap’, 空 *kōng* ‘empty’, and 直 *zhí* ‘straight’ are all compatible with the negative adverb 不 *bù* ‘not’, which is thus taken as evidence by previous studies (see Piao 2009; Shi 2003:17) to group these adjectives together, but closer examination would find that these adjectives show different entailments under negation. As illustrated in (7) and (8), when 髒 *zāng* ‘dirty’ and 直 *zhí* ‘straight’ are negated, 不髒 *bù zāng* ‘not dirty’ and 不直 *bù zhí* ‘not straight’

⁷ The four adjectives 熱 *rè* ‘hot’, 髒 *zāng* ‘dirty’, 直 *zhí* ‘straight’, and 空 *kōng* ‘empty’ are classified into one type (Type A: the most typical simple adjectives) by Piao (2009:176–177). Shi (2003) groups 熱 *rè* ‘hot’, 空 *kōng* ‘empty’, and 直 *zhí* ‘straight’ into one type (i.e. degree adjectives); 髒 *zāng* ‘dirty’ is not explicitly listed in Shi (2003), but it also belongs to degree adjectives according to the tests that Shi (2003:24) proposes (also see Shi 2001[1992]:136).

entail their antonyms 乾淨 *gānjìng* ‘clean’ and 彎 *wān* ‘bent’, whereas when 熱 *rè* ‘hot’ and 空 *kōng* ‘empty’ are negated, the negation does not necessarily entail their antonyms, for example 冷 *lěng* ‘cold’ ((9b)) and 滿 *mǎn* ‘full’ ((10b)).

- (7) a. 地板不髒
dìbǎn bù zāng
 floor NEG dirty
 ‘The floor is not dirty.’ → b. 地板乾淨
dìbǎn gānjìng
 floor clean
 ‘The floor is clean.’
- (8) a. 這根棍子不直
zhè gēn gùnzi bù zhí
 this CLF rod NEG straight
 ‘This rod is not straight.’ → b. 這根棍子彎
zhè gēn gùnzi wān
 this CLF rod bent
 ‘This rod is bent.’
- (9) a. 今天天氣不熱
jīntiān tiānqì bú rè
 today weather NEG hot
 ‘The weather today is not hot.’ !→ b. 今天天氣冷
jīntiān tiānqì lěng
 today weather cold
 ‘The weather today is cold.’
- (10) a. 這個杯子不空
zhè ge bēizi bù kōng
 this CLF cup NEG empty
 ‘This cup is not empty.’ !→ b. 這個杯子滿
zhè ge bēizi mǎn
 this CLF cup full
 ‘This cup is full.’

Compatibility with degree modifiers and negation is an important test for classifying adjectives in previous studies such as Shi (2001[1992], 2003), Zhang (2000, 2006a, 2006b), and Piao (2009) (which we shall come back to in §4.3). However, the inconsistencies between adjectives in examples (5)–(10) suggest that the diagnostics in previous studies have not captured some important quantity-related differences between simple adjectives such as 熱 *rè* ‘hot’, 便宜 *piányi* ‘cheap’, 空 *kōng* ‘empty’, and 直 *zhí* ‘straight’. In contrast to previous studies that group the four adjectives together, examples (5)–(10) show that each of them behaves differently from the others.

In other words, further classification should be carried out in order to accurately reflect the different types of gradability inherent in simple adjectives. In this paper, we assume that such internal differences between simple adjectives can be ascribed to the differences of boundedness inherent in gradability (Kennedy 2007; Kennedy & McNally 2005; Paradis 2001; Rotstein & Winter 2004, among others; see also Shen 1995; Shi 2001[1992]). In what follows, we shall provide an analysis of different types of quantitative denotations of simple adjectives that are determined by the scale structures associated with these adjectives. Then, in §3, we shall provide a finer-grained classification of simple adjectives, and discuss further how our analysis can better solve the problems found in previous studies.

3. Scale, boundedness, and simple adjectives

In this section, we introduce the notion of scale and the feature of boundedness associated with scales, following the scalar approach taken in previous studies (Kennedy 2007; Kennedy & McNally 2005; Paradis 2001; Rotstein & Winter 2004, among others). We shall show that, with this new approach, Chinese simple adjectives can first be divided into scalar and non-scalar adjectives. Scalar adjectives can be further classified into four types based on the quantitative information inherent in the meanings of simple adjectives. Our classification is linguistically more relevant than those in previous studies. We shall also provide a set of diagnostics that can effectively achieve a successful classification of simple adjectives.

3.1 Scale and scalar adjectives

A scale corresponds to a set of ordered degrees in the form of points or intervals along dimensions such as height, cost, or temperature (Hay et al. 1999; Kennedy 1999, 2001; Kennedy & Levin 2008; Kennedy & McNally 2005; Rappaport Hovav 2008; Rappaport Hovav & Levin 2010, and others). An adjective that lexicalizes such a scale maps objects to the scale; specifically, we follow Kennedy & McNally (2005:350, see also Kennedy 2007:4) in maintaining that the meanings of such adjectives can be defined in terms of “a measure function that maps entities to scales”. For example, according to Kennedy & McNally (2005:349), when we say ‘Michael Jordan is tall’ the adjective *tall* maps the height of Michael Jordan onto degrees ordered along the dimension of height. More specifically, the meaning of adjectives such as *tall* can be understood as a relation between the degree of height Michael Jordan possesses and the standard of comparison. Such a relation is analogous to ‘Michael Jordan’s height exceeds a standard of tallness’ (Kennedy & McNally 2005:349) (we shall come back to the notion of standard of comparison in §3.3). Adjectives that express such a relation are called ‘gradable adjectives’ (e.g. Kennedy 2007; Kennedy & McNally 2005; Paradis 2001; Rotstein & Winter 2004). For consistency, we shall call them ‘scalar adjectives’ in this paper.

There is also a group of adjectives that is not associated with any scale. These adjectives are called ‘non-scalar adjectives’ in this paper (also called ‘nongradable adjectives’ in Kennedy 2007:22, see also Kennedy & McNally 2005:356). Take the adjective *wooden* for example. When we say a table is *wooden*, it does not mean the woodenness of the table exceeds a standard value of woodenness, in contrast to the denotation of *tall* illustrated above. In other words, *wooden* denotes a property that cannot be measured according to any scale, nor is there any standard of comparison to be compared with so that an entity can be understood as *wooden*.

In what follows, we introduce in more detail the difference between scalar and non-scalar adjectives. Then we further classify scalar adjectives into three subtypes based on their boundedness features.

