Chinese Descriptive and Resultative V-*de* Constructions A Dependency-based Analysis

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Abstract

This contribution presents a *dependency grammar* (DG) analysis of the so-called *descriptive and resultative V-de constructions* in Mandarin Chinese (VDCs); it focuses, in particular, on the dependency analysis of the noun phrase that intervenes between the two predicates in a VDC. Two methods, namely chunking data collected from informants and two diagnostics specific to Chinese, i.e. *bǎ* and *bèi* sentence formation, were used. They were employed to discern which analysis should be preferred, i.e. the ternary-branching analysis, in which the intervening NP (NP2) is a dependent of the first predicate (P1), or the small-clause analysis, in which NP2 depends on the second predicate (P2). The results obtained suggest a flexible structural analysis for VDCs in the form of "NP1+P1-*de*+NP2+P2". The difference in structural assignment is attributed to a semantic property of NP2 and the semantic relations it forms with adjacent predicates.

1 Introduction

The aim of this paper is to assign dependency structures to a familiar construction of Chinese, the *descriptive and resultative V-de constructions* (abbreviated as VDCs in following discussions). Having attracted considerable interest both at home in China and abroad, VDC has also been referred to as *得字句*、*得句型* '*de* construction', *状态补语* 'stative complement' and *得字补语* '*de* complement' according to different scholars.

Until now, research efforts concerning VDCs have centered on the origin and lexical properties of *de* (e.g., Jinxi Li, 2000/1924, p. 178-181; Chao, 1968, p. 350-358; Wang, 1985, p. 98-100, 103-105; Lin, 2011/1957, p. 69-71), categorization and typology (e.g., Li and Thompson, 1981; Zhu, 1982, p. 133; Chao Li, 2015), and semantic, syntactic, and pragmatic properties of the construction (e.g., Linding Li, 1986, p. 225-255; Huang, 1988; Yen-hui Audrey Li, 1990; Fan, 1993; Yafei Li, 1999; Gouguet, 2006; Zhang, 2006, p. 47-66, 155-161; Loar, 2011, p. 331-367). The big picture is that although many aspects of VDC have been studied, little agreement has been reached. This observation is particularly true of the hierarchical analysis.

Examples (1) and (2) are illustrations of the widely-assumed dichotomy between the *descriptive* and *resultative* VDCs (c.f., Li and Thompson, 1981; Yen-hui Audrey Li, 1990; Huang et al., 2009; Chao Li, 2015):

(1) (from Huang, 1988, p. 274)

Wǒ pǎo de hěn kuài.
I run DE very (be)fast
'I run very fast.'
我跑得很快。

(2) (EM=Emphasis)

Wǒ pǎo de xiédài dōu diào le.
I run DE shoelaces EM loosen LE
'I ran to the extent that even my shoelaces got loose'
我跑得鞋带都掉了。

That *de* is the marker of this construction is easy to see, but a proper analysis of *de* is much more difficult to produce. There are three distinct stances in this regard: *De* has been treated as a preposition (e.g., Jinxi Li, 2000/1924, p. 178), as a suffix (e.g., Zhu, 1982, p. 32), and as a *结构助词* 'structural function word', as opposed to a content word (e.g., Fan, 1993, p. 60; Zhang, 2006, p. 156). Following the majority position on this issue, i.e. the last of the three, the discussion

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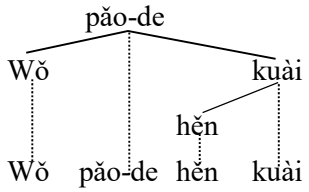
here takes *de* as a function word that "clings to" its preceding predicate P1, and it is glossed as *-de* in the syntactic structures.

A notable feature of VDCs is the presence of two predicates.[1] For instance, in (1), the verb *pǎo* 'run' is a predicate that takes NP1 *wǒ* 'I' as its agent; on the other hand, the adjective *kuài* '(be)fast' is also a predicate that takes either the entity *wǒ* 'I' or the proposition *wǒ pǎo* 'I run' as its argument. In example (2), where there is an intervening NP *xiédài* 'shoelaces', NP1 *wǒ* 'I' is the agent of the first predicate *pǎo* 'run', and *xiédài* 'shoelaces' is the theme of the second predicate *diào* 'loosen'. The question, then, is which of the two predicates involved, the first predicate (P1) to the left or the second (P2) to the right, is the root of the sentence?

There has been a longstanding debate on the basic structural analysis just sketched (e.g., Li and Thompson, 1981; Huang, 1988; Osborne and Ma, 2015). Researchers in this area have attempted to address this problem by examining the forms of the two predicates during question formation, aspect marking and sentence negation. In particular, Huang (1988) has contributed to the establishment of the *Secondary Predication hypothesis* (in which P1 is the main predicate over P2) by reinvestigating the arguments for the opposite viewpoint and rebutting them cogently. Since the status of P1 and P2 is not the focus of this study, the discussion here takes Huang's claim for granted (also following Ding, 1961; Linding Li, 1986; Gouguet, 2006; Loar, 2011). Thus sentence (1) has the following dependency analysis, where P2 is a dependent of P1:

(3)



'I run very fast.'

Difficulty arises when one attempts to assign structures to VDCs such as sentence (2), in which an intervening NP (NP2) appears between P1-*de* and P2. In previous studies regarding the status of NP2, a series of diagnostics were employed to discern to which predicate the intervening NP is closer in meaning and structure. These tests include: pause and interjection insertion (e.g., Ding 1961, p. 65; Zhu 1982, p. 136; Yafei Li, 1999, p. 458; Huang et al., 2009, p. 85), *bǎ* and *bèi* constructions (see section 3.2), adverbial insertion (e.g., Zhu, 1982, p. 135; Yafei Li, 1999, p. 459) and topicalization (e.g., Zhu, 1982, p. 136). Given that the diagnostics at times deliver contradictory results and that the validity of some of the tests are debatable (e.g., Chao Li 2015), no consensus has been reached about the best hierarchical analysis.

