Reanalysis of semantically required dependents as complements in the Chinese *ba*-construction

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Proceedings of the 18th International Conference on
Head-Driven Phrase Structure Grammar

University of Washington

Stefan Müller (Editor)

2011

Stanford, CA: CSLI Publications

pages 147–166

Lipenkova, Janna. 2011. Reanalysis of semantically required dependents as complements in the Chinese *ba*-construction. In Stefan Müller (ed.), *Proceedings of the 18th International Conference on Head-Driven Phrase Structure Grammar, University of Washington*, 147–166. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2011.9.

Abstract

This paper aims at a formulation of semantic constraints on the productivity of the *bǎ*-construction and their representation at the syntax-semantics interface. It builds on the observation that requirements on the surface form of the construction may be altered by the choice of the verb. I propose that the semantics of the *bǎ*-construction can be treated in terms of a scalar constraint: a *bǎ*-sentence must come with a scale and a difference value that holds of the described event. The satisfaction of this constraint largely relies on the lexical semantics of the sentence. Not all verbs are inherently associated with scalar relations; those that are not must combine with an additional dependent which satisfies the scale requirement. Due to the obligatory presence of the additional dependent for some verbs, it is reanalyzed as a complement of *bǎ*: being optional on their level of combination with the verb, it becomes obligatory once the verb is used in the *bǎ*-construction.

1 Introduction

In theoretical linguistics, the *bǎ*-construction has been approached mainly from the syntactic perspective: a large number of accounts focus on the issue of the syntactic status of *bǎ* and naturally relate to the syntactic structure of *bǎ*-sentences. However, given the rather restricted syntactic flexibility of *bǎ*-sentences, the actual challenge seems to stem from semantics and usage; the construction is rather uncooperative when it comes to establishing a common semantic core, and still more if we try to find analogous phenomena in other languages. As Li (2001) puts it, "vagueness and uncertainty are in the nature of the constraints on this construction". In this paper, I attempt to formulate a semantics that, though at a rather schematic level, provides an interface at which these constraints can be accommodated. I take the semantics of the lexical instantiation as starting point and show that it interacts with requirements on the surface form of the construction. Specifically, I argue that the *bǎ*-construction can be analyzed in terms of a scalar relation which requires the saturation of a degree argument. The source of the scale and the degree argument is underspecified: they can stem from the verb, from the theme argument or from the whole event. Thus, verbs which do not lexicalize a scale must combine with an additional scale-contributing element. The syntactic structure of the *bǎ*-construction naturally follows if we want to capture this constraint.

The paper is organized as follows: in Section 2, I describe the basic properties of the *bǎ*-construction along with a short survey of previous studies and a delimitation of the scope of my analysis. In Section 3, I give a more detailed description of the considered problem, namely the variation of behavior for different verb classes in the *bǎ*-construction. In Section 4, I introduce the relevant notions of scalar semantics and show how they can be used to characterize the semantics of the *bǎ*-construction. Finally, in Section 5, I propose a syntactic analysis which allows to incorporate this semantic constraint and captures its interaction with the surface form of the construction.

2 The *bǎ*-construction: basic facts

In its canonical form, the *bǎ*-construction is formed from an SVO sentence by preposing the object into the preverbal position, where it is marked by *bǎ*:

(1) a. SVO word order:
Tā chī le píngguǒ.
he eat PFV apple
'He ate apples.'

b. *bǎ*-construction:
Tā bǎ píngguǒ chī le.
he BA apple eat PFV
'He ate the apple(s).'

This move mainly impacts on the referential properties of the object NP. Thus, whereas the object is underspecified with respect to definiteness or specificity in (1a), it obligatorily receives a definite or specific interpretation in (1b); in the above example, this also leads to a telic interpretation of the event. Furthermore, the preverbal position presupposes contextual givenness of the object NP. The increased prominence of the object NP has led authors to an explanation of the construction in information-structural terms. Tsao (1986) recognizes that the *bǎ*-NP fulfills most of the conditions on topic NPs; a treatment as topic or secondary topic is also proposed in Bender (2000), Hsueh (1989), Ding (2000) and Li (2001).

Diachronically, *bǎ* has been grammaticalized from a verb with the meaning "hold, manipulate". At present, the part of speech of *bǎ* is not identified. Its behavior and the constraints on the construction are used to argue for analyses as verb (Hashimoto, 1971; Bender, 2000), light verb (Huang et al., 2009), preposition (Chao, 1968; Travis, 1984; Cheng, 1998; Li, 1990), case marker (Huang, 1982; Koopman, 1984; Goodall, 1986) and functional head (Zou, 1993; Sybesma, 1999). The part of speech issue is beyond the scope of the analysis proposed here; nevertheless, we will find that *bǎ* has to be analyzed as a head if we want to capture the semantic constraints and obtain an appropriate representation of the syntax-semantics interface. With respect to the previous proposals, my analysis structurally relates to the light verb account in Huang et al. (2009).