3.2 Classification of simple adjectives into non-scalar adjectives and scalar adjectives

As introduced in §3.1, scalar adjectives lexicalize a scale, namely a set of ordered degrees on a particular property dimension. A scalar adjective can usually appear in constructions with quantitative information. More specifically, scalar adjectives can usually occur in comparative constructions with 比 *bǐ* ‘than’ (Kennedy 2007; Kennedy & McNally 2005; Li & Thompson 1981; Shi 2003, among others), as illustrated by 便宜 *piányi* ‘cheap’ in (11):

- (11) 買房比租房便宜
mǎi fáng bǐ zū fáng piányi
 buy room COMP rent room cheap
 ‘It is cheaper to buy a room than to rent a room.’
 (<http://www.epochtimes.com/gb/12/3/24/n3549325.htm>)

In contrast, non-scalar adjectives do not usually occur in comparative constructions. *Wooden*, *geological*, *locked*, and *hand-made* are some examples of non-scalar adjectives in English (Kennedy 2007:22, also Kennedy & McNally 2005), as in (12):

- (12) a. ??The platinum is less *geological* than the gold.
 b. ??The table is more *wooden* than the floor.
 c. ??The door isn’t as *locked* as I want it to be.
 d. ??This rod is too *hand-made* to be of use for this purpose. (Kennedy 2007:22)

There are fewer examples of non-scalar adjectives in Mandarin Chinese. So far, we have only identified four adjectives 真 *zhēn* ‘real’, 假 *jiǎ* ‘fake’, 方 *fāng* ‘square’, and 圓 *yuán* ‘round’. These adjectives exhibit features of non-scalar adjectives when used in literal meanings (i.e. in a precise sense).

Take 真 *zhēn* ‘real,’ for example. First, 真 *zhēn* ‘real’ is an adjective rather than a distinguishing word in that it can function as a predicate, and thus can be negated by 不 *bù*.⁸ Second, as illustrated in (13), 真 *zhēn* ‘real’ does not occur naturally in comparative constructions when its literal meaning is used:

- (13) a. 這兩幅畫都是齊白石的真跡，??但這幅比那幅真
zhè liǎng fú huà dōu shì Qíbaishí de zhēnjì,
 this two CLF painting all is Qibaishi POSS authentic
dàn zhè fú bǐ nà fú zhēn
 but this CLF COMP that CLF true
 (Lit.) ‘These two paintings are both authentic of Qi Baishi, ??but this one is more authentic than the other.’

⁸ As introduced in §1, distinguishing words cannot be negated by 不 *bù* ‘not’ whereas adjectives can.

- b. ??這個純金戒指比那個純金戒指更真
zhè ge chún jīn jièzhǐ bǐ nà ge chún jīn jièzhǐ gèng zhēn
 this CLF pure gold ring than that CLF pure gold ring more real
 ??‘This pure gold ring is more real than that pure gold ring.’

Meanwhile, some non-scalar adjectives may show syntactic behavior similar to scalar adjectives by appearing in comparative constructions or being modified by degree modifiers such as 很 *hěn* ‘very’. However, in these constructions, these non-scalar adjectives are used in their non-literal senses. The examples in (14) demonstrate the imprecise uses of some non-scalar adjectives.

- (14) a. 夢想比現實更真
mèngxiǎng bǐ xiànshí gèng zhēn
 dream COMP reality more true
 ‘A dream is more true than reality.’
 (<http://book.douban.com/subject/2363651/annotation?sort=page>)
- b. 市面上也有好多仿品做得很真
shìmiàn-shàng yě yǒu hǎoduō fǎngpǐn zuò de hěn zhēn
 market-on also have many imitation make DE very real
 ‘There are many imitation goods in the market which are made as real as the actual product.’ (<http://wenwen.soso.com/z/q143161925.htm>)

We observe that such imprecise uses of non-scalar adjectives are often found in two types of situations: (i) when the property denoted by an adjective is used to describe an abstract entity, for example a dream ((14a)); (ii) when the entity cannot have the precise property denoted by the adjective, for instance a fake product cannot have the property of authenticity ((14b)). Such a use of adjectival denotation is called ‘imprecision’ (Pinkal 1995), ‘loose talk’ (Unger 1975), or ‘pragmatic halos’ (Laserson 1999) (see more details in Kennedy 2007:24; Kennedy & McNally 2005:357). In this sense, although sometimes adjectives such as 真 *zhēn* ‘real’ and 圓 *yuán* ‘round’ are found in gradable uses, we assume that these uses do not represent their primary meanings, and categorize them as non-scalar adjectives.⁹

⁹ We argue that the adjective 圓 *yuán* ‘round’ is a non-scalar adjective even though it shares a semantic similarity with upper-closed-scale adjectives such as 直 *zhí* ‘straight’ (we shall introduce upper-closed-scale adjectives in §3.3). First, 圓 *yuán* ‘round’ is a non-scalar adjective like 真 *zhēn* ‘real’ when it is used literally. For example, it does not occur naturally in the comparative construction (i), unless it is used in a non-literal sense, that is imprecise use (ii). In reality, a face cannot be rounder than a moon-cake.

(i) ??這張圓桌比那張圓桌圓
zhè zhāng yuánzhuō bǐ nà zhāng yuánzhuō yuán
 this CLF roundtable COMP that CLF roundtable round
 ??‘This round table is rounder than that round table.’

3.3 A further classification of scalar adjectives

In §3.2, we distinguished non-scalar adjectives from scalar adjectives. The examples of scalar adjectives in Chinese are traditionally called ‘unquantized adjectives’ (非定量形容詞 *fēidìngliàng xíngróngcí*; Shi 2001[1992]) or ‘unbounded adjectives’ (無界形容詞 *wújiè xíngróngcí*; Shen 1995). On the other hand, the terms (定量形容詞 *dìngliàng xíngróngcí*, Shi 2001[1992]) or ‘bounded adjectives’ (有界形容詞 *yǒujiè xíngróngcí*, Shen 1995) traditionally refer to distinguishing words and complex adjectives. However, against the previous assumption that simple adjectives are unitarily unbounded, we argue that the feature of being ‘bounded’ is also found with some simple adjectives. Different properties of boundedness within simple adjectives result in the inconsistent behaviors of the simple adjectives as shown in examples (5)–(10) in §2, but the identification of a group of bounded simple adjectives is neglected in previous studies.

In what follows, we shall introduce two types of standards of comparison that are associated with scalar adjectives, and a principled correlation between these types of standards of comparison and two types of adjectives: open-scale adjectives and closed-scale adjectives (Kennedy 2007; Kennedy & McNally 2005; Rotstein & Winter 2004, among others). Then, we shall provide further classification of closed-scale adjectives into three subtypes – lower-closed-scale, upper-closed-scale, and totally-closed-scale adjectives.

3.3.1 Open-scale adjectives and closed-scale adjectives

Recall the sentence *Michael Jordan is tall* (Kennedy & McNally 2005:349) in §3.1. This statement is true if Michael Jordan is compared with the heights of average human beings. However, the statement could be false in other contexts. For example, the height of Michael Jordan

(ii) 我的臉，比月餅圓

wǒ	de	liǎn,	bǐ	yuèbǐng	yuán
I	POSS	face	COMP	moon-cake	round

‘My face is rounder than a moon cake.’ (<http://www.paigu.com/u60483/a8238712.html>)

Second, both non-scalar adjectives and upper-closed-scale adjectives have some kind of boundary. This common feature is exhibited by the fact that both non-scale adjectives and upper-closed-scale adjectives can be modified by totality degree modifiers, as in 百分百圓 *bǎi fēn bǎi yuán* ‘one hundred percent round’ and 百分百直 *bǎi fēn bǎi zhí* ‘one hundred percent straight’.