One noteworthy study that is directly related to VDCs with an intervening NP is Sun (2005). By examining how each type of construction behaves, Sun claims that there are four varying structures that have the form of "NP1+P1+'de'+NP2+P2". Insightful as it is, Sun's analysis does not include any diagrams. Thus, it is difficult to see what his interpretations of hierarchical structures might be.

Adopting DG as the theoretical framework, the account presented here strives to address the thorny issue just outlined: When there is an NP2 in the Chinese V-*de* constructions, should it be analyzed as a dependent of P1, or of P2? Compared to other theories of syntax, dependency grammar is by nature more straightforward and efficient in assigning hierarchical structures to natural languages. Nonetheless, there are few theoretically-oriented DG accounts of this construction (e.g., Osborne and Ma, 2015), let alone an analysis on the particular issue of the intervening NP.

To address the problem raised by contradictory diagnostics, the current study also employed chunking data to discern the best hierarchical analysis. The results suggest that VDCs with an

[1] To be precise, a small handful of adverbials can appear where P2 normally would be, adding intense extent to the statement denoted by P1. These degree adverbs, as noted by Chao Li (2015), are not predicative. Such adverbials include *hěn* 'very', *duō* 'much', *yuǎn* 'far', *yàomìng* 'almost killed sb', *lìhài* 'severely' and *bùxíng* 'not ok', e.g.,

(i) Wǒ kùn de bùxíng
I (be)sleepy DE not ok
'I am extremely sleepy.'
我困得不行。

intervening NP enjoy flexible structures. Actual structure assignment, either as a ternary-branching analysis (in which NP2 is a dependent of P1) or a small-clause analysis (in which NP2 is dependent on P2), is determined by predicate-argument relationships between NP2 and the two predicates, results of the *bǎ* and *bèi* tests, and a semantic property of NP2.

2 Dependency grammar

2.1 Some principles

This subsection briefly introduces the theoretical framework adopted in this manuscript. Three principles of syntactic organization are assumed:

1. One-to-one mapping,
2. Strict headedness, and
3. Projective syntax

Like many other DGs, the current approach assumes one-to-one mapping whereby each atomic syntactic unit, i.e. each word, is mapped to exactly one node in the syntactic structure, and vice versa (e.g., Mel'čuk and Pertsov, 1987, p. 48, 57–8; Kahane, 1996, p. 45; Hudson, 2007, p. 183). In addition, the syntactic structures adopted in this DG are entirely headed, meaning that exocentric units are not possible. The current DG also agrees that the root of a sentence is the (finite) verb (in Chinese just verb), and it allows ternary branching, as opposed to the strict binarity of branching associated with many modern phrase structure grammars (PSGs).

At the same time, the current DG is different from many other DGs in that it is projective (or mono-stratal) in syntax. This means that linear order (precedence) and vertical order (dominance) are both considered as primitive, as opposed to linear order being secondary to hierarchical order (e.g., Tesnière, 2015/1959; Mel'čuk and Pertsov, 1987). The structures assumed in the study therefore always encode actual word order.

2.2 Dependency grammar and Chinese

The modern history of dependency grammar begins primarily with the posthumously published oeuvre of Lucien Tesnière (1893–1954), *Elements of Structural Syntax* (2015/1959). While constituency-based grammars have been dominant in the study of syntax and grammar, DG has enjoyed a following in Europe, particularly in Germany, likely because the verb centrality of Tesnière's approach was more compatible with the verb second (V2) principle of word order in German and other Germanic languages. In China, it was not until the late 1970s and early 1980s that the first work introducing DG was published (e.g., Feng, 1983). Due to easily accessible and readily applicable structures, DG has become the widely-assumed approach for parsing in machine translation and natural language processing (e.g., Liu, 1997; Feng, 1998; Feng, 2008).

In the last decade, work on DG concerning Chinese has been increasing in great number due to the development of computational linguistics. Focusing on the functional side of the grammar, Chinese computational linguists have made attempt to deepen our understanding of human languages and cognition on the basis of their self-built DG tree banks (e.g., Liu, 2008; Jiang and Liu, 2015). At present, there are three true-born large-scale dependency tree banks of Chinese, one from Zhejiang University, one from Peking University, and another is the HIT-CIR from Harbin Institute of Technology.

While there have been many computational and quantitative investigations into the nature of Chinese, purely linguistic questions about Chinese have received less attention. It is therefore warranted that DG be employed to address syntactic issues of the sort mentioned above, and to shed light on the potential structural analyses of various constructions, such as the VDCs.

3 Methodology

This section establishes the validity of the two means for discerning the best structural analysis, namely the chunking experiment and the *bǎ* and *bèi* diagnostics. It starts with the introduction of the experiment in which informants were asked to chunk sentences according to their intuition, and then moves to the illustration of how the widely-used *bǎ* and *bèi* tests are employed to help discern the status of the intervening NP.

3.1 Chunking handouts

Informants' chunking responses were collected and used as guidance to discern the best hierarchical analysis for VDCs with an intervening NP.