Semantically, the discussion around the construction is centered around two issues, namely the variety of possible argument distributions and a set of interacting and vague productivity constraints. The presented analysis targets the latter problem; yet, as my formulation of the constraints will be largely independent from argument structure, the proposal is also apt to an extension to other subtypes of the construction.

Subtypes of the *bǎ*-construction can be characterized in terms of argument structure. The pattern presented so far ([Subj *bǎ* Obj V]) is the "canonical" form; the following examples show some other possible argument distributions:

(2) a. *Causative*:

Zhè jiàn shì bǎ tā kū-lèi le.
this cl affair BA he cry-tired.RESULT PFV

'This affair made him cry to the extent of becoming tired.'

b. *Theme subject*:

Zhè píng jiǔ bǎ tā hē-zuǐ le.
this bottle wine BA he drink-drunk PFV

'This bottle of wine made him drink to the extent of getting drunk.'

c. *Additional "retained" object*:

Tā bǎ júzi bō le pí.
he BA orange peel PFV skin

'He peeled the skin off the orange.'

A comprehensive account faces the choice between positing multiple lexical entries for *bǎ* and identifying common properties of the different forms which would ideally provide sufficient and necessary conditions for all types in an underspecified representation.

The second problem turns around formulating constraints on the productivity of the *bǎ*-construction: not every SVO sentence has a *bǎ*-counterpart. For example, the choice of the verb may yield a contrast in grammaticality:

(3) Tā bǎ píngguǒ chī / *zhǎo / *xiǎng le.
he BA apple eat / *look.for / *think PFV
'He ate / *looked for / *thought about the apple(s).'

Multiple levels have been exploited for the formulation of constraints: in terms of lexical semantics and event structure, it has been found by and largely acknowledged thereafter that the *bǎ*-construction typically expresses disposal (Wang; check Syb), affectedness (Tenny, 1987; Hashimoto, 1971), causation (Sybesma, 1999) and high transitivity (Hopper and Thompson, 1980). Aspectually, the event described by the *bǎ*-construction must be temporally bounded (Liu, 1997; Rhys, 1996; Tenny, 1987). With respect to nominal reference, the *bǎ*-NP must be marked or interpretable as definite, specific or generic (Bender, 2000; Liu, 1997; Hashimoto, 1971), which in turn interacts with aspectual boundedness. Finally, a constraint has been posited with respect to the observation that the verbal domain of *bǎ* must contain further elements besides the main verb:

(4) **Verbal complement constraint** (henceforth VCC): the *bǎ*-construction cannot be formed with a bare verb; the verb must combine with an additional element:

*[. . .[bǎ NP V]]

The following illustrates:

(5) a. Ta bǎ píngguǒ chī *(le).
he BA apple eat PFV
'He ate the apple(s).'

b. Ta bǎ wǒ qì-*(sǐ le).
he BA me annoy-dead.RESULT PFV
'He annoyed me to death. '

Again, accounts focussing on different levels have led to different justifications of this constraint. Li and Thompson (1981) come up with a semantic explanation: "the reason that *bǎ*-sentences always have verbs with those elements (adverbs and postverbal elements) preceding or following them is that such elements serve to elaborate the nature of disposal." (Li and Thompson 1981, p. 489) Structurally, the VCC has been given syntactic and prosodic explanations. Li (1990) claims that the number of elements in postverbal position in Chinese is confined to one.[1] Prosodically, Feng (2001) claims that the *bǎ*-construction cannot be formed with a bare monosyllabic verb; this constraint seems to hold for the considered data (stipulation).

In the following section, I will proceed to a reexamination and differentiation of the VCC and conclude that the proposed structural explanations are insufficient: prosody and syntax cannot save sentences which do not satisfy the semantic constraints of the construction. The primary motivation seems to be semantic, in that additional information must be specified about the event, which leads to a potential requirement of extra lexical material.

3 Problems with the VCC

The VCC was first stated by Lü (1995), who also proposes a detailed classification of the 18 possible additional dependents to the verb. Less differentiated versions have been proposed by Sybesma (1999), Liu (1997) and Li (2001). For instance, Li states that the required additional element can be one of the following:

[1]This claim undergenerates under a surface-oriented view of syntax: certain combinations of dependents are indeed possible in postverbal position, as shown in the following examples:

(i) a. double object:
Tā sòng Lǐsī huā.
he offer Lisi flower
'He offered Lisi flowers.'

b. direct object + locative complement:
Tā fàng huā zài zhuōzi shàng.
he put flower LOC table on
'He put the flowers on the table.'

Various strategies have been proposed to reanalyze multiple dependents in postverbal position as one single complement in order to maintain the above hypothesis, e. g. Sybesma (1999); Li (1990).