However, 圓 *yuán* ‘round’ and 直 *zhí* ‘straight’ are different in that 圓 *yuán* ‘round’ is non-scalar when it is used in its literal sense and the semantics of non-scalar adjectives have nothing to do with scale. The property of ‘roundness’ cannot be understood as having gradable degrees because an entity is either round or not round. This can be supported by the lack of an antonym for 圓 *yuán* ‘round’. When 圓 *yuán* ‘round’ is negated, the values returned by the negation can be in any dimension other than ‘roundness’. For example, when we say 這張桌子不圓 *zhè zhāng zhuōzi bù yuán* ‘The table is not round’, the table can be square, rectangular, oval, or any shape other than round. In contrast, scalar adjectives have antonyms, and when they are negated, the values returned are only on the dimension of the scale associated with the adjectives. For instance, when 直 *zhí* ‘straight’ is negated, its meaning entails its antonym 彎 *wān* ‘bent’, which shares the same scale with 直 *zhí* ‘straight’.

might be short when compared with buildings, which are usually much taller than human beings. Similarly, ‘Jumbo is small’ can be true when the ‘comparison class’ is elephants (Kennedy 2007:8; see also Klein 1980), but this statement can be false when compared with much smaller animals such as cats. As shown by these examples, different interpretations of the same property may arise because ‘the standard of comparison’ of these adjectives varies in different contexts (Kennedy 2007:8; Kennedy & McNally 2005:349).¹⁰

In contrast, there is also a kind of standard of comparison that is fixed, that is independent of context. Take *open* in (15) for example. A door obtains the property of being open as long as the door possesses some degree of openness. The door undergoes the transition from a zero degree (i.e. closed) to a non-zero degree (Kennedy 2007:31–32). In other words, the truth conditions of a sentence *x is A* can be understood as being that the entity *x* has greater than zero degree of property *A* (Kennedy 2007:26–35; Kennedy & McNally 2005:356).

(15) The door is open. (Kennedy & McNally 2005:356, (29c))

In addition, there is a type of fixed standard of comparison that is associated with the maximal degree of a property (Kennedy 2007; Kennedy & McNally 2005; Rotstein & Winter 2004, among others). For example, in (16) only if the degree of fullness of the glass reaches the maximal value (i.e. 100% full) can the glass be considered full. In this sense, the maximal value, 100% full, serves as the standard of comparison.

(16) The glass is full. (Kennedy & McNally 2005:356, (30a))

For adjectives with the maximal value as the standard of comparison, the truth conditions of a sentence *x is A* are that the entity *x* has a maximal degree of property *A* (Kennedy 2007:26; Kennedy & McNally 2005:359). In other words, the entity undergoes a transition from a non-maximal degree to a maximal degree (Kennedy 2007:31–32).

It has been found that there is a principled correlation between standard values and an adjective’s scale structures (Kennedy & McNally 2005:361). On the one hand, the scales lexicalized by adjectives such as *tall* and *big* do not have any minimum or maximum values, or, in other words, the scales do not have endpoints at either their lower or upper ends.¹¹ And because there are no minimum or maximum degrees on a scale that can be used as the fixed standard of comparison, the

¹⁰ For further investigation on context sensitivity, refer to MacFarlane (2007, 2009, 2014). An anonymous reviewer suggests that context sensitivity is not caused by the semantic context or truth conditions of a sentence, but by variation in its circumstances of evaluation; in other words, a sentence like ‘Michael Jordan is tall’ is context-sensitive not because it expresses different propositions in different contexts, but because the truth or falsity of its occurrences depends on the circumstances in which it is evaluated. We thank the reviewer for commenting on this point.

¹¹ To put it in another way, scales that are open include all of those degrees that approach the limit of 0 and the limit of the maximal value 1, but lack two degrees that are equal to 0 and 1 respectively (Kennedy & McNally 2005:354).

standard of comparison of these adjectives needs to be determined by context. For example, recall the sentence *Michael Jordan is tall*. There can always be some lower or higher degree of tallness along the scale of height with which the height of Michael Jordan is compared. Scales associated with this type of property are considered open, that is unbounded at both ends, and adjectives with unbounded scales are called ‘open-scale adjectives’ by Kennedy & McNally (2005:353).

On the other hand, the scales lexicalized by adjectives such as *open* and *full* have scales with one end closed. In particular, *open* has a lower endpoint which is the minimal value of the property openness, whereas *full* has an upper endpoint which is the maximal value of the property fullness. Either the minimal or maximal value of a given property serves as the fixed standard of comparison, which is not influenced by context. The scales associated with these adjectives are bounded at either the lower or upper end, and the adjectives with such scales are called ‘closed-scale adjectives’ by Kennedy & McNally (2005:361). We shall further discuss adjectives with bounds at different ends of their scales in §3.3.2.

A similar distinction regarding the boundedness of scales is also reflected in the syntactic and semantic behaviors of gradable adjectives in Mandarin Chinese. For example, adjectives such as 熱 *rè* ‘hot’, 冷 *lěng* ‘cold’, 便宜 *piányi* ‘cheap’, 貴 *guì* ‘expensive’, 高 *gāo* ‘tall’, and 矮 *ǎi* ‘short’ have context-dependent standards of comparison because the scales they lexicalize do not have inherent minimal or maximal values, whereas adjectives such as 直 *zhí* ‘straight’, 彎 *wān* ‘bent’, 濕 *shī* ‘wet’, 乾 *gān* ‘dry’, 空 *kōng* ‘empty’, and 滿 *mǎn* ‘full’ are associated with scales with endpoints and these endpoints serve as the standard of comparison. For example, for the NP 直棍 *zhí gùn* ‘straight rod’, when we judge that a rod is straight, the property that the rod possesses regarding straightness matches the maximal value of straightness, namely the upper endpoint of the scale of straightness or 100% straightness. However, as for 彎棍 *wān gùn* ‘bent rod’, the bentness of the rod is compared with the minimal value of bentness, namely zero degree of bentness, and as long as an entity has a degree of bentness greater than the zero value, it is true that the entity is bent.

Open-scale and closed-scale adjectives lead to different interpretations when they occur in comparative constructions. Open-scale adjectives in a comparative construction indicate that one object exceeds the other in terms of the value of the property, but such a comparison does not give us any information ‘about how the objects stand in relation to a contextually significant amount of the relevant property’ (Kennedy 2007:28; Kennedy & McNally 2005:360). As illustrated in (17)–(20), open-scale adjectives in comparative constructions do not convey information regarding how tall or short the object is in either English or Chinese.

