

Part I Syntax, Semantics, and Morphology

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1 Morphology

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1 Introduction

This chapter provides an overview of morphological phenomena in Mandarin Chinese. Although Chinese is in the main an isolating language, with significantly less morphology than agglutinating and polysynthetic languages, a range of both inflectional and derivational affixes do occur and are productive, and will be discussed in Section 2. Like many other heavily isolating languages, Chinese exhibits great richness in the area of compounding, and much of the chapter focuses on this aspect of morphology in Chinese. Section 3 discusses general patterns found in nominal compounds and the controversial issue of the headedness of Chinese compounds. Section 4 takes the study of compounds further into the verbal domain and examines the status of a particularly challenging type of compound in Chinese, verb-object/VO compounds, which seem to behave both as morphological compounds and syntactic phrases, posing potential problems for their categorization as objects formed by morphological or syntactic rules. Before we proceed to consider these issues, certain standard morphological terminology made use of in the chapter will be noted. First, in terms of structural role, a morpheme (the smallest meaningful or grammatical unit participating in word formation operations) may be a *stem* (the base of which is called a *root*) or an *affix* (AFF). If a morpheme is able to stand alone as an independent word, it is termed a *free morpheme*; it is otherwise referred to as a *bound morpheme*. By such a definition, all affixes are necessarily bound, while roots may be either free or bound (simple examples of bound roots in Chinese would be *ge-* in *ge-dan* “pigeon-egg, pigeon egg” and *er-* in *er-zi* “son-Affix, son”). Affixes are further divided into two types, according to their morphological functions. *Derivational* affixes generally change the categories of the stems they attach to, while *inflectional* affixes

contribute grammatical information and functions to the stems but do not affect the category of the stem (e.g., plural marking on nouns, tense affixation to verbs).

2 Affixes in Chinese

In its inventory of affixal elements, Chinese has been noted to exhibit both inflectional and derivational affixes, as broadly defined above (Dai 1992; Packard 2000).¹ In what follows in Sections 2.1–2.2, a sampling of representative affixes given in Chao (1968), Dai (1992), Li and Thompson (1981), and Packard (2000), is given, categorized here according to their categorial statuses (i.e., whether the inflectional affixes are attached to verbal or nominal stems, and whether the derivational affixes yield verbal or nominal stems). In Section 2.3, a controversial issue is discussed regarding the correct distinction of bound roots and derivational affixes in Chinese.

2.1 Inflectional affixes

2.1.1 *Nominal inflectional affixes* Chinese nouns are in general rather “bare” because they are not inflected for grammatical gender, number, or person. The plural (PL) suffix *-men*, which is used with *human nouns* and *pronouns* in standard Mandarin, marks the only exception, as illustrated in (1):²

- (1) N_[+human]-*men* “noun-Plural”
 ren-men “person-PL: people,” laoshi-men “teacher-PL: teachers,” nan-hai-men “male-child-PL: boys,” gong-ren-men “work-man-PL: workers,” wo/ni/ta-men “I/you/he-PL: we/you/they” (but not *niu-men “cow-PL” or *che-men “car-PL”).

Chao (1968) notes that certain classifiers can also be used as inflectional suffixes marking plurality and collectivity:

- (2) N+CL “noun-Collective”
 zhi-zhang “paper-CL: papers,” niu-zhi “cow-CL: a herd of cows,” ma-pi “horse-CL: a herd of horses,” hua-duo “flower-CL: flowers” (but not *ren-ge “person-CL” or *shou-zhi “hand-CL”).

2.1.2 *Verbal inflectional affixes* Verbal inflections in Chinese are also relatively few. Verbs are only inflected with aspectual suffixes (Asp). In Mandarin, these aspectual suffixes include the Perfective *-le*, Experiential *-guo*, and Progressive/Durative *-zhe*, which combine with verbs in an extremely regular fashion (see Chapter 7 for further discussion). One less-mentioned aspectual suffix, which Chao (1968: 205) refers to as *Tentative aspect* (while Li and Thompson 1981 and Dai 1992 use the term *Delimitative aspect*), is in the form of reduplication (RED):

- (3) V-RED “V for a short while/a little”
 zou-zou “walk-walk: walk for a while,” xue-xue “learn-learn: learn a little/
 for a while,” kan-kan “see-see: watch for a while”

As Dai (1992) notes, when this rule is applied to disyllabic words, the whole stem must be reduplicated, as shown in (4b), which contrasts with unacceptable reduplication forms in (4c):

- (4) Verb reduplication rule for disyllabic stems
 a. $[XY]_{V-RED} \rightarrow XY-XY$, when the verbal stem is of the form XY
 b. [bang-zhu]-bang-zhu “help-help-RED: help a little,” [an-wei]-an-wei
 “peace-console-RED: console a little”
 c. *bang-bang-zhu, *bang-zhu-zhu, *bang-bang-zhu-zhu

We shall come back to reduplication in Section 3.2, where the reduplication rule will be shown to be useful for determining the “compound-hood” of Verb–Object compounds.

It can also be noted that adjectives in Chinese may undergo reduplication, and while verbal reduplications take the form XYXY, adjectival reduplications have the different form XXYY (Chao 1968; Li and Thompson 1981). For example, the word *qingsong* “relax/relaxed” can be used as a verb or as an adjective. The distinction is reflected through different reduplication patterns. Observe the following examples:

- (5) a. $[qing-song]_{V-RED} \rightarrow qing-song-qing-song$ “to relax a little” [XYXY]
 b. $[qing-song]_{Adj-RED} \rightarrow qing-qing-song-song$ “quite relaxed” [XXYY]

2.2 Derivational affixes

Derivational affixes generally display a range of characteristics: (i) they select for the syntactic category of the stem/root they attach to; (ii) sometimes they may change the category and meaning of the stem/root they are attached to; and (iii) in some instances they may have no inherent meaning at all. A representative selection of derivational affixes present in Mandarin is illustrated in this section. Structurally, the cross-linguistic observation has been made that a derivational *suffix* functions as the head of the morphological unit it builds up, in the sense that its categorial feature projects as the identity in the new unit, while only some (but not many) derivational *prefixes* may function as heads (Di Sciullo and Williams 1987; Williams 1981). This property holds of Chinese too, as shown in (6). The word *pai-zi* “racket” is formed from the combination of the suffix *-zi*, which belongs to the category of N, and the verb *pai* “stroke.” The suffix functions as the head of the output *pai-zi*, which accordingly is a noun rather than a verb:

- (6)
$$\begin{array}{c} \text{pai-zi}_N \text{ "racket"} \\ \swarrow \quad \searrow \\ \text{pai}_V \quad \text{-zi}_N \\ \text{"stroke"} \quad \text{"ZI"} \end{array}$$

2.2.1 *Nominal derivational affixes* The suffix *-zi*, which does not have a substantive meaning, is very common in Chinese in combination with monosyllabic roots. The suffix *-zi* generally selects V or N as its input (in a few exceptional instances *-zi* also combines with an adjective), and always results in an output of type N/noun:

- (7) a. N-*zi*_N
 qī-zi “wife-ZI: wife,” er-zi “son-ZI: son,” guā-zi “melon-ZI: melon,”
 shēng-zi “rope-ZI: rope”
 b. V-*zi*_N
 pāi-zi “stroke-ZI: racket,” shuā-zi “brush-ZI: brush,” jiā-zi “pick-ZI:
 clip,” piān-zi “cheat-ZI: cheater”
 c. A-*zi*_N
 lǎo-zi “old-ZI: father (pejorative),” xiǎo-zi “small-ZI: kid,” fēng-zi
 “crazy-ZI: lunatic”

Another suffix, *-tou* (literally “head”), also occurs as a derivational suffix, though less commonly than *-zi*:

- (8) a. V-*tou*_N
 zhuan-tou “earn-head, opportunity to profit,” xiang-tou “think-head,
 idea/hope”
 b. Adj-*tou*_N
 lao-tou “old-head, old people (pejorative)”
 c. N-*tou*_N
 ling-tou “zero-head, small change”

Nominal derivational prefixes are also found in Chinese. For example, the prefix *lao-* (literally “old”) can be seen in many words in Chinese, which no longer carry the literal meaning “old”:

- (9) a. lao-N
 lao-hu “old-tiger, tiger,” lao-shu “old-mouse, mouse,” lao-shi “old-
 teacher, teacher,” lao-po “old-wife, wife,” lao-ban “old-board, boss,”
 lao-xiong “old-brother, buddy”

2.2.2 *Verbal derivational affixes* There are very few verbal derivational suffixes in Chinese. In fact, the only one that is still quite productive in modern Mandarin is the suffix *-hua*, which selects for N or Adj as its input, and yields a V:

- (10) a. N-*hua*_V
 [gong-ye]-hua “labor-industry-HUA: industrialize,” [ji-xie]-hua
 “machine-machine-HUA: mechanize”
 b. A-*hua*_V
 ruo-hua “weak-HUA: weaken,” qiang-hua “strong-HUA: strengthen,”
 huo-hua “active-HUA: activate,” zi-dong-hua “self-move-HUA:
 automatize”

2.2.3 *Adjectival derivational affixes* The prefix *ke-* (literally “able”) is a notable case of a prefix that may function as a head (it changes a V input to an Adj output):

- (11) $ke_{Adj}\text{-}V \Rightarrow \text{Adj}$
ke-ai “able-love: lovable,” *ke-hen* “able-hate: detestable,” *ke-xiao* “able-laugh: laughable,” *ke-lian* “able-pity: pitiable,” *ke-shi* “able-eat: edible,”
ke-gui “able-expensive: valuable”

2.3 *On bound roots and derivational affixes*

In addition to the class of derivational affixes illustrated with examples above, Chinese also has a significant number of elements that function as bound roots – roots that cannot stand as words by themselves. As there are various similarities between bound roots and derivational affixes, it is always a challenging in Chinese morphology to decide whether a bound morpheme should be categorized as a bound root or a derivational affix.

Dai (1992: section 4.2) lists four relevant criteria which may be used to differentiate bound roots from affixes, while recognizing that none of the criteria is, by itself, precise enough to be decisive in the categorization of bound morphemes: (i) affixes tend to be more productive than bound roots; (ii) the meanings of affixes tend to be consistent, and are sometimes more abstract in nature than the meanings of bound roots (or are even without any clearly definable meaning); (iii) affixes tend to perform certain grammatical functions; and (iv) affixes tend to attach to free forms. Notice that all of these criteria are effectively stated as “tendencies” since counterexamples can always be found (see Dai 1992 for details). The criteria (i) to (iii) are also adopted in Packard (2000: Section 3.4.3.2). Using these criteria, Dai (1992) argues that examples like *-xi* in *xue-xi* “study-practice: study,” *yu-* in *yu-jian* “pre-see: foresee,” *-ti* in *shen-ti* “body-body: body,” and *-qi* in *yue-qi* “music-instrument: musical instrument” are actually all derivational suffixes, rather than bound roots.

Before reconsidering the affix vs. root status of these bound morphemes noted by Dai, it is worth noticing that similar challenges of bound morpheme categorization occur in English too. For example, consider the neoclassic bound roots *bio-*, *photo-*, and *-(o)logy* in English (Bauer 1983; Plag 2003; Selkirk 1982). At first glance, these bound morphemes appear to be affixes. However, Plag (2003) argues that a “*bio-logy* problem” occurs if we consider these bound morphemes as affixes. Specifically, if *bio-* and *-logy* were both to be classed as affixes, then it would have to be concluded that the word *bio-logy* contains no root, violating the fundamental principle of word formation that every word contains at least one root. Plag (2003) therefore concludes that forms such as *bio-* and *-logy* are best analyzed as bound roots (in other words, *bio-logy* will be analyzed as a compound; see Section 3).

The same operating criterion can be adopted to determine the affix vs. root status of bound morphemes in Chinese. For example, *yu-* “pre-” and *-xi* “practice,” which Dai (1992) considers affixes, should instead (following Plag’s approach to *bio-logy*) be analyzed as bound roots because their combination in *yu-xi*

“pre-practice: preview/practice beforehand” is also a well-formed word (or at least, one of the two morphemes should be classed as a bound root, otherwise *yu-xi* will be rootless). Another useful criterion, based on the word-internal position of bound morphemes, can now be added here as a means to distinguish the root vs. affixal status of bound morphemes. Categorizing a bound morpheme as an affix entails that the affix occurs in a regular, fixed position relative to the stem it attaches to as either a prefix or a suffix, while a root in principle has greater freedom in positioning and might be expected to occur in different word-internal positions relative to other roots (while maintaining a constant meaning). Consequently, if a bound morpheme is not subject to a positional constraint, it should clearly best be analyzed as a bound root. Applying such a criterion to the morphemes considered by Dai above, *yu-* “pre-” should most probably be categorized as a prefix, while *-xi* “practice” should be treated as a bound root. This is because *-xi* can be found in word-initial as well as word-final position (e.g., *xi-zuo* “practice-doing, assignment”, *xi-guan* “practice-tendency, habit”, etc.), but it is difficult to find *yu-* in a non-initial, non-prefix position. By the same criterion, *-qi* “instrument” and *-ti* “body” should also be treated as bound roots, instead of suffixes (contra Dai 1992), since one can find words like *qi-ju* “instrument-tool: tool” and *ti-ji* “body-volume: volume.”