In this regard, the following claims are put forth for orientation:

> 1. Native speakers of a language intuitively know how words in a sentence are organized into meaningful groups, and these groups can be identified using chunking data collected from informants.
>
> 2. Words connected in meaning are more likely to be included within one chunk. i.e. dependents should be grouped together with their head, as opposed together with one or more words that do not include their head (think *projectvity*, e.g., Hays, 1964; Gaifman, 1965; Robinson, 1970).

By asking informants to divide sentences into chunks, the researcher is actually inviting them to group words together that are closely connected in meaning and accordingly in structure. Take sentence (1) as an example, i.e. *Wǒ pǎo-de hěn kuài* 'I run very fast'. The prediction is that informants will prefer to include *hěn* 'very' with *kuài* 'fast' rather than with *pǎo* 'run', because *hěn* is an adverb that modifies *kuài*, not *pǎo*. Similarly, if a significant majority of participants include the intervening NP and a particular predicate within one chunk, then the intervening NP is more likely to a dependent of that predicate, rather than the other one.

All together thirty sentences were tested via three rounds of data collection at a major university in China. The chunking handout was arranged in such a manner that it contained mainly V-*de* sentences as well as a small number of filler sentences, such as *bǎ* sentences. At the beginning of each handout, the chunking concept was introduced and illustrated with examples. The handout then prompted the participants to chunk the sentences according to their intuition.

All the handouts were collected in the classroom with the permission of the teacher. The researcher arrived several minutes before class to explain the instruction. Students were encouraged to ask questions if they did not understand. At the end of the handout, participants were prompted to write down their suggestions as well.

The results were recorded using Microsoft Excel 2007. Handouts that contained responses that are not consistent with the requirements of participation, i.e. containing sentences that are not chunked into three chunks, were excluded from recording. The number of meaningful set of results obtained from each round of data collection was 43 (two excluded), 47(one excluded), and 43, respectively.

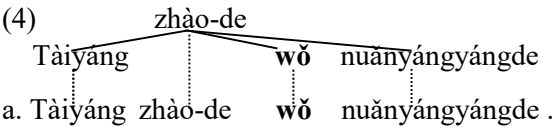
3.2 The *bǎ* and *bèi* diagnostics

The *bǎ* and *bèi* diagnostics are two related, widely-used tests in the study of Mandarin grammar (e.g., Zhu, 1982, p. 135; Linding Li, 1986, p. 241-242, 245-246; Huang, 1988, p. 297-300; Yafei Li, 1999, p. 449-451; Loar, 2011, p. 364-366). Compatible with previous analyses that take *bǎ* and *bèi* as object markers (e.g., Liang, 1971; Wang, 1985, p. 82-92; Goodall, 1986; Jinxi Li, 2000/1924, p. 37), the assumption of these tests is that what can follow *bǎ* or what precedes *bèi* in corresponding structures is the direct object of the main predicate in the normal active counterpart.

Acknowledging that some doubt the assumption behind these dignostics (e.g., Xue, 1987; Shen, 1997; Chao Li, 2015), the discussion here focuses on the dependency relations that the test is able to reveal. If a VDC with an intervening NP (NP2) can be transformed into *bǎ* and *bèi* constructions, then it seems plausible to assume NP2 as a dependent of P1, because P1 denotes how NP2 is "disposed of",[2] whereas P2 describes the result or the extent.

Take (4) as an example:

(4)



a. Tàiyáng zhào-de **wǒ** nuǎnyángyángde .
Sun shine-DE I/me (be)warm-happy
'The sun shined on me, making me feel warm and happy.'
太阳照得我暖洋洋的。

[2] "The *bǎ* construction is often called the 'disposal' construction, a term due to Wang (1947)，who writes, 'The disposal form states how a person is handled, manipulated , or dealt with; how something is disposed of; or how an affair is conducted.' (translation by Y.-C. Li, 1974) " (from Bender, 2000, p. 106).

b. Tàiyáng **bǎ wǒ** zhào-de nuǎnyángyángde.
Sun BA me shine-DE (be)warm-happy
'The sun shined on me, making me feel warm and happy.'
太阳把我照得暖洋洋的。

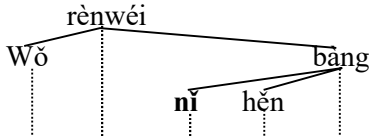
c. **Wǒ bèi** tàiyáng zhào-de nuǎnyángyángde.
Me BEI sun shine-DE (be)warm-happy
'I was shone by the sun, and as a result, I felt warm and happy.'
我被太阳照得暖洋洋的。

The semantic relations in the sentence do not provide any clue about the best hierarchical analysis: *Wǒ* 'I/me' is the object argument of P1 *zhào* 'shine' that is acted upon; it is also the subject argument of P2 *nuǎnyángyángde* '(be)warm-happy' that experiences the change.

That NP2 can be passivized in (4b) and (4c) suggests that it should be analyzed as the dependent of P1 instead of P2, supporting the ternary-branching analysis shown in (4a).

This use of the *bǎ* and *bèi* tests is also supported by another observation:

(5)



a. Wǒ rènwéi **nǐ** hěn bàng.
I think you very good.
'I think you are excellent.'
我认为你很棒。

b. *Wǒ **bǎ nǐ** rènwéi hěn bàng.
I BA you think very excellent
Intended: 'I think you are excellent.'
我把你认为很棒。

c. ***Nǐ bèi** wǒ rènwéi hěn bàng.
You BEI I think very excellent
Intended: 'You are thought by me to be ex cellent.'
你被我认为很棒。

Example (5a) is a sentence with a bridge verb *rènwéi* 'think'.[3] As the root of the sentence, *rènwéi* 'think' takes the clause *nǐ hěn bàng* 'you are excellent' as its complement. NP2 *nǐ* 'you' is clearly a dependent of the root of the object clause *bàng* 'good' rather than of the matrix root *rènwéi* 'think'. Taking the position of *nǐ* into consideration, the assumption is that it should indeed not be accessible for building the *bǎ* and *bèi* constructions. Attempts to form such sentences support this prediction, as shown in (5b) and (5c). Note that similar attempts to form the passive in English also fail, e.g., **You are thought by me are excellent*.