1. Resultative complement
2. Adverb of duration, frequency or manner
3. Verb reduplication, indicating short duration
4. "Outer" object: NP whose referent stands in a part-whole or inalienable possession relation to the *bǎ*-NP
5. Aspect marker: perfective *le*, durative *zhe*

This list contains adjunct-like dependents, complements and grammatical markers. Along with other existing expositions of the VCC, it suffers from an insufficient differentiation of the set of possible types of dependents. On the one hand, the categories seem to be rather disparate to allow for a generalization: grammatical aspect markers are mixed with lexical dependents, such as adverbs of degree and frequency, result complements etc. These two classes of elements are to be distinguished here: as will be shown, verbs that can be used with lexical dependents in the *bǎ*-construction may become unacceptable once the lexical dependent is replaced with a simple aspect marker. On the other hand, the list does not differentiate between optional dependents and elements that can actually make a grammaticality contrast. In the following, I focus on those kinds of lexical dependents that can trigger contrasts in acceptability.

The structural explanations of the VCC capture the tendency for *bǎ*-sentences to be formed with informationally and prosodically "heavy" predicates. In the following, we will see that verbs differ in their requirements of additional dependents; thus, the "heaviness" criterion apparently relates not to the quantity of lexical material, but rather follows from the requirement of specific semantic components that license the construction.

First, we find verbs which are acceptable in the *bǎ*-construction in bare[2] form:

(6) a. Incremental theme verbs:
Tā bǎ píngguǒ chī le.
he BA apple eat PFV
'He ate the apple(s).'

b. Achievements:
Zhāngsān bǎ zhè jiàn shì wàng le.
Zhangsan BA this CL affair forget PFV
'Zhangsan forgot about this affair.'

c. Some verbs of physical impingement (following Beavers: semelfactives):

[2]I use "bare form" to refer to VPs which may contain aspect markers, but no additional lexical dependents.

Zhāngsān bǎ gǒu dǎ le.
Zhangsan BA dog hit PFV
'Zhangsan hit the dog.'

Second, we find verbs which are not acceptable in bare form; however, they can be used in the *bǎ*-construction in combination with specific, semantically constrained types of dependents. This class contains verbs of perception, cognition and directed movement, as well as psych verbs and degree achievements derived from open scale adjectives:

(7) a. V + manner adverb modified for degree:
Zhāngsān bǎ zhè shì xiǎng *(de tài bēiguān).
Zhangsan BA this affair think DE too pessimistic
'Zhangsan thinks too pessimistically about this affair.'

b. V + punctualizer:
Tā bǎ gǒu kàn le *(yī yǎn).
he BA dog look PFV one eye
'He caught a glimpse of the dog.'

c. V + resultative complement:
Zhāngsān bǎ Mǎkè fán-*(sǐ) le.
Zhangsan BA Mark annoy-dead.RES PFV
'Zhangsan annoyed Mark to death.'

d. V + goal argument:
Āmíng bǎ zìxíngchē qí *(huí jiā) le.
he ba bike ride back home PFV
'He rode the bike back home.'

e. V + source argument:
Wáng lǎoshi bǎ shǒu líkāi le *(ménba).
Wang teacher ba hand leave PFV door
'Teacher Wang took his hand from the door handle.'

f. V + directional complement:
Āmíng bǎ qián yìng le *(huí-lái).
Aming BA money win PFV back-come
'Aming "won the money back".'

As shown in the examples, the following kinds of dependents can make a grammaticality contrast:

- Resultative complements
- Expressions indicating short duration (punctuality) of the event

- Degree modifier + manner adverb
- Source/goal arguments

Finally, we have a class of verbs which do not occur in the construction; this class mainly contains stative verbs (8) and a small set of verbs that are classified as verbs of "social interaction" by Levin (1993) (9):

(8) a. * Zhāngsān bǎ Mǎlì xǐhuān le (XP).
Zhangsan BA Mary like PFV
'Zhangsan liked Mary.'

b. * Zhāngsān bǎ Mǎkè xiàng (XP).
Zhangsan BA Mark resemble
'Zhangsan resembles Mark.'

(9) a. * Āmíng bǎ qiúsài cānjiā le (XP).
Aming BA ball game participate PFV
'Aming participated in the ball game.'

b. * Wǒ bǎ nà ge xuéxiào bǎifàng le (XP).
I BA this CL school visit PFV
'I visited that school.'

Descriptively, we observe that the acceptability of verbs in the *bǎ*-construction decreases with the degree of semantic transitivity in the sense of Hopper and Thompson (1980) and Tsunoda (1985); this leads us back to the long-standing characterization of the *bǎ*-construction in terms of high transitivity. However, we do not have at hand an operative notion of semantic transitivity which would allow for a neat classification of verbs according to transitivity degrees. The transitivity classification by Tsunoda is based on observations about the crosslinguistic acceptability of verbs in transitive case patterns. Hopper and Thompson identify ten sublexical semantic components that make a predicate more or less transitive; they propose that the transitivity degree be determined based on the number of transitivity features in a given predicate. However, on the one hand, their characterization heavily relies on the referential properties of the NP arguments in a sentence, which is not a relevant criterion for the above data. On the other hand, comparing counts of disparate primitive components seems not to be a formally reliable criterion, as the features and feature combinations cannot be weighted and evaluated against each other.