- (17) a. 棍子 A 比 棍子 B 長
 gùnzi A bǐ gùnzi B cháng
 rod A COMP rod B long
 ‘Rod A is longer than Rod B.’
 !→ b. 棍子 A/B 長/不長
 gùnzi A/B cháng / bù cháng
 rod A/B long / NEG long
 ‘Rod A/B is (not) long.’
- (18) a. Rod A is longer than Rod B.
 (Kennedy 2007:28, (51)–(52))
 !→ b. Rod A/B is (not) long.

- (19) a. 棍子 A 比棍子 B 短
gùnzi A bǐ gùnzi B duǎn
 rod A COMP rod B short
 ‘Rod A is shorter than Rod B.’
 !→ b. 棍子 A/B 短/不短
gùnzi A/B duǎn / bù duǎn
 rod A/B short / NEG short
 ‘Rod A/B is (not) short.’
- (20) a. Rod A is shorter than Rod B.
 (Kennedy 2007:28, (51)–(52))
 !→ b. Rod A/B is (not) short.

Closed-scale adjectives in comparative constructions produce entailments that are different from open-scale adjectives. A closed-scale-adjective with minimum and maximal degrees ‘generates positive and negative entailments to the unmarked form respectively’ (Kennedy 2007:27; Kennedy & McNally 2005:360). In Chinese, too, (21a) and (22a) are true only if the floor possesses a non-minimal degree of wetness, because otherwise the floor cannot be wetter than the countertop. (23a) and (24a) are true only if the countertop is not maximally dry, because the dryness of the floor cannot exceed the maximal degree of dryness.

- (21) a. 地板比臺面濕
dìbǎn bǐ tái miàn shī
 floor COMP countertop wet
 ‘The floor is wetter than the countertop.’
 → b. 地板是濕的
dìbǎn shì shī de
 floor is wet DE
 ‘The floor is wet.’
- (22) a. The floor is wetter than the countertop.
 (Kennedy 2007:27, (49)–(50))
 → b. The floor is wet.
- (23) a. 地板比臺面乾
dìbǎn bǐ tái miàn gān
 floor COMP counter top dry
 ‘The floor is drier than the countertop.’
 → b. 臺面不乾
tái miàn bù gān
 countertop NEG dry
 ‘The countertop is not dry.’
- (24) a. The floor is drier than the countertop.
 (Kennedy 2007:27, (49)–(50))
 → b. ‘The countertop is not dry.’

3.3.2 A further classification of closed-scale adjectives

In §3.3.1, we state that closed-scale adjectives are associated with scales with inherent endpoints (be it the lower or upper endpoints) and that these endpoints serve as the fixed standard of comparison. According to Kennedy & McNally (2005:353) and Kennedy (2007:34), the closed-scales can be further classified into three types according to which end of the scale is closed: lower-closed-scale, upper-closed-scale, and totally-closed-scale. In this section, we introduce these three types of closed-scales and show that in Chinese too, the adjectives with three types of scales are linguistically distinctive.

We shall call adjectives whose standard of comparison is the minimal value on the associated scale ‘lower-closed-scale adjectives’ based on Kennedy & McNally (2005:354). Chinese adjectives such as 彎 *wān* ‘bent’, 濕 *shī* ‘wet’, and 髒 *zāng* ‘dirty’ belong to this category. A scale associated with these adjectives only has a minimal value and does not have a maximal value. For example, 髒 *zāng* ‘dirty’ does not have a degree at which an entity it describes is maximally dirty. Similarly, 彎 *wān* ‘bent’ does not have a maximal value, that is 100% bent.

In contrast, there also exist closed-scale adjectives that lexicalize scales with upper endpoints. We shall call such adjectives ‘upper-closed-scale adjectives’ based on Kennedy & McNally (2005:354). Closed-scale adjectives such as 直 *zhí* ‘straight’, 純 *chún* ‘pure’, and 乾淨 *gānjìng* ‘clean’ belong to this category. For example, the denotation of the adjective 直 *zhí* ‘straight’ is based on a scale that has a maximal value, that is being completely straight, but does not have a minimal value, that is zero degrees of straightness.

In addition to adjectives associated with a scale that is only closed at one end, there is another type of closed-scale adjective with both lower and upper bounds. We shall call these adjectives ‘totally-closed-scale adjectives’ based on Kennedy & McNally (2005:353). The standard of comparison of this type of adjective corresponds to either the minimal or maximal values of the scales they have. Adjectives such as 滿 *mǎn* ‘full’ and 空 *kōng* ‘empty’ belong to this category. For example, the minimal degree of 滿 *mǎn* ‘full’ is 0% in fullness, which corresponds to 100% in emptiness, whereas the maximal degree of 滿 *mǎn* ‘full’ is 100% in fullness, which corresponds to 0% in emptiness.

3.4 Diagnostics distinguishing the four types of scalar adjectives

In this section, we first investigate whether the use of degree modifiers for the categorization of adjectives is adequate or not, and point out that for Mandarin Chinese not all degree modifiers can be used reliably for classifying adjectives in terms of their quantitative, i.e. scalar, denotations. Then, we propose a set of tests that can effectively distinguish different types of scale adjectives.

As discussed in §2, degree modifiers are often used by Chinese scholars for the classification of adjectives (Piao 2009; Shi 2001[1992]). However, we observe that degree adverbs in general are not a highly reliable test of adjective class. Take 最 *zuì* ‘most’ as an example. 最 *zuì* ‘most’ is used by both Piao (2009) and Shi (2001[1992], 2003) in their tests, but it is not useful in distinguishing different properties of boundedness in gradable adjectives. As illustrated in (25), 最 *zuì* ‘most’ can modify all four types of scalar adjectives. We shall further discuss 最 *zuì* ‘most’ and other degree modifiers in §4.3.

- (25) a. 今天最熱
jīntiān zuì rè
 today most hot
 ‘Today is the hottest.’
 (<http://www.tudou.com/programs/view/pcpdHZoVDG0/>)

- b. 廚房地板最髒
chúfáng dìbǎn zuì zāng
 kitchen floor most dirty
 ‘The floor in the kitchen is the dirtiest.’
 (<http://m.huaren.us/Home/Topic?tid=1329868>)
- c. 我畫的棍子最直
wǒ huà de gùnzi zuì zhí
 I draw REL rod most straight
 ‘The rod I drew is the straightest.’
 (<http://tieba.baidu.com/p/1978094382>)
- d. 那個盤子最空的是我的
nà gè pánzi zuì kōng de shì wǒde
 that CLF plate most empty REL is mine
 ‘That plate, the emptiest one, is mine.’
 (<http://price.52che.com/Sonata/news-21196503.html>)

However, these four types of Chinese scalar adjectives are indeed linguistically distinguishable. In the following, we introduce a neat and effective test. Our test makes use of the 更 *gèng* ‘more’ comparative construction and the entailment of negation. Recall the four adjectives 熱 *rè* ‘hot’, 髒 *zāng* ‘dirty’, 直 *zhí* ‘straight’, and 空 *kōng* ‘empty’ that are grouped together in previous studies (§2). Our test will use these four adjectives as examples and show that they belong to the open-scale, lower-closed-scale, upper-closed-scale, and totally-closed-scale categories respectively, as they are associated with four different scale structures.