The inference is thus that if an intervening NP can survive the *bǎ* and *bèi* tests, it seems more plausible to analyze it as a dependent of P1 than of P2.

4 Discussion of results

The discussion in this section focuses only on the thorny issue of the hierarchical analysis of the VDCs with an intervening NP. Based on their predicate-argument relationships, VDCs were divided into three groups:

1. The intervening NP is an argument of P1 only,

2. The intervening NP is an argument of both P1 and P2 at the same time, and

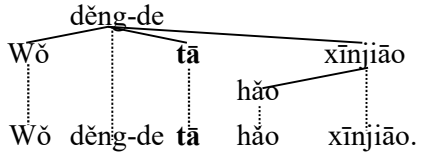
3. The intervening NP is an argument of P2 only.

Chunking results obtained for each type of VDCs are reported and discussed in the following subsections.

4.1 Argument of P1 only

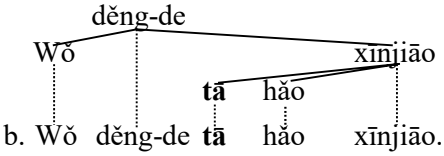
When NP2 is semantically selected just by P1, P2 generally needs to be predicated of the other NP in the sentence, i.e. the matrix subject, forming *subject control* (e.g., Sun, 2005, p. 125; Chao Li, 2015, p. 27). Take *Wǒ děng-de tā hǎoxīnjiāo* as an example. The matrix subject *wǒ* 'I' is the agent of the first predicate *děng* 'wait'.

(6) (from Chao Li, 2015, p. 25)



a. Wǒ děng-de **tā** hǎo xīnjiāo.
I wait-DE him very anxious
'I waited for him so anxiously.'
我等得他好心焦。

[3] A bridge verb is a predicate of speaking and thinking that typically takes an object clause, e.g., *rènwéi* 'think', *shuō* 'say', and *zhīdào* 'claim'.



b. Wǒ děng-de **tā** hǎo xīnjiāo.
#'I waited, and he was anxious.'

In the ternary-branching analysis given as (6a), the intervening NP is the patient of P1. P2 *xīnjiāo* 'anxious', on the other hand, is predicated of the matrix subject *wǒ* 'I', denoting the agent's anxious state from the action of *děng tā* 'waiting for him'. In the small-clause analysis shown in (6b), however, P2 seems to take NP2 as its subject argument, resulting in a pragmatically strange reading of *tā* 'he' being anxious while *wǒ* 'I' was the one who waited. The prediction is therefore that the ternary-branching analysis will be preferred for this type of VDC.

Results obtained from chunking handouts confirmed the prediction. For sentence (6), informants produced the following responses:

(7) I wait-DE him very anxious

a. Wǒ | děng-de **tā** | hǎo xīnjiāo. – 35
b. Wǒ děng-de **tā** | hǎo | xīnjiāo. – 3
c. Wǒ | děng-de | **tā** hǎo xīnjiāo. – 2
d. Wǒ děng-de | **tā** | hǎo xīnjiāo. – 3

'I waited for him so anxiously.'

As stated in the previous section, dependents are normally grouped together with their head according to the principle of *projectivity*. The fact that a significant majority of informants chose to chunk the sentence as in (7a) and (7b) in which P1 and NP2 are in one chunk excluding P2 supports the ternary-branching analysis that positions NP2 as a dependent of P1 as shown in (6a).

Concerning the other sentence containing subject control that was tested, i.e. *Wǒ xiǎng-de tā shuì-bù-zháo jiào* 'I missed her so much that I cannot fall asleep',[4] the results were similar:

(8) I miss-DE her sleep-not-touch

a. Wǒ | xiǎng-de **tā** | shuì-bù-zháo jiào. – 39
b. Wǒ xiǎng-de **tā** | shuì-bù-zháo | jiào. – 1
c. Wǒ xiǎng-de | **tā** | shuì-bù-zháo jiào. – 3

'I missed her so much that I cannot fall asleep.'

While a significant majority of informants (40 out of 43) grouped NP2 *tā* 'he/him' with P1 *xiǎng* 'miss', no one grouped it with P2 *shuì-bù-zháo jiào* 'cannot fall asleep' (0 out of 43). Once again, three informants chose to chunk the sentence in a manner that NP2 alone appears as one chunk, which was not in favor of either one of the analyses.

The conclusion is therefore that when NP2 is selected just by P1, a ternary-branching analysis should be preferred over the small-clause analysis.

4.2 Argument of both P1 and P2

While the structure of *subject control* VDCs matched expectation, it is hard to predict which analysis should be preferred for the second type of VDC, in which NP2 is selected by both P1 and P2.

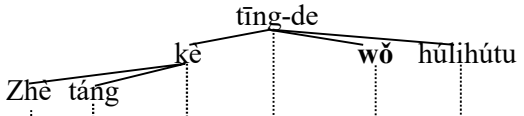
(9) (from Zhang, 2006, p. 47; gloss and translation mine)

a. Dìzhǔ bī-de **tā** wúlùkězǒu.
landowner force-DE he/him no-way-can-go
'The landowner drove him into a desperate situation. '
地主逼得他无路可走。

b. Dìzhǔ bī-de **tā** wúlùkězǒu.
'The landowner drove him into a desperate situation.'