In the following, I propose a treatment of the semantics of the *bǎ*-construction in terms of scalarity. Scales and measure functions have been used for the analysis of affectedness and variable telicity phenomena; they allow for a uniform representation of different classes of verbs that accommodates shared abstract features such as extents, endpoints, degrees etc.

4 The semantics

In this section, I first introduce the basic distinctions on scales that will be relevant for the analysis. Then, I show how scales have been used for the analysis of events and, specifically, of changes of state; the formalization mainly follows Kennedy and McNally (2005), Kennedy (2010) and Beavers (2011). Finally, I show how the semantics of the *bă*-construction can be captured by a scalar constraint.

4.1 Scales

In the following, I adopt the formalization of scales proposed in Beavers (2011): scales are series of states of type $< d, < e, t >>$, where d is the type of degrees. Each state "tells" us that a property obtains of an individual to a certain degree. The degrees stand in an isomorphic relation with the numbers between 0 and 1. Three distinctions on scales are relevant:

1. open vs. closed scales
2. binary vs. multi-valued scales
3. scales with fixed vs. context-dependent standard values.

Scales can be open or closed; closed scales have edge values that define the minimal or maximal possible degrees to which a property can be possessed; these values correspond to 0 or 1. Open scales do not have such values; they have degrees that approach 0 or 1. However, there are no unique degrees that are lower or higher than all other degrees in the set. A scale may be open in one direction and closed in the other; thus, we get the following four possibilities:

- open scale, e. g. *long*: s_1 : long$(x)(d_1) \oplus \ldots \oplus s_n$: long$(x)(d_n)$
- totally closed scale, e. g. *full*: s_1 : full$(x)(0) \oplus \ldots \oplus s_n$: full$(x)(1)$
- lower-closed scale, e. g. *awake*: s_1 : awake$(x)(0) \oplus \ldots \oplus s_n$: awake$(x)(d_n)$
- upper-closed scale, e. g. *straight*: s_1 : straight$(x)(d_1) \oplus \ldots \oplus s_n$: straight$(x)(1)$

Scales can be binary or multi-valued; the distinction roughly parallels the distinction between gradable and non-gradable adjectives in English. It can be captured by Krifka's formulation of atomic, simplex and complex structures (Krifka, 1998):

- Points on scales are atoms:
  $\forall x(atom(x) \leftrightarrow \neg\exists y(y <_X x))$
- Binary scales are simplex objects that consist of two parts (endpoints):
  $\forall x(simplex(x) \leftrightarrow \exists y, z(y \oplus_X z = x \ \wedge \ atom(y) \ \wedge \ atom(z)))$

- Multi-valued scales are complex objects, consisting of three parts (endpoints plus middle):
  $\forall x(complex(x) \leftrightarrow \exists y(y <_X x \ \wedge \ simplex(y) \ \wedge \ atom(z)))$

In a given use, a scalar expression is evaluated against a standard value on the associated scale. Standard values may be context-dependent or fixed. Context-dependent standards are computed based on a comparison class which consists of objects similar to the one described by the argument of the scalar predicate:

(10) Mark is a **tall** basketball player. ($\rightarrow$ *Mark is taller than basketball players usually are.*)

A fixed standard corresponds to an absolute value on the scale which is independent of the denotation of the argument; it may relate to the minimal or maximal value of a predicate:

(11) a. *maximum standard*:
#The paper is complete, I just have to write the conclusion.
b. *minimum standard*:
#The shirt is not dirty, there is just some mud on it.

The distinction between fixed and context-dependent standards correlates with the open/closed scale criterion. Kennedy and McNally (2005) make the following generalizations: open scales have context-dependent standards, whereas closed scales have fixed standards by default. The default standard of a closed-scale adjective is associated with the minimal value if the scale is lower-bound, and with the maximal value if the scale is upper-bound or bound at both ends:

(12) a. *lower-bound scale + minimum standard*:
#The spot is not visible, but I can see a bit of it.
b. *upper-bound scale + maximum standard*:
#The paper is complete, I just have to write the conclusion

4.2 The analysis of scalar expressions

As already observed by Sapir (1944) and Bolinger (1972), the categories of scalarity and grading are not restricted to adjectives; verbs, nouns and prepositions may also denote scalar relations. This section describes the semantics of nouns, verbs and adverbs formed from gradable adjectives; they are analyzed via measure functions taking objects and returning the degrees to which a property holds of the arguments. A distinction is made between static scalar properties and properties that change over time. If a change happens, the relation must be additionally parametrized for times or be tied to an event argument.