Other cases are trickier, due to the fact that some bound morphemes exhibit *polysemy* (there are actually different morphemes which share the same phonological form). For example, consider the prefix *lao-* “(literally) old” and the suffix *-tou* “(literally) head”. These bound morphemes no longer carry their literal meanings when they are affixes (e.g., *lao-hu* “old-tiger: tiger,” *lao-shi* “old-teacher: teacher,” *zhuan-tou* “earn-head: opportunity to profit”; see (8) and (9)). However, in other instances, they seem to behave as bound roots, keeping their literal meanings. As the positional criterion above predicts, such non-literal uses of *lao* and *tou* are not restricted to fixed word-internal positions:

- (12) a. *lao* “old” used as bound root
lao-tou “old-head: old people (pejorative),” **lao-ren** “old-person: senior citizen,” **nian-lao** “age-old: aged,” **qi-lao** “old-old: aged and respectable person,” **yuan-lao** “origin-old: senior statesman”
 b. *tou* “head” used as bound root
tou-fa “head-hair: hair,” **tou-kui** “head-helmet: helmet,” **che-tou** “car-head: hood of vehicle,”

We can thus conclude the following. If a bound morpheme carries no substantive meaning, and/or its position is fixed, it is best analyzed as an affix. Otherwise, it should be categorized as a bound root.³

3 Compounds in Chinese

Compounding gives rise to a rich set of vocabulary in Chinese. Following Chao (1968) and Plag (2003), a broad definition of compounds is adopted here: a mor-

phological word is a compound if it consists of two or more (free or bound) roots. Consequently, disyllabic compounds may consist of (i) two free roots, (ii) a free root combined with a bound root, or (iii) two bound roots. Such a definition of compounding is both optimally straightforward and naturally allows for the characterization of the bound root compounds that are so prevalent in Chinese. Section 3.1 now provides an overview of the various types of compound found in Chinese, and follows this with a review of the controversial issue of compound headedness in Section 3.2.

3.1 *Types of compounds*

Two popular approaches to the categorization of compounds in Chinese have been: (i) to categorize compounds in terms of the syntactic and semantic relations which hold between the sub-components of the compounds (Huang 1984; Y. Huang 1991; Li and Thompson 1981; Tang 1988); and (ii) to categorize compounds simply in terms of the morpho-syntactic categories (N, V, Adj etc.) of the component parts (S. Huang 1998; Packard 2000). This chapter makes primary use of the first approach, though the categories of the sub-components of the compounds are also noted. By virtue of the syntactic and semantics relations which obtain between the internal parts of compounds, compounds in Chinese can roughly be categorized into the following types:

- (13) **Coordinative/Parallel Compounds** (The two roots carry similar, related, or contrary meanings)
- a. N-N: lei-dian “thunder-lightning: thunder,” zi-nu “son-daughter: children,” jun-zhu “king-master: monarch,” li-lun “reason-discussion: theory,” zuo-you “left-right: control,” shi-fei “affirmative-negative: right and wrong/trouble,” mao-dun “spear-shield: contradiction”
 - b. V-V, Adj-Adj: bang-zhu “help-help: help,” qian-yi “move-relocate: relocate,” jian-cha “test-examine: examine,” cui-hui “damage-destroy: destroy,” zhu-li “help-arrange: assistant,” fang-qi “drop-renounce: abandon,” bao-bian “praise-condemn: appraise,” chang-duan “long-short: gossip/accident”
- (14) **Modifier-Head Compounds** (One root modifies – or restricts – the other root)
- a. Adj-N, V-N: hei-ban “black-board: blackboard,” luo-ye “drop-leave: fallen leaves,” jian-yu “surveillance-prison: prison,” duan-chu “short-point: shortcoming”
 - b. N-N: ti-wen “body-temperature: temperature,” che-deng “car-light: headlight,” deng-ta “light-tower: light house,” nü-zhuang “woman-clothes: women’s clothes”
 - c. Adj-V, N-V: man-pao “slow-run: jog,” man-dun “slow-stew: slow cook,” kuang-ben “crazy-run: run extremely fast,” da-jiao “big-cry: cry loud,” tuan-gou “group-buy: bulk buy”

- (15) **Verb–Resultative Compounds** (One root denotes the action, and the other root refers to the result)

V-Adj, V-V: chi-wan “eat-finish: finish eating,” chi-ni “eat-tired: tired of eating,” nong-huai “do-ruined: damage/ruin,” shai-gan “expose.to. sunlight-dry: dry something under the sun”

- (16) **Subject–Predicate Compounds** (One root is the subject, while the other root functions as the predicate)

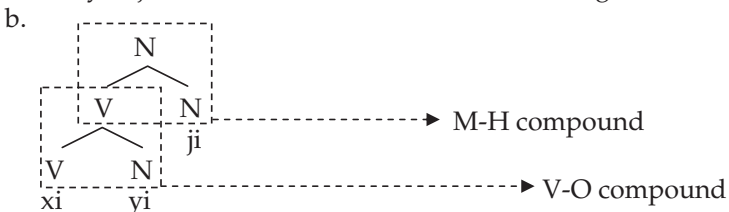
N-V, N-Adj: ri-chu “sun-rise: sunrise,” ri-luo “sun-fall: sunset,” di-zhen “land-vibrate: earthquake,” tou-teng “head-ache: get a headache/feel troubled,” yan-hong “eye-red: envy,” lian-hong “face-red: feel embarrassed,” xin-ruan “heart-soft: forgiving”

- (17) **Verb–Object Compounds** (One root refers to the predicate, while the other root a thematically related object – theme, location, instrument, etc. – (Y. Huang 1991))