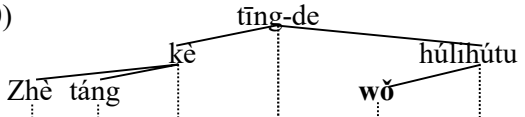
[4] It should be pointed out that, although all sentences tested are well-accepted Chinese, the use of this type of subject control VDCs that put NP2 directly after *–de*, as shown in (7) and (8), is decreasing (e.g., Linding Li, 1986, p. 244). The preferred way to express this meaning is the verb-copying construction (e.g., Chao Li, 2015, p. 27). For example, sentence (8) would be *Wǒ xiǎng tā xiǎng-de shuì-bù-zháo jiào* 'I miss her miss-*de* that I cannot fall asleep'.

(10) (CL = classifier)



a. Zhè táng kè tīng-de **wǒ** húlihútu.
This CL class listen-DE I/me confused
'I listened to the class, and as a result, I was confused.'
这堂课听得我胡里胡涂。

(10)



b. Zhè táng kè tīng-de **wǒ** húlihútu.
'I listened to the class, and as a result, I was confused.'

Sentences (9) and (10) demonstrate the case where NP2 is selected by both predicates. In (9), the intervening NP *tā* 'he/him' is the patient of P1 *bī* 'force' and the experiencer of P2 *wúlùkězǒu* 'no-way-can-go'. In (10), the syntactic subject of P1, i.e. NP1, is the patient of P1 and NP2 is both the agent of P1 and the experiencer of P2 (c.f., Huang, 1988, p. 299; Sun, 2005, p. 149-151; 450-452).

Six of the sentences tested contained an intervening NP that is semantically related to both predicates. Among them, two were "active" VDCs such as (9), and four were "passive" VDCs like (10).

The two active sentences were sentence (9) and *Tàiyáng zhào-de wǒ nuǎnyángyángde* 'The sun shined on me, making me feel warm and happy', as illustrated in (4). The results obtained for sentence (9) were as follows:

(11) landowner force-DE him no-way-can-go

a. Dìzhǔ | bī-de **tā** | wúlùkězǒu. – 37
b. Dìzhǔ | bī-de | **tā** wúlùkězǒu. – 3
c. Dìzhǔ bī-de | **tā** | wúlùkězǒu. – 3

'The landowner drove him into a desperate situation.'

Two potential structural analyses of the sentence are illustrated in (9) above. Example (9a) is the ternary-branching analysis and (9b) shows the small-clause analysis. Given the informants' responses, it is possible to discern the best analysis.

The chunking results in (11) reveal that informants were more willing to group the intervening NP with P1 rather than with P2, supporting the ternary-branching analysis given as (9a).

Concerning the other active sentence that was tested, i.e. *Tàiyáng zhào-de wǒnuǎnyángyáng-de* 'The sun shined on me, making me feel warm and happy', the results were similar: 40 out 43 participants chunked the sentence in such a manner that supports the ternary-branching analysis that views NP2 as a dependent of P1.

The four "passive" sentences that were tested are listed next: *Zhè táng kè tīng-de wǒ húlihútu* 'I listened to the class, and as a result, I was confused', *Shǔjià fàng-de wǒ bù xiǎng kaīxué* 'I had a summer vacation, and as a result, I did not feel like going to school', *Zhè dùn fàn chī-de wǒ bù kāixīn* 'I had the meal, and as a result, I was unhappy', and *Zhè diànyǐng kàn-de wǒ hěn gāoxìng* 'I watched the movie, and as a result, I was pleased'. The results for the first sentence i.e. sentence (10), are provided here for discussion. The informants were, again, invited to divide these sentences into three chunks, the following results obtained:

(12) This CL class listen-DE I/me confused

a. Zhè táng kè | tīng-de **wǒ** | húlihútu. – 35
b. Zhè táng kè | tīng-de| **wǒ** húlihútu. – 4
c. Zhè táng kè tīng-de | **wǒ** | húlihútu. – 4

'I listened to the class, and as a result, I was confused.'

The preferred way of chunking again supports the ternary-branching analysis given as (10a) over the small-clause analysis given as (10b). While thirty-five informants chose to group the intervening NP with P1, four of them grouped it with P2. The results given in (12c) are not in favor of either one of the analyses.

The results for the other three passive sentences were similar. Although there was a small minority of informants that chunked the sentence in a manner that contradicts the ternary-branching analysis, it was usually the case, however, that a large majority of informants chunked the sentence in a manner that supports it.

The conclusion so far is therefore that as long as the intervening NP is an argument of P1 (regardless of its relation with P2), a ternary-branching analysis in which the intervening NP is a dependent of P1 should be pursued.

4.3 Argument of P2 only

The feature of the third type of VDC is that the intervening NP is selected by P2 only. Unlike subject control VDCs, the hierarchy of which is predictable, the structure of this group of VDCs is hard to predict for two reasons:

1. The arguments for the two competing analysis both seem well-motivated (e.g., Huang, 1988; Sun, 2005);

2. The diagnostics used in the literature, e.g., the pause test and *ya* insertion, sometimes yield inconsistent results.