Each scalar predicate comes with a degree argument d that must be saturated by additional semantic material specifying degrees/measures. This material can be

overt, as for example with degree morphology for adjectives. It can also be covert: in this case, d is instantiated by a default standard or via existential boundedness.

Static measure functions apply to adjectives, Kimian states and nominal predicates. These expressions have the following form:

(13) $[\![P]\!] = \lambda d \lambda x.m_P(x) \geq d$

The measure function m_P is lexically defined by the predicate. Thus, for a stative predicate like *resemble John*, we get the following representation:

(14) $[\![\text{resemble John}]\!] = \lambda d \lambda x.\text{resemble}(\text{John})(x) \geq d$

In the sentence *Mark resembles John*, the degree argument is not overtly saturated; the following covert operator is applied by default and yields the positive form:

(15) $[\![pos]\!] = \lambda P \lambda x \exists d.\text{stnd}(d)(P)(\mathbf{C}) \ \wedge \ P(x) = d$

The function 'stnd' outputs a default degree d which is above the degree to which resembling applies to the comparison class **C** which contains individuals that are judged "similar" to the arguments of the predicate wrt the scalar property. The representation of our sentence is as follows:

(16) $[\![\text{[Mark resembles John]}]\!] = \exists d.\text{stnd}(d)(\text{resemble}(\text{john}))(\mathbf{C}) \wedge \text{resemble}(\text{john})(\text{mark}) = d$

Similarly, when the predicate is combined with degree morphology, the overt degree modifier saturates the degree argument:

(17) $[\![\text{ resemble John closely}]\!] = \lambda x.\text{resemble}(\text{john})(x) \geq \text{closely}$

In the case of nominal predicates, the degree corresponds to the quantity or size of the referent:

(18) $[\![\text{ apples}]\!] = \lambda d \lambda x.\text{apples}(x) \wedge \text{NU}(\text{apples})(x) \ \geq \ d$

"Apples" takes a referent x and returns d, which corresponds to the quantity of apples represented by the referent. The function NU ("natural units") returns an appropriate measure (Krifka, 1989). For instance, apples are naturally measured by pieces, water by liters etc.

If no quantity measure is specified, the default options for the degree argument of nominal predicates are "1" or existential boundedness. *Apples* then yields the following interpretation:

(19) $[\![\text{ apples }]\!] = \lambda x \exists d.\text{apples}(x) \wedge \ \text{NU}(\text{apples})(x) \ \geq \ 0$

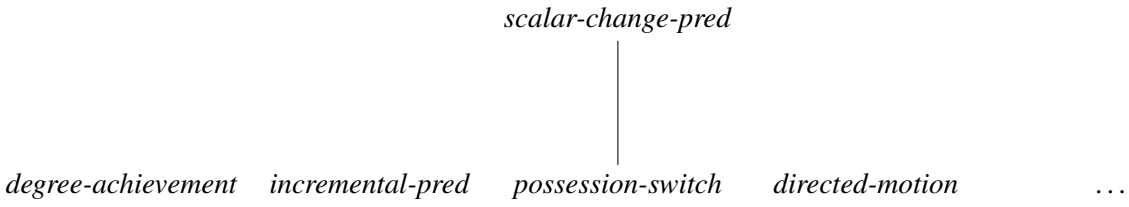
The degree argument may be instantiated via overt lexical material, e. g. by measure phrases:

(20) $[\![\text{ half an apple }]\!] = \lambda x.\text{apples}(x) \wedge \text{NU}(\text{apples})(x) = 0,5$

Events and measures of change We have seen how a static measure function returns the absolute degree to which an object possesses the property denoted by a scalar predicate. In the following, I will show how the function can be parametrized for times in order to represent changes in the degree to which an object possesses a property. Changes are conceptualized as events; the measure of change function $m_{\triangle}$ takes an object and an event and returns the difference between the degrees of the property on the object at the beginning and the end of the event:

(21) $[\![scalar\text{-}change\text{-}pred]\!] = \lambda d \lambda x \lambda e.m_{\triangle}(x)(e) \geq d$

Different types of change predicates have different types of degrees and sources of the scale; the type $scalar\text{-}change\text{-}pred$ is further differentiated in the lexicon:



The measure of change may stem from the verb or from its arguments. Degree achievements, which are built from gradable adjectives, lexicalize a measure of change function:

(22) $[\![degree\text{-}achievement]\!] = \lambda x \lambda d \exists e.\text{TH}(e) = x \ \wedge \ m_{\triangle}(x)(e) = d$

(23) $[\![$ warm the soup 5 degrees $]\!] = \exists e.\text{TH}(e) =$soup $\wedge$ warm$_{\triangle}$(soup)$(e) =$ 5 degrees

The degree achievement verb combines with a theme argument; it outputs the degree to which the theme referent changes with respect to 'warmness'.