V-N: dou-feng “catch-wind: go for a drive,” kai-xin “open-heart: feel happy,” guan-xin “close-heart: care for,” kai-dao “open-knife: operate,” kai-che “open-car: drive car,” chu-ban “come.out-printing: publish,” jian-fei “subtract-fat: lose weight,” jie-hun “join-marriage: get married,” huai-yi “bear-doubt: suspect,” dong-shou “move-hand: start (working on something)”

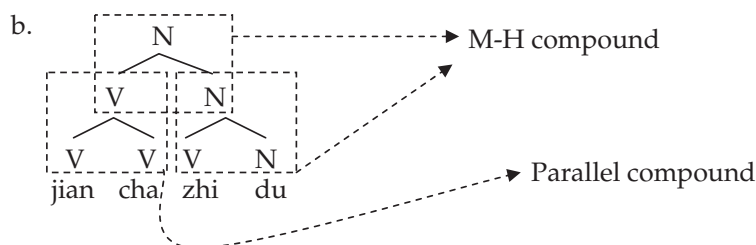
Larger nominal compounds (more than two roots) are also possible. These are constructed by building any type of compound into a Modifier–Head (M–H) compound structure (such complex compounds will be discussed further in Section 3.2). Some examples are given below:

- (18) Verb-Object compound as part of a larger M–H compound:
 a. [[xi-yi]_V-ji]_N “[wash-clothes]-machine]: washing machine”



- (19) Parallel compound and M–H compound as part of a larger M–H compound: [[VV]_V [VN]_N]_N

a. [[jian-cha]_V-[zhi-du]_N]_N “[test-examine]-[restrict-degree]]: examination rule/censorship”



3.2 Heads of compounds

3.2.1 *Endocentric vs. exocentric compounds* One of the controversies present in discussions of Chinese morphology is the issue of headedness in Chinese compounds. The “head” of a compound refers to the element that projects its categorical identity in the compound structure (e.g., the noun “suit” in the Adj–N compound [_N [_{Adj} wet] [_N suit]], which functions as a noun not an adjective), and whose meaning is regularly dominant in the compound (hence “cave man” is a type of “man” not a type of “cave”, due to the semantic dominance of the compound head “man”). A definition of headedness is given by Di Sciullo and Williams 1987, as in (20):

(20) The definition of heads of compounds

In a compound [XY], Y is the head if and only if [XY] inherits the linguistic features of Y (the features may include *semantic content*, syntactic category, and phi-features, etc.).

If a compound has a head, it is called an *endocentric compound*, and a compound is called an *exocentric compound* if no head can be defined from its components. When, in certain instances, both elements appear to function as heads within a compound, such a compound is referred to as *double-headed*. Simple illustrations of endocentric, exocentric, and double-headed compounds from English are given in (21–23), in which the compound heads are bold-faced:

(21) Endocentric compounds

- a. [black_A-**bird**_N]_N: a kind of bird that is generally black
- b. [truck_N-**driver**_N]_N: a kind of driver that operates truck
- c. [strong_{Adj}-**man**_N]_N: a kind of man that is strong

(22) Exocentric compounds

- a. [big_A-foot_N]_N: not a kind of foot or bigness, but an ape-like monster with big feet
- b. [saber_N-tooth_N]_N: not a kind of saber or tooth, but a kind of cat with saber-like teeth
- c. [black_A-out_P]_N: not a kind of blackness, but an incident of power outage.

(23) Double-headed compounds

- a. [**doctor**_N-**patient**_N]_N: refers to both doctor and patient
- b. [**mind**_N-**body**_N]_N: refers to both mind and body
- c. [**nature**_N-**nurture**_N]_N: refers to nature and nurture

In English, endocentric compounds are most common, and they are all right-headed. That is, English compounds (as well as derivational and inflectional morphology) are governed by the *right-hand head rule* (Lieber 1992; Williams 1981). In view of the complexity and variety of compounds in Chinese, a natural question to ask is whether any kind of headedness rule applies consistently within Chinese compounds? Section 3.2.2 reviews three relevant proposals from the literature, all of which arguably capture only part of the patterns observed in Chinese. It will be pointed out that the headedness of compounds in Chinese is in fact directly correlated to the compound types noted in Section 3.1, which in turn supports an approach categorizing compounds in terms of their internal syntactic and semantic relations.

3.2.2 Earlier accounts By means of a statistical method, S. Huang (1998) demonstrates that it is virtually impossible to predict which element in Chinese compounds will function as a head, because the combination of N, V, and Adj elements *in any linear order* seems to result in compounds that are nouns, verbs, and adjectives. For example, a combination of V and N in either order (V–N and N–V compounds) may yield an output which is a verb/V, a noun/N, or even an adjective/Adj. Using *Guoyu Ribao Cidian* (Mandarin Daily Dictionary) as a corpus, the statistical results are listed in (24) (only the results from V–N and N–V compounds are shown here; see S. Huang 1998: 264). S. Huang therefore argues that Chinese compounds are essentially *headless*. That is to say, they are not governed by a headedness rule:

(24) Input\Output	V	N	A	Total
[V–N] compounds	1581	2940	378	4881
[N–V] compounds	306	446	72	824

S. Huang's conclusion does not go without challenge in the literature, however. Starosta *et al.* (1998), concede that if one looks at *disyllabic* compounds, it is not clear whether there is a uniform headedness rule in Chinese. However, if longer compounds are considered (compounds with three or more morphemes), it becomes clear that headedness does play a significant role in Chinese compounds and consistently follows the same right-hand head rule as in English. Some examples are illustrated here, with heads being bold-faced (Starosta *et al.* 1998: 354):

- (25) a. [[AN]_NN]_N [[xiao-shu]-**dian**] "small-number-point: decimal point"
- b. [A [NN]_N]_N [xian-[ya-**dian**]] "salty-duck-egg: salted duck egg"
- c. [[VN]_VN]_N [[lu-yin]-**ji**] "record-sound-machine: tape recorder"
- d. [[VV]_VN]_N [[jiang-luo]-**san**] "descending-dropping-umbrella: parachute"

- (26) a. [[AN]_N[AN]_N]_N [[bai-huo]-[gong-si]] “hundred-good-public-govern; department store”
 b. [[AA]_A[NN]_N]_N [[gong-gong]-[shi-ye]] “public-shared-affair-enterprise; public career”

Starosta *et al.* (1998) therefore claim that all Chinese compounds should be considered right-headed, and that the apparent counter-examples, such as left-hand headed V–O compounds and the double-headed V–V compounds (see Section 2.2.3), are not true compounds and are merely bi-morphemic words that are not constructed by compounding rules. Some problems, however, can still be noted for Starosta *et al.* (1998). One issue that is not addressed in their analysis is that larger compounds are all of the same compound type (see Section 2.1: the larger compounds in Chinese are always M–H compounds). Indeed, all of 3+ morpheme compounds given in Starosta *et al.* (1998) are uniformly M–H compounds. This indicates that the conclusion that all Chinese compounds are right-headed is too strong. At best, the conclusion is that all M–H compounds (if endocentric) are right-headed, and Starosta *et al.*'s account offers no real explanation for the apparent lack of headedness in other types of compounds.