By collecting informant responses to chunking tasks, it has become possible to shed light on this group of VDCs. A pilot test containing a couple of sentences was conducted first. Based on the results obtained, a ternary-branching analysis is preferable for sentences that can survive *bǎ* and *bèi* tests, whereas for those sentences that do not allow the insertion of *bǎ* and *bèi*, a small-clause analysis seems more plausible. These matters are illustrated with the following examples:

(13) (from Yafei Li, 1999, p. 459; translation mine)

a. Tāmen chàng-de **wǒ** bù xiǎng kàn shū.
They sing-DE I not want read book
'They sang, and as a result, I did not feel like reading.'
他们唱得我不想看书。

b. Tāmen **bǎ wǒ** chàng-de bù xiǎng kàn shū.
They BA me sing-DE not want read book
'They sang, and as a result, I did not feel like reading.'
他们把我唱得不想看书。

c. **Wǒ bèi** tāmen chàng-de bù xiǎng kàn shū.
I/me BEI they sing-DE not want read book
'I did not not feel like reading because they sang.'
我被他们唱得不想看书。

(14) (adapted from Sun 2005: 141)

a. Zhè háizi zhǎng-de **wǒ** dōu bú rènshi le.
This child grow-DE I even not recognize LE
'The child has grown so much that I did not even recognize him.'
这孩子长得我都不认识了。

b.*Zhè háizi **bǎ wǒ** zhǎng-de dōu bú rènshi le.
This child BA I grow-DE even not recognize
Intended: 'The child has grown so much that I did not even recognize him.'
*这孩子把我长得都不认识了。

c.* **Wǒ bèi** zhè háizi zhǎng-de dōu bú rènshi le.
I BEI this child grow-DE even not recognize
Intended: 'I did not even recognize the child because he has grown so much.'
*我被这孩子长得都不认识了。

Sentence (13) and sentence (14) both contain an intervening NP that is semantically selected just by P2: in (13) the verb *chàng* 'sing' is used intransitively; in (14) *zhǎng* 'grow' is an intransitive verb. As illustrated in (13b) and (13c), *Tāmen chàng-de wǒ bù xiǎng kàn-shū* can be transformed into *bǎ* and *bèi* constructions. Sentence (14), however, failed to form the corresponding *bǎ* and *bèi* constructions, as in (14b) and (14c). Their chunking results are listed as follows:

(15) (=sentence (13))

They sing-DE I not want read book

a. Tāmen | chàng-de **wǒ** | bù xiǎng kàn shū.–24
b. Tāmen chàng-de **wǒ** | bù xiǎng | kàn shū –1
c. Tāmen |chàng-de| **wǒ** bù xiǎng kàn shū.–9
d. Tāmen chàng-de |**wǒ** bù xiǎng| kàn shū.–2
e. Tāmen chàng-de |**wǒ** bù xiǎng kàn| shū. –1
f. Tāmen chàng-de | **wǒ** | bù xiǎng kàn shū. –6

'They sang, and as a result, I did not feel like reading.'

(16) (=sentence (14))

This child grow-DE I EM not recognize LE

a. Zhè háizi |zhǎng-de| **wǒ** dōu bú rènshi le. –30
b. Zhè háizi |zhǎng-de **wǒ** | dōu bú rènshi le. –1
c. Zhè háizi zhǎng-de| **wǒ** dōu| bú rènshi le. –7
d. Zhè háizi zhǎng-de| **wǒ** | dōu bú rènshi le. –5

'The child has grown so much that I did not even recognize him.'

While the chunking results for sentence (13), a sentence that can be transformed into the *bǎ* and *bèi* constructions, suggest a ternary-branching analysis, the results in (16) imply that for sentences like (14) that cannot survive the *bǎ* and *bèi* diagnostics, a small-clause analysis should be pursued.

To test this observation, more sentences of the two types sketched above were tested. Sentences that can form corresponding *bǎ* and *bèi* constructions include *Wǒ pǎo-de xiédaì dōu diào le* 'I ran to the extent that even my shoelaces got loose', *Tāmen bèng-de fángzi dōu kāishǐ huàng le* 'They jumped to the extent that the house has started to shake' and *Tāmen chàng-de wǒ yilián sān-tiān dōu bù xiǎng kàn shū* 'They sang, and as a result, I did not feel like reading for three days in a row' (adapted from (13)). Sentences that failed the *bǎ* and *bèi* diagnostics were *Zhè yì qiú tī-de guānzhòng liánshēng jiàohǎo* 'The kick ['goal'] was so good that the audience broke into loud cheers' (from Sun, 2005, p. 141) and *Zhè wénzhāng xiě-de shéi yě kàn bù dǒng* 'The article is written in such a way that no one can understand' (adapted from Zhu, 1982, p. 135).

Chunking results for the sentences that failed the *bǎ* and *bèi* tests were consistent with the small-clause analysis. Take *Zhè wénzhāng xiě-de shéi yě kàn bù dǒng* as an example; the following results obtained (*Zhè wénzhāng* 'this article' is abbreviated as NP1)

(17) NP1 write-DE who also see not understand

a. NP1 | xiě-de | **shéi** yě kàn bù dǒng. –31
b. NP1 | xiě-de **shéi** yě | kàn bù dǒng. –1
c. NP1 xiě-de | **shéi** | yě kàn bù dǒng. –3
d. NP1 xiě-de | **shéi** yě | kàn bù dǒng. –8

'This article is written in such a way that no one can understand'

The fact that a significant majority of participants, 31 of them, chose to group the intervening NP with P2 to the exclusion of P1 implies that NP2 is a dependent of P2. Results obtained for the other sentence containing an intervening NP that fail the *bǎ* and *bèi* tests were similar, i.e. supportive of the small-clause analysis.

