Ba and *Bei* as Multi-Valence Prepositions in Chinese - An LFG Perspective

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Abstract

This paper studies the syntactic properties of two Chinese function words *ba* and *bei* from a *Lexical-Functional Grammar* (LFG) perspective. It is proposed that they be identified as *multi-valence prepositions* or *co-verbs* that share the argument-taking characteristic of verbs and play the role of *syntactic head* (*vs. semantic head*) in organizing a sentence and determining the unexpressed grammatical functions (GFs) in a post-*ba/bei* XCOMP. The grammatical mechanism *conditional functional control* (CFC), extended from *functional control* (FC) in classic LFG, is developed for *ba/bei* constructions and the CFC rules are accordingly formulated. It is shown that FC not only lies in a control word's lexical properties but also observes *grammatical context*. Causativization and passivization by *ba* and *bei*, respectively, are unified into FC as special cases of their lexical properties. Previous treatments of *bei* with no OBJ as verbal prefix is also criticized in the discussion of anaphoric control in *bei* constructions. The LFG analysis of *ba* and *bei* is highly extendable to many other Chinese function words and can significantly facilitate Chinese sentence parsing.

1 Introduction

There are many Chinese function words, like *ba, jiang, bei, rang, you, gei, jiao*, etc., whose syntactic properties, and even their category label, appear rather controversial. Most Chinese linguists have traditionally classified them as simple *prepositions* that take only an NP as object, just like the English ones, e.g., *by* and *to*; a few have classified them as *verbs*, e.g., Hashimoto (1971), Ma (1985), Her (1990) and Kit (1992), with heavy emphasis on their verb-like behavior; some have simply labeled them as *co-verbs*, e.g., Rao (1960, 1988), Chao (1968), but paid very little attention to their argument-taking characteristics. Many more important linguistic principles underlying these function words seem not to have been thoroughly discussed in previous studies. Also deserving of investigation are such matters as their *valency* or *subcategorization* and other related grammatical mechanisms, e.g., functional control (FC).

It is proposed in Kit (1993a) to refer to them as *multi-valence prepositions* or *co-verbs*[1], in order to highlight their distinct grammatical properties from both verbs and *single-valence* (or *simple*) *prepositions* and to respect their capacity in organizing a whole sentence, e.g., as in *ba/bei* constructions. Treating them as verbs appears too radical and is not further maintained in Kit (1993a), since they never qualify to function alone as the main verb (or predicate) in a sentence,

[1] Note that we emphasize their multi-valency or subcategorization while using the term *co-verb* interchangeably with *multi-valence preposition*.

although like verbs they possess the categorial features [*predicative* +] and [*transitive* +] (see Bresnan 1977, 1982). The **existence** of multi-valence prepositions in Chinese has been observed to be *one of the most important features distinguishing the Chinese language from other languages.*

This paper focuses on the basic syntactic properties of two typical function words in Chinese, i.e., *ba* and *bei*, basically following classic *Lexical-functional Grammar* (LFG) theory (Kaplan and Bresnan 1982, Bresnan 1982, Bresnan and Kanerva 1989). Within this approach, multi-valence and single-valence prepositions are not confused simply they share the semantic inability to denote an action. Rather, we differentiate between them in term of their distinct grammatical properties, in particular, their subcategorizations: a simple preposition, whose function is said to introduce an NP, subcategorizes only for an OBJ; in contrast, however, a multi-valence preposition subcategorizes not only for an OBJ but also for a SUBJ and an XCOMP (Kit 1993a), just like a transitive verb. This differentiation properly respects the fact that the second type of prepositions bear the categorial feature [*predicative* +]. Their multi-valency, which is very similar to that of verbs, has led some linguists to intuitively label them as co-verbs or verbs, e.g., Ding (1953), Rao (1960), Hashimoto (1971), etc. Insufficient investigation, however, has been made into their subcategorization and their lexical capacities in *functional control* (FC).