Incremental theme verbs do not lexicalize measures of change; their measure of change is contributed by the theme argument. We have seen that nominal predicates are associated with measure functions; once a nominal fills the theme argument position of an incremental theme verb, its measure function is converted into a measure of change function:

(24) $[\![$eat half of the apple$]\!] = \lambda x \exists e.eat(e) \wedge \text{TH}(e) = x \wedge$ apple$(x) \wedge \text{NU}_{\triangle}$(apple)$(x)(e) = -0.5$

The verb takes a theme argument whose referent has the 'apples' property. The function $\text{NU}_{\triangle}$ returns the natural measure for objects of sort 'apples' and outputs the degree to which the quantity of the object changes along this measure.

Verbs of change of possession come with a binary measure function; the degree corresponds to 1 for acquisition and to -1 for loss of possession. The function is defined for the recipient/former possessor:

(25) $[\![receive]\!] = \lambda d \lambda x \lambda y \exists e.\text{EXP}(e) = x \wedge \text{TH}(e) = y \wedge \text{possess}_{\triangle}(y)(x)(e) = 1$

(26) $[\![loose]\!] = \lambda d \lambda x \lambda y \exists e.\text{EXP}(e) = x \wedge \text{possess}_{\triangle}(y)(x)(e) = -1$

4.3 The *bǎ*-construction: scale and difference value

In this section, I describe the semantics of the lexical entry for *bǎ* and show how it captures the variation in behavior for different classes.

4.3.1 Lexical entry for *bǎ*

I posit the following semantic constraint for *ba*:

(27) $[\![ba]\!] = \lambda e \lambda s \lambda d. \ldots scale(s)(e) \ \wedge \ extent(s)(d)(e)$

Bǎ requires an event argument e, a scale s that is associated with this event and a difference value d on this scale.

In the following sentence, *ba* is licensed by a possession switch:

(28) Lǎowáng bǎ zìxíngchē diū le.
Laowang BA bike loose PFV
'Laowang lost the bike.'

The scale is the closed, binary scale of possession:

(29) possession $= s1 : have'(x)(\text{Laowang})(0) \oplus s2 : have'(x)(\text{Laowang})(1)$

The constraint of *ba* is satisfied as follows:

(30) $\exists e. \ldots scale'(\text{possession})(e) \ \wedge \ extent'(\text{possession})(-1)(e)$

If the verb is not of the appropriate type, it must combine with additional elements in order to satisfy the semantic requirement. The additional elements must contribute a scale; this scale, however, is not necessarily a scale of change. This creates an apparent asymmetry: bare verbs in the *bǎ*-construction have to contribute scales of change, whereas combinations of verbs with additional dependents can have both static and dynamic scales. The asymmetry is resolved by the requirement of an event argument: we find that only verbs of change have an event argument; "static" scalar verbs, e. g. emotion verbs, do not contribute an event argument and are thus disallowed.

The following example shows a resultative complement which licenses a scale:

(31) Āmíng bǎ zìxíngchē qí-huài le.
Aming BA bike ride-broken.RES PFV
'Aming rode the bike and as a result it broke.'

The scale is a lower-bound multi-valued scale:

(32) $s_{broken} = broken'(\text{bike})(0) \oplus broken'(\text{bike})(d_{min}) \oplus \ldots$

The semantic requirement of *bǎ* is satisfied as follows:

(33) $\exists e. \ldots scale'(\text{broken})(e) \ \wedge \ extent'(\text{broken})(+d_{min})(e)$

In the following example, the use of *ba* is licensed by a manner adverb modified for degree:

(34) Āmíng bǎ zhè shì xiǎng de tài bēiguān.
Aming BA this affair think DE too pessimistic
'Aming thinks too pessimistically about this affair.'

The scale is an open multi-valued scale:

(35) $s_{pessimistic} = \ldots \oplus pessimistic'(P)(d_{accept.}) \ \oplus \ \ldots \ \oplus$
$pessimistic'(P)(d_{too}) \ \oplus \ \ldots$

Under the canonical treatment of the degree modifier *too* as referring to a degree that is higher above some contextually acceptable degree, the difference value is defined by two degrees, namely the acceptable and the actual degree. Thus, the difference value is existentially bound:

(36) $\exists e. \ldots scale'(\text{pessimistic})(e) \wedge extent'(\text{pessimistic})(\text{diff}(d_{accept.})(d_{too}))(e)$

Instantiation of the difference value The instantiation of the difference value required by *ba* is dependent on the open vs. closed property of the scale. In the case of an open scale (e. g. *pessimistically*), the difference value must be overtly specified. For closed scales, overt specification is optional:

(37) Ta bǎ píngguǒ chī le (bàn ge).
he BA apple eat PFV half CL
'He ate (half of) the apple.'