Results for the other subgroup of sentences that survived the *bǎ* and *bèi* diagnostics, however, were unexpected. For instance, the results for *Wǒ pǎo-de xiédaì dōu diào le* 'I ran to the extent that even my shoelaces got loose' were as follows:

(18) (=sentence (2))

I run-DE shoelaces EM loosen LE

a. Wǒ | pǎo-de| **xiédaì** dōu diào le. –18
b. Wǒ | pǎo-de **xiédaì** | dōu diào le. –5
c. Wǒ pǎo-de **xiédaì** | dōu | diào le. –1
d. Wǒ pǎo-de | **xiédaì** | dōu diào le. –16
e. Wǒ pǎo-de | **xiédaì** dōu | diào le. –3

'I ran to the extent that even my shoelaces got loose'

While 18 participants grouped NP2 together with P2, only five grouped it together with P1. Note that results shown in (18d) are not in favor of either analysis (because *xiédaì* 'shoelace' is grouped neither with P1 nor with P2). The result for *Tāmen bèng-de fángzi dōu kāishǐ huàng le* 'They jumped to the extent that the house has started to shake' were similar, i.e. in favor of the small-clause analysis in which the intervening NP is a dependent of P2 rather than of P1. The chunking results for the sentence with an animate NP support the ternary-branching analysis, however.

The contradictory results for this type of VDC are accommodated in terms of a semantic property of the intervening NP (NP2): (in)animacy.[5] The success of the *bǎ* and *bèi* tests suggests that NP2 can be interpreted as an entity that is disposed of or affected by the matrix predicate P1, even though P1 is intransitive. When NP2 is animate, it is more accessible to P1 allowing P1 to influence its, i.e. NP2's, relationship with P2. When NP2 is inanimate, however, despite the success of the *bǎ* and *bèi* diagnostics, its semantic property prevents P1 from establishing a syntactic relation with it.

The conclusion is therefore that when the intervening NP is an argument of P2 only, a flexible structural analysis should be pursued. When a VDC can survive the *bǎ* and *bèi* tests and has an animate NP2, a ternary-branching

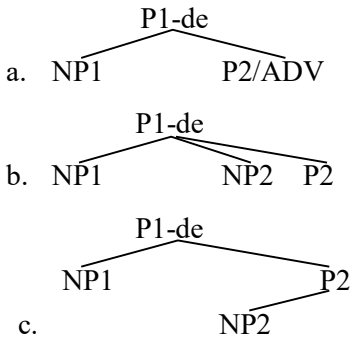
[5] One may object that this difference is not caused by a property of NP2, but rather by the features of predicates. For example, two of the tested VDCs with an inanimate NP2 (in favor of a small-clause analysis) both had an intransitive P1, i.e. *bèng* 'jump' and *pǎo* 'run'. Two other examples with an animate NP2, on the other hand, had an unergative P1, i.e. *chàng* 'sing'. To test this, one V-*de* sentence containing the same intransitive P1 *bèng* 'jump' and the same animate NP2 *wǒ* 'I/me' was chunked by 20 informants. The results were supportive of the stance assumed here, namely that the (in)animacy of NP2 is the decisive factor: More informants chose to chunk NP2 with P1 this time, consistent with the results obtained for the VDCs that has an animate NP2 but a different P1.

analysis is warranted; otherwise, i.e. when it survives the *bǎ* and *bèi* tests but has an inanimate NP2 or when it fails the tests, a small-clause analysis is preferred.

5 Summary and conclusion

This study has assigned dependency structures to the descriptive and resultative V-*de* constructions (VDCs) in Mandarin Chinese. The focus has been on the status of the intervening NP (NP2) between the two predicates. The analyses arrived at above are visualized with the following syntactic diagrams:

(19)



Tree (19a) shows that when there is no intervening NP in the construction, P2 is viewed as a direct dependent of the first predicate (P1), in accordance with the *Secondary Predication hypothesis* (e.g., Huang, 1988). In addition to predicates (verbs and predicative adjectives), some adverbials can also appear in the position of P2, expressing a high degree of the action or event denoted by P1 (see footnote 1).

The structure becomes much more complicated when an NP intervenes between P1 and P2. As shown in (19b) and (19c), there are two possible dependency analyses concerning this matter. The structure in (19b) demonstrates the ternary-branching analysis in which NP2 is a dependent of P1, and (19c) shows the small-clause analysis in which NP2 is a dependent of P2. Based on chunking results collected from native speakers of Chinese, the account above proposed a flexible analysis for VDCs with an intervening NP, whereby the actual structure assignment is determined by predicate-argument relationships, results of the *bǎ* and *bèi* tests and a semantic property of NP2 ((in)animacy).

According to the predicate-argument structures that NP2 forms with P1 and P2, VDCs are divided into three groups:

1. The intervening NP is an argument of P1 only (e.g., (6), (8));

2. The intervening NP is an argument of both P1 and P2 (e.g., (4), (9), (10)), and;

3. The intervening NP is an argument of P2 only (e.g., (2), (13), (14), (17)).

For the first two types, a ternary-branching analysis should be preferred. For the last type, however, some flexibility of analysis is necessary to accommodate all the data.

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References

Emily Bender. 2000. The syntax of Mandarin *bă* : reconsidering the verbal analysis. *Journal of East Asia Linguistics*, volume 9 (2), 105-145.

Yuen Ren Chao. 1965. *A Grammar of Spoken Chinese.* Oakland, California: University of California Press.

Shengshu Ding. 1961. *Xiàndài hànyǔ yǔfǎ jiǎnghuà [Lectures on the Modern Chinese Grammar].* Beijing: The Commercial Press.

Xiao Fan. 1993. Fù dòng V-de jù [The verb-copying V-de construction]. *Yǔyán jiàoxué yǔ yánjiū [Language Teaching and Linguistic Studies]* 4, 57-74.