Packard (2000) raises another interesting possibility. Observing that verbal compounds in Chinese are dominantly left-headed, while nominal compounds are generally right-headed (where a head can be identified), he proposes a headedness principle that allows for two different directions of headedness, dictated by the categorial identity of the compound, as in (27):

- (27) Headedness Principle
 a. (Disyllabic) noun words have a nominal constituent on the right, and verb words have a verbal constituent on the left.
 b. V → [V X]
 N → [X N]

Packard's headedness principle makes accurate predictions for certain types of compounds (the nominal M–H, the V–O, and the V–R compounds), but other types of compounds are not well accounted for (as noted in Duanmu 2002). For example, verbal M–H compounds and Subject–Predicate (S–P) compounds, run contrary to the headedness principle. These verbal compounds are all right-headed (note that here only endocentric compounds are considered):⁴

- (28) a. man-**pao** “slow-run: jog” [Verbal M–H Compound]
 b. dao-**kao** “rob-copy: make pirate copy” [Verbal M–H Compound]
 c. tou-**teng** “head-ache: get a headache” [S–P Compound]

Note that neither of the two accounts reviewed above incorporates the notion of “semantic content” in attempting to define the heads of compounds. This leads to two obvious problems. First, many exocentric compounds are wrongly counted

as endocentric ones. For example, the N–V compound [*ri_N-chu_V*]_N “sun-out: sunrise” which is a noun/N may be incorrectly categorized as a left-headed compound, though it is actually an exocentric compound (*sunrise* is not a kind of sun). Second, since semantic content is excluded from consideration, the relational analysis of compound types is not adopted, which complicates the identification of a systematic headedness rule.

3.2.3 *Head direction in Chinese compounds* When the relational analysis of compound types is used, the issue of headedness within Chinese compounds actually becomes very clear. Consider the various compound types again, and the head directionality in these compounds (the issue of Verb–Result Compounds, or Resultative Verbal Compounds, will not be discussed here, however; readers are referred to Chapter 13 for analysis of the complex patterns in this type of compound):⁵

- (29) **Coordinative/Parallel Compounds [Double-headed]**
a. N–N: [*lei-dian*]_N “thunder-lightning: thunder” refers to both thunder and lightning
b. V–V: [*bang-zhu*]_V “help-help: help” refers to helping
- (30) **Modifier–Head Compounds [Right-hand headed]**
a. Adj–N: [*hei-ban*]_N “black-board: blackboard” is a kind of board
b. N–N: [*ti-wen*]_N “body-temperature: temperature” is a kind of temperature
b. Adj–V: [*man-pao*]_V “slow-run: jog” is a kind of running
- (31) **Subject–Predicate Compounds [Right-hand headed]**
N–V: [*tou-teng*]_V “head-ache: get a headache” is a kind of aching
- (32) **Verb–Object Compounds [Left-hand headed]**
V–N: [*du-shu*]_N “read-book: study” is a kind of reading

An interesting observation here is that the headedness of compounds is in fact isomorphic to that of their syntactic, phrasal counterparts: Chinese verb phrases are left-headed (i.e., head-initial), and noun phrases are right-headed (i.e., head-final) (Huang 1982). The comparison is illustrated in Table 1.1.

The conclusion, then, is that Chinese compounds are indeed governed by a systematic headedness rule, which operates in isomorphism to phrasal syntax and copies the directionality of headedness present in syntactic structures.⁶ Note that, however, this conclusion is not equivalent to saying that morphology is actually part of syntax, and may merely reflect a deep connection behind syntax and morphology in certain ways.⁷ In fact, although many V–O compounds are argued to be phrases in disguise (see below), for other types of compounds, the distinction between morphology and syntax is quite strict and clear. We shall take up this issue further in the following section.

Table 1.1 Headedness properties of compounds of phrases.

	<i>Compounds</i>	examples	<i>Phrases</i>	examples
Coordinative	double-headed	[shi _N - sheng _N] _N “teacher-student: teacher-student”	double-headed	[[laoshi] _{NP} han [xuesheng] _{NP}] _{NP} “teachers and students”
Modifier-Head	right-hand	[hei _A - ban _N] _N “black-board: blackboard”	right-hand	[[hei - de] _{AP} ban - zi] _{NP} “a black board”
Subject-Predicate	right-hand	[tou _N - teng _V] _V “head-ache: have a headache”	right-hand	[[tou] _{NP} teng _V - le] _{VP} “head aches”
Verb-Object	left-hand	[du _V - shu _N] _N “read-book; study”	left-hand	[du _V - le [shu] _{NP}] _{VP} “read-book; read books”

4 More on V-O compounds: Syntax or morphology?

In the generative tradition, the opacity of the morphological realm to operations of syntax is referred to as the Lexical Integrity Hypothesis (Bresnan and Mchombo 1995; Di Sciullo and Williams 1987; Duanmu 1998; Huang 1984; Jackendoff 1997; Selkirk 1982; among many others):

- (33) Lexical Integrity Hypothesis (LIH)
 Syntactic transformations are not applicable to word-internal structures.