As illustrated in examples (5) and (6), repeated here as (26) and (27), when 更 *gèng* ‘more’ is used for comparison between changed properties of the same entity, 熱 *rè* ‘hot’ and 髒 *zāng* ‘dirty’ occur naturally in the 更 *gèng* ‘more’ comparative construction, whereas 直 *zhí* ‘straight’ and 空 *kōng* ‘empty’ do not. This difference can be explained by our scalar analysis: 熱 *rè* ‘hot’ and 髒 *zāng* ‘dirty’ lexicalize an open-scale and a lower-closed-scale respectively; the two scales share the same feature that both have no maximal values, and thus the entities being described can reach higher degrees, that is the weather can be hotter and the floor can be dirtier, as in (26a and b); on the other hand, 空 *kōng* ‘empty’ and 直 *zhí* ‘straight’ are closed-scale adjectives with maximal values, so the entities expressed by these adjectives already possess the maximal value and do not allow higher degrees, as in (27a and b):

- (26) a. 天氣變得更熱了
tiānqì biàn de gèng rè le
 weather become DE more hot LE
 ‘The weather became hotter.’
 (<http://zhidao.baidu.com/question/428297318.html>)

- b. 地板更髒了
dìbǎn gèng zāng le
 floor more dirty LE
 ‘The floor became dirtier.’
 (<http://bbs.tianya.cn/post-41-1040951-1.shtml>)

- (27) a. ??這個杯子變得更空了
zhè ge bēizi biàn de gèng kōng le
 this CLF cup become DE more empty LE
 ??‘This cup became emptier.’
- b. ??這根棍子變得更直了
zhè gēn gùnzi biàn de gèng zhí le
 this CLF rod become DE more straight LE
 ??‘This rod became straighter.’

In addition, when the four adjectives are negated by 不 *bù* ‘not’, 髒 *zāng* ‘dirty’ and 直 *zhí* ‘straight’ differ from 熱 *rè* ‘hot’ and 空 *kōng* ‘empty’ in that only the negations of the former entail the denotation of their antonyms.

- (28) a. 地板不髒
dìbǎn bù zāng
 floor NEG dirty
 ‘The floor is not dirty.’
- b. 地板乾淨
dìbǎn gānjìng
 floor clean
 ‘The floor is clean.’
- (29) a. 這根棍子不直
zhè gēn gùnzi bù zhí
 this CLF rod NEG straight
 ‘This rod is not straight.’
- b. 這根棍子彎
zhè gēn gùnzi wān
 this CLF rod bent
 ‘This rod is bent.’
- (30) a. 今天天氣不熱
jīntiān tiānqì bù rè
 today weather NEG hot
 ‘The weather today is not hot.’
- !→ b. 今天天氣冷
jīntiān tiānqì lěng
 today weather cold
 ‘The weather today is cold.’
- (31) a. 這個杯子不空
zhè ge bēizi bù kōng
 this CLF cup NEG empty
 ‘This cup is not empty.’
- !→ b. 這個杯子滿
zhè ge bēizi mǎn
 this CLF cup full
 ‘This cup is full.’

Within our scalar analysis, 髒 *zāng* ‘dirty’ refers to any degree on the scale of ‘dirtiness’ that is higher than the zero degree (i.e. the minimal degree, which is equivalent to its antonym 乾淨

gānjìng ‘clean’). Therefore, when 髒 *zāng* ‘dirty’ is negated, the negation entails 乾淨 *gānjìng* ‘clean’. Similarly, because 直 *zhí* ‘straight’ indicates the maximal degree of a scale, when it is negated, 不直 *bù zhí* ‘not straight’ refers to any degree on the scale that is lower than the maximal degree. These degrees are equivalent to the range of degrees that the antonym of 直 *zhí* ‘straight’, namely 彎 *wān* ‘bent’, denotes.

On the other hand, 熱 *rè* ‘hot’ expresses a degree that is higher than a context-dependent standard of comparison. When 熱 *rè* ‘hot’ is negated, 不熱 *bù rè* ‘not hot’ can be a temperature that is cold (i.e. 冷 *lěng* ‘cold’, the antonym of 熱 *rè* ‘hot’) or a temperature that is equivalent to the standard of comparison (i.e. neither hot nor cold). As for 空 *kōng* ‘empty’, the associated scale has a maximal degree (i.e. 100% empty) and a minimal degree (滿 *mǎn* ‘full’, i.e. 0% empty) and many other degrees in between them that are neither 空 *kōng* ‘empty’ nor 滿 *mǎn* ‘full’; therefore, when 空 *kōng* ‘empty’ is negated, the negation can refer to its antonym 滿 *mǎn* ‘full’ or any degree that is in between 空 *kōng* ‘empty’ and 滿 *mǎn* ‘full’.

Our test is summarized in Table 2. Each type of scalar adjective exhibits different responses to the 更 *gèng* ‘more’ comparative construction and the entailment of negation, and thus every individual type is differentiated from the others.

Table 2: Diagnostics to distinguish four types of scalar adjectives in Chinese

	更 <i>gèng</i> ‘more’ comparative construction	Negation → antonym
Open-scale adjectives, e.g. 熱 <i>rè</i> ‘hot’	Yes	No
Lower-closed-scale adjectives, e.g. 髒 <i>zāng</i> ‘dirty’	Yes	Yes
Upper-closed-scale adjectives, e.g. 直 <i>zhí</i> ‘straight’	No	Yes
Totally-closed-scale adjectives, e.g. 空 <i>kōng</i> ‘empty’	No	No

4. Discussion

In §4.1, we first summarize our classification and the highlights of our analysis. In §4.2, we compare the notion of boundedness adopted in this study with previous studies of Chinese adjectives and show how the notion of boundedness we use can better account for the syntactic and semantic characteristics of Chinese simple adjectives. In §4.3, we shall discuss why previous studies fail to identify the sub-types of bounded simple adjectives. For this purpose, we shall demonstrate how degree adverbs are often used in an indiscriminating way by previous studies.