Default interpretations arise if the difference value is not overtly specified: for upper-closed scales, we get an interpretation of total traversal (-> $\forall$). Lower-closed scales are interpreted via existential boundedness: a state on the scale obtains that has a higher degree than the initial state with degree 0.

Excluded verb classes The presented account automatically excludes Kimian statives (emotion, knowledge verbs) from appearing in the *bǎ*-construction. Stative verbs do not introduce an event argument, which also makes them inaccessible for scalar manner adverbs[3] and other licensing dependents.

Besides statives, verbs of social interaction (e. g. *visit, participate*) are also not acceptable in the construction; it is not clear which semantic features make these verbs different from the large class of verbs that are allowed in the *bǎ*-construction. Obviously, the verbs come with event arguments. A possible explanation could be that these verbs describe closed, conventionalized events which do not allow to accommodate scalar relations in the sense of the *bǎ*-construction. Thus, similarly to statives, these verbs, if at all, are modifiable by manner adverbs in restricted ways, and it is not clear whether the manner adverbs modify the event denoted by the verb or subevents that are associated with this event.

5 The syntax-semantics interface

5.1 Arguments for *bǎ* as head

As shown in Section 2, the syntactic status of *bǎ* is a matter of discussion. The following analysis aims at modelling a transparent syntax-semantics interface which captures the interaction between the two levels. *Without going into syntactic details Some arguments are still in place to explain my view of the category of* bǎ. I view *bǎ* as the head of its clause; this option has been adopted in some previous accounts: Zou (1993) analyzes *bǎ* as a functional head. Sybesma (1999) starts out with causative sentences ([CAUSER bǎ CAUSEE V], cf. (2a)), in which *bǎ* acts as an argument-selecting head; he extends this analysis to "canonical" *ba*-sentences and claims that *bǎ* always heads a causative projection[4]. Bender (2000) analyzes *bǎ* as verbal head selecting for a subject, an object and a verbal complement; semantically, *bǎ* determines the topic-comment packaging of the sentence. My arguments for *bǎ* as head are partly linguistic and partly stem from analytical ease. First, the head status is in accord with diachronic facts: in Ancient Chinese, *bǎ* was a lexical verb denoting physical manipulation and thus a head in earlier stages of development of the language. As illustrated in (2), there are still instances of the construction in which *bǎ* acts as a causative head. Second, we have seen that the *bǎ*-construction is associated with a number of constraints that may alter its surface form depending on the choice of the verb. An analysis of *bǎ* as head of NP (preposition or case marker) would run into difficulties when expressing the co-occurrence restrictions between verbs, *bǎ*-marked NPs and potentially required

[3] Some stative verbs apparently combine with manner adverbs (e. g. *love passionately, resemble closely*). However, these manner adverbs are interpreted rather as degree modifiers than as "true" manner adverbs (Katz, 2003); besides, they modify not the state itself, but rather associated events that are recovered by coercion.

[4] It is not clear what contributes the causative semantics in *bǎ*-constructions which do not describe causative events. ...

additional verbal dependents. Finally, we have seen that the *bǎ*-construction can be used with different argument distributions (2); in some of the forms, *bǎ* selects arguments (e. g. causatives) or creates additional argument positions (e. g. retained objects).

5.2 Type constraint and complement attraction

I focus on the canonical argument distribution of the *bǎ*-construction. In this argument distribution, the use of *bǎ* does not make an additional contribution to the event structure of the sentence. Of course, this is not to say that *bǎ* has no semantic import: it impacts on the referential properties of the *ba*-NP and on the overall information packaging of the sentence and changes. Information packaging is not considered here; the switch in referential properties is relevant inasmuch as it changes the event structure of the sentence, eventually yielding a reading of telicity, "holistic" affectedness etc.

Thus, abstracting from referential and information-structural properties, *bǎ* seems to be a vacuous head that does not contribute relations of its own. The semantic constraint for *ba* is as follows:

(38)
$$\begin{bmatrix} \textsc{phon} \langle ba \rangle \\ \textsc{subcat} \left\langle \ldots \left[\textsc{content} \mid \textsc{rels} \langle \ldots \boxed{1} \textit{scale-rel} \ldots \rangle \right] \ldots \right\rangle \end{bmatrix}$$

The satisfaction of the semantic constraint hinges on the composition of the SUBCAT list of *bǎ*. I use the complement attraction mechanism proposed initially by Hinrichs and Nakazawa (1989) and largely adopted in analyses of verbal complexes and complex predicates. *Ba* is a head that selects for a verbal complement and attracts the arguments of the verb; the index of *bǎ* is identified with the index of the verb, restricting the range of possible verbs to verbs contributing event arguments:

(39)
$$\begin{bmatrix} \textsc{phon} \langle ba \rangle \\ \textsc{subcat} \boxed{0} \oplus \left\langle \textsc{v} \begin{bmatrix} \textsc{arg-st} \boxed{0} \langle \textsc{np}, \textsc{np} \rangle \\ \textsc{content} \mid \textsc{index} \boxed{3} \textit{event} \end{bmatrix} \right\rangle \\ \textsc{content} \mid \textsc{index} \boxed{3} \end{bmatrix}$$

Here, if the verb already is a scalar-change predicate, it contributes a scale relation that licenses the use of *ba*.