Huang (1984) and Duanmu (1998) have shown that the LIH also holds in Chinese compounding morphology (with exceptions among V-O compounds; see Section 3.1). First, consider the case of syntactic coordination in (34). As predicted by the LIH, elements internal to a compound cannot be manipulated by rules of syntactic NP-coordination, hence (34b) is ungrammatical.⁸

- (34) a. Lisi shi yi ge [lu-shi]_{NP} jian [yi-shi]_{NP}
 Lisi Aux one CL law-teacher and heal-teacher
 “Lisi is a lawyer and doctor.”
 b. *Lisi shi yi ge [[lu-jian-yi]-shi]_N
 *Lisi Aux one CL law-and-heal-teacher

Second, consider the two attempted instances of syntactic modification in (35) and (36). (35a) illustrates that adverbial modification of the adjective *bai* (by *hen* “very”)

is possible when the adjective projects a full syntactic phrase (an AdjP, which is subsequently combined with the linker element *de*, and then with the noun *tu-zi* “rabbit”). In (35b), however, *bai* “white” is compounded with *tu*, as *bai-tu*, and this creates a word whose internal parts resist syntactic modification by external elements (specifically, the Adj element inside the compound is not visible for modification by the adverbial *hen*). Example (36b) shows that the meaning of *bai* when compounded with *tu* is actually no longer projected as a property of the nominal compound, which simply means “rabbit”, not necessarily a white rabbit. Because of this morphological opacity of the adjective in the compound, *bai-tu* can be modified with a different color term *hei-se-de* “black” without any semantic contradiction arising. Similar modification is impossible in (36a) when *bai* projects a separate syntactic phrase modifying *tu-zi* – here the combination of *hei-se-de* and *bai-se-de* does result in a contradiction, as the meaning of *bai* projects in the syntax and is not rendered invisible by the morphological process of compounding.

- (35) a. Lisi mai-le yi zhi [hen bai de tu-zi]_{NP}
 Lisi buy-Asp one CL very white DE rabbit-Aff
 “Lisi bought a very white rabbit.”
 b. *Lisi mai-le yi zhi [hen-[bai-tu]]_N
 (Lisi buy-Asp one CL very-white-rabbit)
- (36) a. #Lisi mai-le yi zhi hei-se de [[bai-se de] tu-zi]_{NP}
 Lisi buy-Asp one CL black-color DE white-color DE rabbit-Aff
 “#Lisi bought a black white rabbit.”
 b. Lisi mai-le yi zhi hei-se de [bai-tu]_N
 Lisi buy-Asp one CL black-color DE white-rabbit
 “Lisi bought a black rabbit.”

Finally, it can be noted that word-internal elements may not serve as the inputs to rules of syntactic transformations such as movement (Chomsky 1970). This can be illustrated with the focus dislocation construction *lian . . . dou* “even” in examples (37) and (38) (for further discussion of the *lian dou* construction, see Chapter 6). In (37), displacement of *yu* is possible when it projects a full syntactic phrase (an NP), but when *yu* occurs as part of the compound *gui-yu* “salmon,” it cannot be extracted from the noun and focus-moved.

- (37) Lisi lian [_{NP} yu_i] dou zhi chi [jin-kou de t_i]_{NP}
 Lisi even fish all only eat come.in-mouth DE
 “Even for fish, Lisi only eats the imported one.”
- (38) *Lisi lian yu_i dou bu chi [gui-t_i]_N
 Lisi even fish all not eat salmon-e
 “(intended) Lisi does not even eat salmon.”

There is thus good evidence that the LIH applies in Chinese as in other languages, and compounds and phrases belong to independent domains, the former being part of word formation/morphology, and the latter being part of syntactic computation. Having noted this much, it will shortly be seen that the syntax/morphology divide becomes less clear when “problematic” V–O (and V–R) compounds are considered. These turn out to be “phrase-like” in certain syntactic ways, but “compound-like” by virtue of other morphological properties.

4.1 V–O compounds and lexicalization: Huang (1984)

While many V–O sequences show signs of being morphological compounds, quite surprisingly not all of them are subject to the LIH. The idiosyncratic behavior of V–O compounds in contrast with other types of compounds was noted early on by Chao (1968), and later systematically discussed in the seminal work of Huang (1984). Huang (1984) points out that V–O “compounds” often fail to show the opacity expected by the LIH and allow for syntactic processes to affect internal parts of the V–O sequence. Consider first the coordination test. The two V–O compounds (or more neutrally, V–O forms) *chi-hun* “eat-meat: eat non-vegetarian food” and *chi-su* “eat-vegetable: eat vegetarian food” allow for coordination of the apparent word-internal elements *hun* and *su*, as shown in (39):

- (39) Zhangsan shi-bu-shi [chi-[hun-han-su]] dou keyi?
 Zhangsan Aux-no-Aux eat-meat-and-vegetable all allowed
 “Is it that Zhangsan can eat non-vegetarian or vegetarian meals?”

Next, consider syntactic modification. Contrary to the expectations of the LIH, the nominal objects in many V–O forms appear to be accessible to syntactic modifiers, and can, for example, be modified by frequentative and durative phrases, as seen in (40), where the bolded components of the V–O compound are clearly separated from each other by the adverbial modifiers:

- (40) a. Zhangsan [**jie**-guo san ci **-hun**].
 Zhangsan join-Asp three time marriage
 “Zhangsan has been married for three times.”
 b. Zhangsan [**chi**-le haoduo nian **-su**]
 Zhangsan eat-Asp many year vegetable
 “Zhangsan is a vegetarian for many years.”

Lastly, consider syntactic transformation. As shown in (411), the verbs and objects of V–O compounds such as *jie-hun* “tie-marriage: get married” and *kai-dao* “open-knife: perform a surgical operation” can be separated via focus dislocation in the *lian dou* construction. This indicates again that the verb and its object are both syntactically visible and can be manipulated by syntactic operations:

- (41) a. Zhangsan lian **-hun** dou **jie** le
 Zhangsan even -marriage all join- SFP
 "Zhangsan has even got married."
 b. Zhe ge menggu-daifu lian **-dao** dou **kai**-guo
 this CL Mongolian-doctor even -knife all operate-Asp
 "The fake doctor even operated on his patients."

Such V–O forms are nevertheless word-like in certain clear respects. For example, certain V–O forms may function as transitive verbs and take independent, direct objects (suggesting that the V–O sequence projects as a V in syntax), as seen in (42a) and (43a), while also exhibiting the syntactic behaviors noted above, as shown in (42b) and (43b) where syntactic modification of the O occurs:

- (42) a. Zhangsan hen **dan-xin** zhe ge yi-ti.
 Zhagnsan very carry-heart this CL issue-topic
 "Zhangsan worries about this issue very much."
 b. Dui zhe jian shi, Zhangsan **dan** tai-duo **xin** le
 to this CL matter Zhangsan carry too-many heart SPF
 "Zhangsan worries about this matter too much."
 (43) a. Lisi **liu-xue** ying-guo
 Lisi stay-study England-country
 "Lisi studies abroad in England."
 b. Lisi yijing **liu**-le shi nian **xue** le.
 Lisi already stay-Asp ten year study SPF
 "Lisi has been studied abroad for ten years."