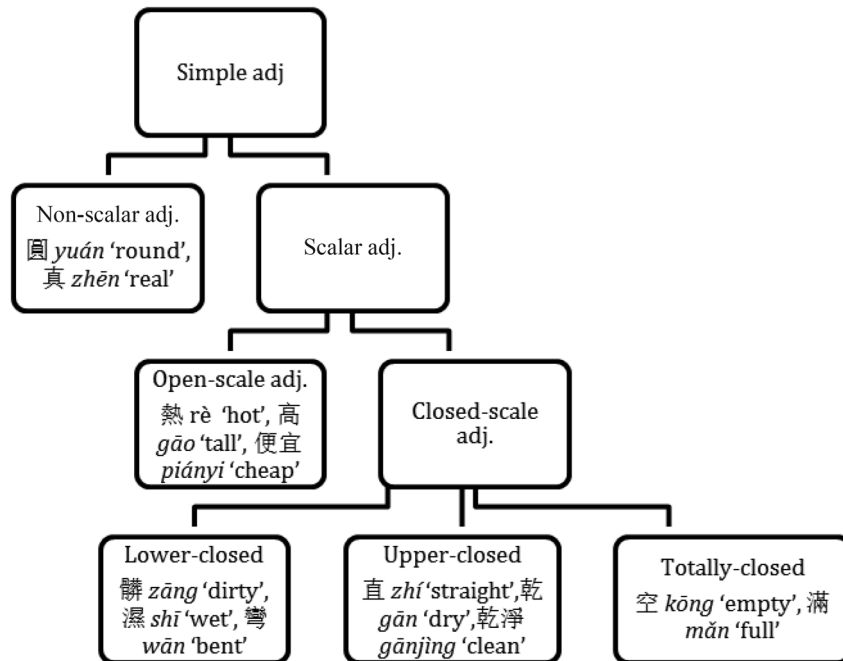


Figure 1: A five-way classification of Chinese simple adjectives

4.1 A five-way classification of Chinese simple adjectives

Up until now, we have introduced that scales can be classified into four types according to which end of the scale has a bound: open-scale, lower-closed-scale, upper-closed-scale, and totally-closed-scale (Kennedy 2007:33; Kennedy & McNally 2005:354, among others; see also Paradis 2001; Rotstein & Winter 2004). Based on the boundedness of scale structure that is lexicalized in adjectives, we have shown that Chinese adjectives can be classified in a more consistent and comprehensive way. Figure 1 summarizes our scale-structure-based classification: Simple adjectives can first be classified into two classes according to whether they are associated with a scale or not: non-scalar adjectives (e.g. 圓 *yuán* ‘round’, 方 *fāng* ‘square’, 真 *zhēn* ‘real’, 假 *jiǎ* ‘fake’) and scalar adjectives (e.g. 熱 *rè* ‘hot’, 便宜 *piányi* ‘cheap’, 高 *gāo* ‘tall’, 彎 *wān* ‘bent’, 直 *zhí* ‘straight’, 空 *kōng* ‘empty’, 滿 *mǎn* ‘full’); based on whether the scale is open or closed, the scalar adjectives can be further classified into two types: open-scale adjectives (e.g. 熱 *rè* ‘hot’, 便宜 *piányi* ‘cheap’, 高 *gāo* ‘tall’) and closed-scale adjectives (e.g. 彎 *wān* ‘bent’, 直 *zhí* ‘straight’, 滿 *mǎn* ‘full’, 空 *kōng* ‘empty’); finally, based on which end of a scale is bounded, the closed-scale adjectives can be further classified into three types: lower-closed-scale adjectives (e.g. 彎 *wān* ‘bent’, 濕 *shī* ‘wet’, 髒 *zāng* ‘dirty’), upper-closed-scale adjectives (直 *zhí* ‘straight’, 乾 *gān* ‘dry’, 乾淨 *gānjìng* ‘clean’), and totally-closed-scale adjectives (空 *kōng* ‘empty’, 滿 *mǎn* ‘full’).

The classification in Figure 1 highlights the contribution of our study. While previous studies of Chinese adjectives put all scalar adjectives in one single group, that is simple adjectives, we not only identified the closed-scale adjectives (e.g. 髒 *zāng* ‘dirty’, 直 *zhí* ‘straight’, 空 *kōng* ‘empty’),

namely the bounded simple adjectives, from open-scale adjectives (熱 *rè* ‘hot’), but also provided further classification within closed-scale adjectives according to which end of the associated scales is bounded (e.g. 彎 *wān* ‘bent’ vs. 直 *zhí* ‘straight’ vs. 滿 *mǎn* ‘full’). Furthermore, we proposed a set of tests that effectively distinguishes non-scalar adjectives from scalar adjectives, and further determines the four subtypes of scalar adjectives.

4.2 Our notion of boundedness in comparison with previous studies

Previous studies of Chinese adjectives also have used the notion of ‘boundedness’ (Piao 2009; Shen 1995; Shi 2001[1992], 2003; Zhang 2000, 2006a, 2006b), but the notion has been used differently from this paper.

According to Shen (1995:376), the boundedness distinction is argued to be equivalent to the quantitative distinction, that is quantitatively bounded and quantitatively unbounded. Take the color white for example. There are different degrees of ‘whiteness’ and the simple adjective 白 *bái* ‘white’ covers the whole range of whiteness and denotes an unbounded property (also see Shi 2001[1992]:120–153, 2003). In contrast, complex adjectives such as 雪白 *xuěbái* ‘snow white’ and 灰白 *huībái* ‘grey-white’ denote particular degrees or sections of the range of ‘whiteness’, and thus express a bounded property (also see Shi 2001[1991]:120–153, 2003). Within the analyses of these previous works, typical simple adjectives are considered to unitarily have the unbounded feature, whereas typical complex adjectives are analyzed as bounded.

In contrast to previous assumptions, in this paper the notion of ‘boundedness’ of adjectival meanings is understood in relation to ‘scale structure’ (Kennedy 2007; Kennedy & McNally 2005; Rotstein & Winter 2004; see also Paradis 2001, among others). We chose to follow this assumption because this series of studies in the field of lexical semantics allows us to apply the property of boundedness consistently not only for adjectives, but also for verbs and nouns in both English and Mandarin Chinese (see Hay et al. 1999; Kennedy 2012; Lin & Peck 2011; Peck et al. 2013; Peck et al., forthcoming; Rappaport Hovav & Levin 2010).

In other words, while previous studies treat the property of unbounded versus bounded as approximately equivalent to the property of gradable versus non-gradable, the notion of boundedness presented herein is understood in terms of scales that consist of a set of degrees ordered in a particular domain. In other words, we follow the assumption that there is a bounded gradability and an unbounded gradability; being bounded is understood as having minimum/maximum degrees on a scale, and being unbounded is understood as having no such endpoint on a scale. By doing so, we identified the internal differences among the adjectives that used to be grouped together, namely unquantized adjectives (非定量形容詞 *fēidìngliàng xíngróngcí*, Shi 2001[1992]), degree adjectives (量級序列形容詞 *liàngjí xùliè xíngróngcí*, Shi 2003), unbounded adjectives (無界形容詞 *wújiè xíngróngcí*, Shen 1995), etc. by previous studies, and identified four subclasses: the adjectives with no minimal/maximal degrees, that is open-scale adjectives (熱 *rè* ‘hot’), the ones with minimal or maximal degrees only, namely lower-closed-scale (髒 *zāng* ‘dirty’) or upper-closed-scale (直 *zhí* ‘straight’) adjectives, and the ones with both minimal and maximal degrees, that is totally-closed-scale (空 *kōng* ‘empty’). Furthermore, we showed that the open-scale adjectives have unbounded scales and thus the standard of comparison is context-dependent, whereas closed-scale adjectives have bounded scales and thus the standard of comparison is fixed, independent of context.