5.3 Satisfying the semantic constraint

We have seen how *bǎ* attracts the semantic arguments of the verb and realizes them in syntax. In the following, I will use a similar approach for additional dependents of the verb which will allow them to satisfy the semantic requirement of *bǎ*.

The proposed feature architecture relates to the adjuncts-as-complements approach, which targets the observation that adjuncts and complements should receive a unified treatment for certain phenomena (e. g. case assignment: Przepiórkowski

(1997), extraction: Bouma et al. (2001), diachronic adjunct-to-complement change: Bender and Flickinger (1999)). Bouma et al. assume three levels for the representation of dependency relations. Besides distinguishing between gaps and locally realized dependents, the more differentiated architecture formalizes two kinds of relationships between head and dependent:

- Selection: the head combines with a dependent in order to achieve well-formedness.
- Dependency: the head does not select for the element. It is optional and may be attached to the head in a given projection.

The following three levels of combinatorial representation are stated:

- DEPS: all dependents incl. gaps
- VAL: all locally realized dependents (excl. gaps)
- ARG-ST: only selected (required) elements

The correlations between the three features are shown in the following:

(40) $$\textit{verb} \rightarrow \begin{bmatrix} \text{ARG-ST } \boxed{1} \\ \text{DEPS } \boxed{1} \oplus \boxed{2}\textit{list(adjuncts)} \\ \text{SUBCAT } (\boxed{1} \end{bmatrix}$$

In the *bǎ*-construction, inherently optional dependents of the verb may become obligatory once the verb is used with *bǎ*: if the *bǎ*-construction is instantiated with non-scalar verbs, additional dependents are required that fulfill the semantic requirements of *bǎ*. These dependents are normally not selected by the verb. Thus, a straightforward solution would be to code them on the DEPS value of the verb, thereby keeping their status as lexically optional dependents. The DEPS value of the verb is then inherited onto the ARG-ST value of *bǎ*, which renders the dependents necessary for the well-formedness of the sentence:

(41) $$\begin{bmatrix} \text{PHON} \langle \textit{ba} \rangle \\ \text{SUBCAT } \boxed{0} \oplus \left\langle \text{V} \begin{bmatrix} \text{HEAD } \boxed{5} \\ \text{DEPS } \boxed{0} \left\langle \ldots \begin{bmatrix} \text{MOD} \mid \text{HEAD } \boxed{5} \\ \text{CONT} \mid \text{KEY } \boxed{1} \end{bmatrix} \right\rangle \\ \text{KEY } \textit{non-scalar-change-pred} \end{bmatrix} \right\rangle \\ \text{CONTENT} \mid \text{RELS} \langle \ldots \boxed{1}\textit{scale-rel} \ldots \rangle \end{bmatrix}$$

The following structure shows the analysis of example (7a), repeated here as (42):

(42) Zhāngsān bǎ zhè shì xiǎng *(de tài bēiguān).
Zhangsan BA this affair think DE too pessimistic
'Zhangsan thinks too pessimistically about this affair.'

(43)
$$\left[\begin{array}{l}\textsc{phon}\left\langle ba\right\rangle \\ \textsc{subcat}\ \boxed{0}\oplus\left\langle \textsc{v}\left[\begin{array}{l}\textsc{head}\ \boxed{5}\\ \textsc{deps}\ \boxed{0}\left\langle \ldots\left[\begin{array}{l}\textsc{mod}\mid\textsc{head}\ \boxed{5}\\ \textsc{content}\left[\textsc{key}\ \boxed{1}\ \textit{pessimistic}\right]\end{array}\right]\ldots\right\rangle\\ \textsc{content}\mid\textsc{key}\ \textit{think-rel}\end{array}\right]\right\rangle \\ \textsc{content}\left[\begin{array}{l}\textsc{index}\ \boxed{3}\\ \textsc{rels}\left\langle \ldots\boxed{1}\ldots\right\rangle\end{array}\right]\end{array}\right]$$

6 Conclusions

We have seen that the *bǎ*-construction has an event structure that cannot be exhaustively captured in terms of aspectual properties or the often used criterion of affectedness. I have proposed an account of the semantics in terms of a scalar constraint; such an analysis is more flexible in that it allows for different scalar properties (manner scales, temporal changes, paths) to license the *bǎ*-construction. The different acceptability conditions for verbs and the potential requirement of additional dependents on the verb naturally follow from the constraint.

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