Notice, however, that not all V–O forms are separable in syntax, and these fully inseparable V–O forms can straightforwardly be treated as true compound words (see also Y. Huang 1991):

- (44) a. Zhangsan zhong-yu **cheng-gong** le
 Zhangsan finally achieve-achievement SFP
 "Zhangsan has finally succeeded."
 b. *Zhangsan zhong-yu cheng-le yi ge gong.
 Zhangsan finally achieve-Asp one CL achievement
 (45) a. Lisi **huai-yi** Lao-Wang shuo de hua
 Lisi bear-doubt Lao-Wang say DE words
 "Lisi has doubt on what Lao-Wang said."
 b. *Lisi dui Lao-Wang huai hen da de yi.
 Lisi to Lao-Wang bear very big DE doubt

To account for the ambiguous statuses of the V–O forms that show properties of both single words and syntactic phrases, Huang (1984) considers three possibilities. The first possibility is that these V–O forms are listed in the lexicon as both compounds and phrases, and morphological and syntactic well-formedness conditions independently ensure which form is adopted in a syntactic computation. This possibility is dismissed by Huang due to the conceptual redundancy that the same information would essentially be listed twice in the lexicon for each V–O form. However, more recently such an approach has actually been embraced by a number of Chinese morphologists for other empirical reasons (Dai 1992; Y. Huang 1991; Packard 2000). We shall return to this point in Section 4.2. The second possibility Huang considers is Chao’s (1968) original proposal that V–O forms are all compounds to begin with, and subsequently undergo syntactic reanalysis as phrasal elements. This possibility is also rejected by Huang for the reason that the posited reanalysis rule seems to be too powerful and unrestricted, as it incorrectly predicts that even true V–O compounds, such as those illustrated in (440) and (451), should show phrase-like behaviors. The third possibility, which Huang eventually adopts, is that phrase-like V–O forms should not be treated as inherent compounds, and should instead be analyzed as “phrases” in the lexicon. Such V–O phrases are suggested to be subject to a lexicalization rule, which allows them to become a single syntactic unit (i.e., an X^0 word). Huang (1984) argues that the lexicalization rule is motivated by a syntactic well-formedness condition, which he calls the Phrase Structure Condition (PSC):

(46) Phrase Structure Condition

Within a given sentence in Chinese, the head may branch to the left only once, and only to the lowest expansion (p. 54)

Simply put, the PSC allows a verb to take at most one complement overtly to its right (see Paul 1988 for discussion). Evidence for the PSC comes from the observation that a range of constructions are ill-formed where verbs appear followed by two complements, as in (47a) and (48a). The effects of the PSC can be grammatically side-stepped, however, if a verb with two underlying complements appears either in the *ba*-construction, as in (47b), or in the Verb Copying construction, as in (48b). In both constructions, the one-verb-one-(post-verbal-)complement condition is strictly observed:

- (47) a. *Zhangsan [bo-le [pi] [juzi]].
 Zhangsan peel-Asp skin orange
 “(intended) Zhangsan peeled the orange.”
 b. Zhangsan [ba [juzi] [bo-le [pi]].
 Zhangsan BA orange peel-Asp skin
 “Zhangsan peeled the orange.”

- (48) a. *Ta [qi [ma] [de hen lei]]
 he ride horse DE very tired
 “(intended) He rode a horse until he got very tired.”
 b. Ta [qi [ma]] [qi [de hen lei]]
 he ride horse ride DE very tired
 “He rode a horse until he got very tired.”

Phrase-like (syntactically transparent) V–O forms are therefore phrases that undergo lexicalization if this is forced by the PSC (i.e., if a further overt complement follows the V–O sequence as in (49a)). If the PSC does not apply its force (i.e., if there is no overt complement following the V–O sequence), then the V–O forms syntactically remain as phrases, as in (49b/c):

- (49) a. Zhangsan hui [[dan-xin]_V Lisi]_{VP}. [*dan-xin* is lexicalized due to the PSC]
 Zhangsan will [[carry-heart Lisi
 “Zhangsan will worry about Lisi.”
 b. Zhangsan yiding hui [dan_V [xin]_{NP}]_{VP} [*dan xin* remains a
 [VP V NP] phrase]
 Zhangsan must will [carry [heart
 “Zhangsan must be worried.”
 c. Zhangsan [dan-le tai duo xin]_{VP} [*dan xin* remains a
 [VP V NP] phrase]
 Zhangsan [carry-Asp too much heart
 “Zhangsan worried too much.”

Huang’s insightful analysis predates various other general theories of relations between syntax and the lexicon that have a similar orientation. His idea that phrases may be listed in the lexicon is later echoed by Di Sciullo and Williams (1987), who suggest that idioms (*take advantage, break the ice, take a picture, etc.*) in English and other languages should be analyzed as “phrasal words” in the lexicon. The rule of syntactic lexicalization posited by Huang also receives independent support from Baker’s (1988) analysis of head incorporation, which argues that words can be formed within syntax by syntactic operations (cf. also Massam 2001). Notwithstanding such additional support, Huang’s conclusions about V–O forms have been challenged by other Chinese morphologists. We turn to these challenges in the following section.

4.2 *Challenges from the morphological point of view*

A number of morphologists working on the V–O issue in Chinese have adopted the first possibility outlined above, rather than the third approach advocated by Huang. Dai (1992), Y. Huang (1991), and Packard (2000) all hold the view that V–O

forms should be assumed to be listed in the lexicon as both compounds and phrases. Dai (1992) builds an argument for such an analysis based on patterns of verbal reduplication. Recall that reduplication targets words, but not phrases (see Section 1.1.2 above). Consequently, if a V–O sequence is a [_{VP} V NP] phrase, only the initial V element should undergo reduplication. On the other hand, if a V–O form is a compound word [_V V–O], then the whole V–O form should allow for reduplication. Dai shows that in sentence-final positions, where V–O forms should be analyzed as phrases according to Huang’s analysis, V–O forms actually display both types of reduplication patterns, suggesting that such sequences genuinely are ambiguous in their morpho-syntactic status, as claimed by the third approach. Significantly, for Huang (1984), a V–O sequence only undergoes lexical reanalysis when this is forced by the PSC, and not when the V–O pair occurs in sentence-final position with no following complement. Consequently, it is predicted that reduplication of V–O should not be possible in such a position. The fact that examples like (50b) are well-formed therefore casts doubt on the PSC-based approach to V–O compounds, and is argued to support a dual lexical entry analysis.