Zhiwei Feng. 1983. Tesnière de cóngshǔ guānxī yǔfǎ [The dependency grammar of Tesnière]. *Dāngdài yǔyánxué [Contemporary Linguistics]* 1, 63-65.

Zhiwei Feng. 1998. Cóngshǔ guānxī yǔfǎ duì jīqì fānyì yánjiū de zuòyòng [The role dependency grammar plays in machine translation research]. *Wàiyǔ xuékn [Foreign Language Research]* 1, 18-21.

Zhiwei Feng. 2008. Zìrán yǔyán chǔlǐ de lìshǐ yǔ xiànzhuàng [The past and present of natural language processing]. *Zhōngguó wàiyǔ [Foreign Languages in China]* 1, 14-22.

Chaim Gaifman. 1965. Dependency systems and phrase-structure systems. *Information and Control* 8, 304-337.

Grant Goodall. 1986. On argument Structure and L-marking with Mandarin Chinese *Ba*. *Proceedings of NELS17*, volume1, 232-242.

Jules Gouguet. 2006. Adverbials and Mandarin argument structure. *Empirical Issues in Syntax and Semantics* 6, 155-173.

David Hays. 1964. Dependency theory: A formalism and some observations. *Language* 40, 511–525.

James Huang. 1988. *Wǒ pǎo de kuài* and Chinese phrase structure. *Language* 2, 274-311.

James Huang, Yen-hui Audrey Li, and Yafei Li. 2009. *The Syntax of Chinese.* Cambridge: Cambridge University Press.

Richard Hudson. 2007. *Language Networks: The New Word Grammar*. Oxford: Oxford University Press.

Jinyang Jiang and Haitao Liu. 2015. The effects of sentence length on dependency distance, dependency direction and the implications–based on a parallel English–Chinese dependency treebank. *Language Sciences* 50*,* 93-104.

Sylvain Kahane. 1996. If HPSG were a dependency grammar… *Actes de TALN*, Marseille, 22–24, 45–49.

Chao Li. 2015. On the V-DE construction in mandarin Chinese. *Lingua Sinica* 1: 6, 1-40.

Linding Li. 1986. *Xiàndài hànyǔ jùxíng [The Modern Chinese Constructions]*. Beijing: The Commercial Press.

Jinxi Li. 2000/1924. *Xīnzhù guóyǔ wénfǎ [The Grammar of Mandarin Chinese: New Edition]*. Beijing: The Commercial Press.

Yafei Li. 1999. Cross-componential Causativity. *Natural Language & Linguistic Theory* 17 (3), 445-497.

Yen-hui Audrey Li. 1990. *Oder and Constituency in Mandarin Chinese*. Dordrecht: Kluwer Academic Publishers, 41-59.

James Chaoping Liang. 1971. *Prepositions, Co-verbs or Verbs? A Commentary on Chinese Grammar Past and Present.* PhD dissertation, University of Michigan, Ann Arbor.

Tao Lin. 2011/1957. Xiàndài hànyǔ bǔzúyǔ lǐ de qīngyīn xiànxiàng [Grammatical and semantic issues revealed by phonetic reductions in modern Chinese complements], *Journal of Peking University* 03, 61-74.

Haitao Liu. 1997. Yīcún yǔfǎ hé jīqì fānyì [Dependency grammar and machine translation]. *Yǔyán wénzì yìngyòng [Applied Linguistics]* 3, 91-95.

Haitao Liu. 2008. Dependency distance as a metric of language comprehension difficulty. *Journal of Cognitive Science* 2, 159-191.

Jian Kang Loar. 2011. *Chinese Syntactic Grammar.* New York: Peter Lang.

Igor Mel'čuk and Nikolai Pertsov. 1987. *Surface Syntax of English: A Formal Model with the Meaning-Text Framework*. Amsterdam: Benjamins.

Timothy Osborne and Shudong Ma. 2015. A DG account of the descriptive and resultative de-constructions in Chinese. *Depling 2015*, 261-270.

Jane Robinson. 1970. Dependency structures and transformational rules. *Language* 46, 259–285.

Yang Shen. 1997. Míngcí duǎnyǔ de duōchóng yíwèi xíngshì jí bǎ zì jù de gòuzào guòchéng yǔ yǔyì jiěshì [Formation process of *bǎ*-constructions and its semantic interpretation] *Zhōngguó yǔwén [Studies of the Chinese Language]* 6*,* 402-414.

Yinxin Sun. 2005. Tóngxíngyìgòu de "NS + V + 'de' + NP + VP" jù [Four structures of the "NS + V + 'de' + NP + VP"]. *Lìyún yǔyán xuékān [Academic Journal of Liyun (Language Volume)]* 1, 125-159.

Lucien Tesnière. 2015/1959. *Elements of structural syntax* (translated by Timothy Osborne and Sylvain Kahane). Amsterdam & Philadelphia: John Benjamins.

Li Wang. 1985. *Zhōngguó xiàndài yǔfǎ [China Modern Grammar]*. Beijing: The Commercial Press.

Fengsheng Xue. 1987. Shì lùn bǎ zì jù de yǔyì tèxìng [Study on the semantic features of bǎ-constructions]. *Yǔyán jiàoxué yǔ yánjiū [Language Teaching and Linguistic Studies]* 1, 4-22.

Yufeng Zhang. 2006. *Xiàndài hànyǔ jùzi yánjiū [Research on Modern Chinese Sentences]*. Shanghai: Xuelin Press.

Dexi Zhu. 1982. *Yǔfǎ jiǎngyì [Lectures on Grammar]*. Beijing: The Commercial Press.