From the scalar perspective adopted here, the complex adjectives or adjectival phrases such as 雪白 *xuěbái* ‘snow white’ and 很白 *hěn bái* ‘very white’ that are analyzed as bounded in previous studies actually do not have the feature boundedness associated with a scale. In other words, the complex adjectives or adjectival phrases are assumed to be bounded in a different way: we assume they denote individual properties by relating the degree of the property denoted by their base form with another degree. However, as mentioned in §1, we leave the analysis of Chinese complex adjectives for future studies.

4.3 The function of degree modifiers in distinguishing different types of scalar adjectives

Comparison has been treated as the primary feature of gradability (Paradis 2001:52), as reflected in the statement that ‘comparability is a semantic feature coextensive with “having different degrees” or associated to items which are “susceptible to being laid out on a scale”’ (Bolinger 1967:4). In other words, scalar adjectives inherently denote a type of comparison. We call this ‘implicit comparability’, based on the analysis of implicit comparatives and implicit superlatives in Paradis (2001:53).

Without the help of comparison devices such as 比 *bǐ* ‘than’ construction or comparative and superlative degree adverbs like 更 *gèng* ‘more’ and 最 *zuì* ‘most’, gradable adjectives by themselves lexically express comparability.¹² In more detail, open-scale adjectives (高 *gāo* ‘tall’, 大 *dà* ‘big’, 美麗 *měilì* ‘beautiful’, 漂亮 *piàoliang* ‘beautiful’) correspond to implicit comparatives in the sense that they express a property that is higher than the contextually-dependent standard of comparison. For example, when we say someone is 高 *gāo* ‘tall’, we express a comparison implicitly because the person possesses a value of height that is higher than the standard value of human height. Closed-scale adjectives with maximal values (both upper-closed-scale and totally-closed-scale adjectives, e.g. 直 *zhí* ‘straight’, 平 *píng* ‘flat’, 滿 *mǎn* ‘full’) correspond to implicit superlatives in the sense that they express a property that is equivalent to the maximal value of a property, which exceeds all other degrees on a scale. For example, when we say a cup is 滿 *mǎn* ‘full’, we express an implicit superlative because the cup possesses the highest degree (100% full), which is higher than all other degrees on the scale of ‘fullness’.

In contrast to implicit comparability, which indicates ‘a range or a point on a scale of a gradable property’, explicit comparability ‘locates entities relative to each other based on a certain property’ (Paradis 2001:53–54). In other words, the explicit comparability does not give information if an entity inherently possesses a degree of a property that is higher than the standard value or a degree

¹² The ‘implicit comparability’ lexically expressed by adjectives is the comparison between a given entity and a standard of comparison, rather than a comparison between two different entities. In this sense, implicit comparability does not refer to the widely observed phenomenon that Chinese adjectives alone express comparison between two different entities, whereas they become non-comparative with a degree modifier *hěn*. For the analysis of the latter phenomenon, refer to Zhu (1999[1956]), Lü (1984), Liu et al. (2001), among others.

that is equivalent to the highest value on a scale, but compares degrees of a property possessed by different entities. Explicit comparatives compare two entities, that is in terms of a property A, x is more A than y ; explicit superlatives compare more than two entities, that is in terms of a property A, for all y , x is more A than all y (see Paradis 2001:54).

While English uses inflection to distinguish different levels of explicit comparison, for example *tall* as the base form, *tall-er* as the explicit comparative form and *tall-est* as the explicit superlative form, Chinese relies on lexical methods. The combination of degree adverbs and gradable adjectives such as 更高 *gènggāo* ‘more tall’ and 最高 *zuìgāo* ‘most tall’ express an explicit comparative and superlative respectively (see Liu 2010; Piao 2009:28–29). In other words, degree adverbs such as 更 *gèng* ‘more’ and 最 *zuì* ‘most’ can function to modify the comparison between the degree of property of different entities. Due to this function, they are able to modify any type of scalar adjectives in these contexts. For example, 熱 *rè* ‘hot’, 髒 *zāng* ‘dirty’, 直 *zhí* ‘straight’, and 空 *kōng* ‘empty’ belong to four different types of scalar adjectives, but as illustrated in (25) in §3.4, 最 *zuì* ‘most’ is able to naturally modify all of them. This also explains why previous studies using the diagnostics which include the degree adverb 最 *zuì* ‘most’ (e.g. Piao 2009; Shi 2001[1992]) are unable to detect the internal differences of boundedness among the scalar adjectives. Similarly, when used for comparison of different entities, 更 *gèng* ‘more’ can also modify all scalar adjectives, as shown in (32) below.

- (32) a. 今天比昨天更熱

jīntiān bǐ zuótiān gèng rè
today COMP yesterday more hot
‘Today is hotter than yesterday.’

(<http://xbh.zjol.com.cn/05xbh/system/2011/04/26/017471559.shtml>)

- b. 看似光鮮的枕頭往往比廁所地板更髒

kànshì guāngxiān de zhěntou wǎngwǎng bǐ cèsuǒ dìbǎn gèng zāng
look bright REL pillow usually COMP bathroom floor more dirty
‘The pillows that look bright are usually dirtier than bathroom floor.’

(<http://zixun.69jk.cn/shwx/16107.html>)

- c. 北美楓香...與國內楓香比樹幹更直

běiměi fēngxiāng... yǔ guónèi fēngxiāng bǐ
north.america liquidambar with domestic liquidambar COMP
shùgàn gèng zhí
trunk more straight

‘The trunk of North American liquidambar is straighter than domestic ones.’

(<http://www.ahcfyl.com/product/bmfx/21.html>)

d. 他的盤子比她更空

tā de pánzi bǐ tā gèng kōng
 he POSS plate COMP she more empty

‘His plate is emptier than hers.’

(<http://www.jjwxc.net/onebook.php?novelid=717118&chapterid=23>)

In contrast to 更 *gèng* ‘more’ and 最 *zuì* ‘most’, degree adverbs such as 有點兒 *yǒudiǎnr* ‘a little bit’, 完全 *wánquán* ‘completely’, and 非常 *fēicháng* ‘very’ function to reinforce the denotation of implicit comparability (see Kennedy 2007; Kennedy & McNally 2005; Liu 2010; Paradis 2001; Rotstein & Winter 2004, among others). For example, the unbounded degree modifier 非常 *fēicháng* ‘very’ elaborates on implicit comparison by intensifying the standard of comparison of open-scale adjectives. The maximality modifiers such as 百分百 *bǎifēnbǎi* ‘100%’, 完全 *wánquán* ‘completely’ elaborate on implicit superlatives by pinpointing that the value of the property possessed by a given entity has met the standard of comparison that is the maximal value on a scale. This explains why maximality modifiers such as *perfectly*, *100%*, *completely*, and *fully* occur harmoniously only with upper-closed-scale adjectives (Kennedy & McNally 2005:354–355). And the minimality modifier 有點兒 *yǒudiǎnr* ‘a little bit’ picks up the range that is higher than the minimal value on a scale. This explains why minimum-value oriented degree adverbs such as *slightly* and *partially* modify only lower-closed-scale adjectives (Kennedy 2007:34–35; Kennedy & McNally 2005:354).¹³ Because these degree adverbs function to reinforce different types of scalar meanings, the collocation pattern between these degree modifiers and scalar adjectives reveals the boundedness properties of modified adjectives. As illustrated in (33), for instance, the maximality modifier 百分百 *bǎifēnbǎi* ‘100%’ is natural with the upper-closed-scale adjective 直 *zhí* ‘straight’ and the totally-closed-scale adjectives 滿 *mǎn* ‘full’, but not with the lower-closed-adjective 髒 *zāng* ‘dirty’ and the open-scale adjective 高 *gāo* ‘tall’.