- (50) a. Ni yinggai dui haizi-men duo [[dan-dan] xin]_{VP} [*dan xin* as phrase]
 you should to child-PL more [[carry-RED heart]
 “You should pay more attention to the children.”
- b. Ni yinggai dui haizi-men duo [dan-xin]_V-dan-xin [*dan-xin* as compound]
 you should to child-PL more [carry-heart-RED]
 “as in (a)”
- (51) a. Zan-men lai [[liao-liao] tian]_{VP} ba. [*liao tian* as phrase]
 we-PL come talk-RED sky SFP
 “Let’s chat for a while.”
- b. Zan-men lai [liao-tian]_V-liao-tian ba. [*liao-tian* as compound]
 we-PL come talk-sky-RED SFP
 “as in (a)”

Duanmu (1998) also arrives at a similar conclusion based on the tone sandhi (TS) phenomenon in the Wu dialect of Chinese. His main observation is that a prosodic TS boundary is observed in disyllabic VPs between verbs and their objects, and in a disyllabic V–O form, the TS boundary turns out to be optional. This optionality then also points to the conclusion that the V–O forms can freely be phrases or compounds:

- (52) a. ngu le’-le’ (k^h∅ sz) [V–O as compound, no TS boundary]
 I Asp (read book)
 “I am reading.”
- b. ngu le’-le’ (k^h∅) (sz) [V–O as phrases, with TS boundary]
 I Asp read book
 “I am reading a book.”

Packard (2000) further remarks that if lexicalization is merely driven by the PSC, then it may be wrongly concluded that a loanword like *you-mo* “humor” is actually lexicalized from a syntactic phrase, because *you-mo* is separable in syntax:

- (53) Zhangsan you-le Lisi yi mo
 Zhangsan humor-Asp Lisi one humor
 “Zhangsan made a joke on Lisi.”

Such an approach seems to be counterintuitive for *you-mo*, which must have initially been borrowed as a word and then subsequently permitted a form of syntactic reanalysis. Note, however, that Packard’s conclusion that V–O word forms may permit reanalysis as syntactic phrases may be too strong, because *you-mo* is actually quite exceptional in its patterning (see also Huang 1984). Other loanwords rarely display the same ability to be reanalyzed (contra Packard’s claim). Consider the loanword *kao-bei* from English *copy* as a representative example, where no syntactic separation of the two syllables is possible (54b), unlike *you-mo* in (53):

- (54) a. Zhangsan kaobei-le henduo dang-an.
 Zhangsan copy-Asp many file
 “Zhangsan copied many files.”
 b. *Zhangsan kao-le henduo dang-an de bei.
 *Zhangsan copy-Asp many file DE copy
 “(intended) Zhangsan made many copies.”

Another relevant observation is that the V–O forms under consideration may consist of bound roots, which are otherwise barred from being legitimate syntactic atoms. Observe the following example:

- (55) Zhangsan de hun-yin/*hun hen xing-fu
 Zhangsan DE marriage-marriage/marrige very lucky-happy
 “Zhangsan has a happy marriage.”

The bound root *hun* “marriage” cannot be used as an independent syntactic object if it is not found with *jie* “join/tie” in the same sentence (or with another bound root to form a compound *hun-yin* “marriage”). This fact then suggests that although V–O compounds are syntactically separable, they nevertheless maintain a strict word-level dependency (i.e., they are still subject to well-formedness conditions at the level of morphology). This consequently challenges the idea that V–O compounds are syntactic phrases to begin with.

5 Conclusion

Although Chinese is considerably more limited in its manifestation of morphology than other agglutinating and polysynthetic languages, this chapter has attempted to show that there are nevertheless interesting issues that arise in aspects of word formation in the language, particularly in the area of compounding and the interaction of syntax with the lexicon. The chapter has documented a representative array of both inflectional and derivational affixes from Mandarin Chinese, and argued that compounds in Chinese are best characterized with a syntax–semantic relational analysis that permits a systematic account of the headedness of Chinese compounds. We also saw the problems facing any analysis of V–O “compounds,” which call for a better understanding of the syntax–morphology interface and how elements of certain types may show a dual behavior as both complex words and syntactic phrases.

NOTES

- 1 In Packard (2000), the two types of affixes are named grammatical affixes (for inflectional ones) and word-forming affixes (for derivational ones) instead. No substantial difference arises from the standard terminology adopted here.
- 2 Chao (1968) notes that in some northern dialects of Mandarin Chinese, *-men* can be used with non-human nouns, like *shu-men* “tree-PL, trees,” *rou-men* “meat-PL, meats,” and *yi-shang-men* “clothes-clothes-PL, clothes.”
- 3 It is interesting to note that, in English, bound roots have the tendency to become free roots, for example, *photo*, *ism*, *techno*, *porn*, and so on. Mandarin Chinese seems to evolve in an opposite direction. Bound roots used to be free roots in Classical Chinese, and they tend to become disyllabic morphemes in modern Mandarin Chinese (perhaps due to phonological reasons) (Feng 1998, 2002).
- 4 Packard (2000) also noted that there are counter-examples to the Headedness Principle, yet he argues that the number of counter-examples is relatively few. The question here is not the number of counter-examples, however, but the fact that these counter-examples systematically belong to certain types of compounds. It is the systematic behaviors of counter-examples that call for an explanation.
- 5 Note that exocentric compounds are generally excluded from the study of heads in compounds since their meanings are idiomatic and irregular, and learning these compounds does not follow principled linguistic rules.
- 6 Tang (1988 et seq.) also observes the isomorphism between syntax and morphology in Chinese.
- 7 Williams (2003), for example, argues that isomorphism between morphology and syntax, where attested, should be viewed as the result of a type of economy condition among levels of representations. In contrast to approaches distinguishing morphology and syntax as different forms/levels of representation, the theory of Distributed Morphology adopts the position that morphology actually is constructed in syntax (Embick and Noyer 2001; Embick and Marantz 2008; Halle and Marantz 1993; Marantz 1997; Xue 2001).

8 See Aoun and Li (2003) for discussion of different types of XP-coordination in Chinese.

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