(33) a. 百分百純的金子

bǎifēnbǎi chún de jīnzi
 100% pure REL gold

‘gold that is 100% pure’

(<http://wenwen.sogou.com/z/q399820119.htm>)

b. 百分百滿的電量

bǎifēnbǎi mǎn de diànliàng
 100% full REL battery

‘[cellphone] battery that is 100% full’

(<http://tieba.baidu.com/p/2565112820>)

¹³ In addition, the proportional modifiers such as *half* and *most* can be used to identify totally-closed-scale adjectives: adjectives with a totally-closed-scale are compatible not only with endpoint-oriented degree adverbs, but also with these proportional modifiers: this is because the position of a particular point can be identified with respect to both the minimal and maximal values on a totally-closed-scale (see Kennedy & McNally 2005:352, see also Cruse 1986; Kennedy & McNally 1999; Lehrer 1985).

- c. ??百分百髒的地板
bǎifēnbǎi zāng de dìbǎn
 100% dirty REL floor
 ??‘floor that is 100% dirty’
- d. ??百分百高的人
bǎifēnbǎi gāo de rén
 100% tall REL person
 ??‘a person that is 100% tall’

However, we find that the collocation pattern of degree adverbs in implicit comparability is not a highly reliable type of test either. As introduced in §2, degree modifiers such as 很 *hěn* ‘very’ and 有點 *yǒudiǎn* ‘a little’ are also often used by Chinese scholars to distinguish adjectives (Piao 2009; Shi 2001[1992]). But Chinese exhibits a high degree of tolerance to imprecise use of adjectives (as discussed in §3.2), and due to this reason, these degree modifiers might collocate with adjectives of mismatching scale structures. Take 有點 *yǒudiǎn* ‘a little’ as an example. 有點 *yǒudiǎn* ‘a little’ is a minimum-value-oriented degree modifier according to Kennedy & McNally (2005), and thus we expect that it should modify only lower-closed-scale adjectives (e.g. 髒 *zāng* ‘dirty’ and 彎 *wān* ‘bent’) and totally-closed-scale adjectives (e.g. 空 *kōng* ‘empty’ and 滿 *mǎn* ‘full’). However, searches in corpora and on the internet would result in many examples where 有點 *yǒudiǎn* ‘a little’ occurs with upper-closed-scale adjectives (e.g. 直 *zhí* ‘straight’), as in (34). In these examples, the upper-closed-scale adjective 直 *zhí* ‘straight’ does not denote its literal meaning, but it is used imprecisely to express an ‘abnormal’ property of the entities described. Such examples with imprecise use of the given adjective and their subsequent ‘imprecise’ collocation with degree modifier should be analyzed with caution.

- (34) a. 我頸椎有點直，會有時頭暈
wǒ jǐngzhuī yǒudiǎn zhí, huì yǒushí tóuyūn
 my cervical-spine slightly straight might sometime head-dizzy
 ‘My cervical spine is a little straight and I might feel dizzy sometimes.’
 (<http://zhidao.baidu.com/question/586236373.html>)
- b. 照相館的老闆說話有點直
zhàoxiàng guǎn de lǎobǎn shuōhuà yǒudiǎn zhí
 photo studio POSS boss talk a.little straight
 ‘The boss of the photo studio is a little straightforward while talking.’
 (http://news.china.com.cn/2014-12/17/content_34337884_2.htm)

To summarize, we showed that both degree adverbs (e.g. 更 *gèng* ‘more’ and 最 *zuì* ‘most’) that form explicit comparability and those modifiers (e.g. 百分百 *bǎifēnbǎi* ‘100%’, 有點 *yǒudiǎn* ‘a little’, 很 *hěn* ‘very’) elaborating implicit comparability should be used carefully when analyzing a quantitative property of simple adjectives in Chinese.

5. Conclusion

In this paper, we analyzed the gradability and boundedness denotations of simple adjectives in Mandarin Chinese. Based on the different scale structures of scalar adjectives (Kennedy 2007; Kennedy & McNally 2005; Paradis 2001; Rotstein & Winter 2004, among others), we classified simple adjectives into a total of five classes: non-scalar adjectives, open-scale adjectives, lower-closed-scale adjectives, upper-closed-scale adjectives, and totally-closed-scale adjectives. The latter four types of adjectives were often grouped into one class as unbounded or unquantized adjectives by previous studies (Piao 2009, Shi 2001[1992], 2003, among others). However, we demonstrated the finer-grained classification in terms of the boundedness feature inherent in gradability: open-scale adjectives (e.g. 熱 *rè* ‘hot’) denote a contextually-dependent property on a scale, whereas closed-scale adjectives denote an inherent endpoint-oriented property on a scale; within closed-scale adjectives, lower-closed-scale adjectives such as 髒 *zāng* ‘dirty’ imply a natural transition from zero to a non-zero degree on a scale, upper-closed-scale adjectives such as 直 *zhí* ‘straight’ denote a natural transition from non-maximal to maximal degree on a scale; and totally-closed-scale adjectives such as 空 *kōng* ‘empty’ lexicalize both types of transitions on a scale. Such a distinction in scales accounts for the different syntactic and semantic characteristics exhibited by each type of simple adjective.

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漢語簡單形容詞的量級分析和分類

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本文是對現代漢語簡單形容詞的量級分析和分類，分析方法主要基於近年來英語形容詞的量級分析 (scalar analysis)。多數前人研究認為所有漢語簡單形容詞都表達無界屬性 (unbounded)。然而，本文認為應在等級性 (gradability) 的概念下討論形容詞的有界性 (boundedness)，並指出一些前人認為是無界 (unbounded) 的簡單形容詞，實質為有界 (bounded)。此外，根據每個形容詞所蘊含的量級結構特徵，本文將漢語簡單形容詞進一步分為五類：無量級形容詞、開放量級形容詞、起點閉合量級形容詞、終點閉合量級形容詞，及全閉合量級形容詞。本文展示該五類形容詞可從語言學角度互相區分，同時為漢語形容詞的一些句法和語義特徵提供系統且統一的解釋。本研究同時也是從跨語言及跨詞類的角度，對量級分析法的再一次有效應用。

關鍵詞：漢語，簡單形容詞，量級結構，量