FC is an important feature distinguishing multi-valence prepositions from single-valence ones as well as from verbs. It is a critical **observation** underlying the theme of this paper that in a *ba/bei* construction it is the preposition, rather than a concrete verb in the follow-up VP, that takes charge of organizing the grammatical structure of the whole sentence. FC of a multi-valence preposition is not different, in principle, from that of a control verb. How they differ is in the complexity of FC. Therefore, some conceptual extensions of basic notions in control theory are introduced in this paper. For example, it is a common point, both in LFG and GB (Chomsky 1981), that only a subject can be controlled. However, we have observed from Chinese data that not only the SUBJ but also an OBJ can be a controllee in a FC relation in many *ba/bei* constructions. Such control is determined by the sentence-organizer, i.e., *ba* or *bei* in our case, with respect to the configuration of the sentence, particularly and most importantly, with respect to the expressed and unexpressed grammatical functions (GFs) in the post-*ba/bei* XCOMP. This XCOMP usually leaves at least one GF unexpressed.

Kit (1993a) proposes to introduce the grammatical mechanism *conditional functional control* (CFC) to approach, computationally, such complicated functional coreference relations. It is extended from the original notion of *functional control* (FC), which by the way also appeared to be rather conditional in its formulation in classic LFG (Bresnan 1982). The main idea is that the functional coreferential relations depend not only on the lexical properties of a control word, e.g., *ba* or *bei* in our case, but also on the grammatical context where the control word appears. Whether FC by a verb also observes grammatical context is beyond the scope of this paper, but control theories in mainstream linguistics, such as in GB (Chomsky 1981, Huang 1987, 1989, 1991), LFG (Bresnan 1982, Mohanan 1983, Her 1990, Tan 1991) and HPSG (Pollard and Sag 1987, 1992), from the most part seem to assume it doesn't. Nor can an object be controlled either. What I propose here apparently diverges from the mainstream on these two points, in that we assume an unexpressed OBJ is in principle determinable, at least in a computational sense, by a syntactic head (either a control verb or co-verb) according to the grammatical context.

In the next sections, I will first give a brief review of previous studies on *ba/bei* and examine the syntactic patterns of *ba/bei* constructions, and then turn to characterize their syntactic properties from the LFG perspective, with an emphasis on CFC. It is a commonplace in Chinese linguistics that *ba* is linked with causativization and *bei* with passivization. Thus they are usually referred to as causative and passive markers, respectively, as shown in Teng (1975), Li and Thompson (1981), Zhu (1982), Li (1984, 1986) and Li (1990), and many others. However, within the more generalized approach here, *causativization and passivization are not considered to be their intrinsic* *syntactic properties but only the outcome of their CFC.* In discussion of *anaphoric control* in *bei* constructions, I will also give some straightforward evidence to counter the arguments for treating *bei* with no OBJ as a *verbal prefix*, e.g., in Li (1990) and Tan (1991).

2 Previous studies

For quite some time that Chinese linguists have been arguing over the perplexing properties of *ba*, *bei*, and other prepositions. Traditional Chinese linguists concluded that they both function, syntactically alike, to introduce an NP: *ba* introduces a patient-object NP preceding a (usually) transitive main verb and accordingly results in a causativization; whereas *bei* introduces an NP as an agent-actor of the main verb and therefore plays the role of a passive marker. The amusing parallelism between Chinese *bei*-phrase[2] and English *by*-phrase seems to have trivialized their difference (e.g., *bei* precedes but *by* follows the main verb) and also, even worse, concealed the significant underlying principles.

Arguments against this 'consensus' view of traditional Chinese linguistics began in the 1940's, e.g., in Chao (1948) and Gao (1948). They proposed that *ba*, *bei* and many other function words should be distinguished from prepositions and labeled as *ci-dongci* (*semi-* or *sub-verbs*, literally), based on the fact that they evolved from verbs and still possess certain meanings and properties as verbs. In the 1950's, others, e.g., Lu and Zhu (1951) and Ding (1953), grouped them together with prepositions but, interestingly, referred to them as *fu-dongci* (*semi-verbs*, literally). Wang (1955) also maintained the distinction between prepositions and vice-verbs like *ba, bei, jiao, rang*, etc. Soon after Zhang (1956), however, it became the dominant view in Chinese linguistics that they should be regarded as just simple prepositions. Although a few scholars insisted that they be *co-verbs*, e.g., Rao (1960, 1988) and Chao (1968), their main concern was with the labeling and enumeration of syntactic patterns rather than with consideration for their valency or subcategorization, not to mention other grammatical mechanisms.

The earliest comprehensive study on *ba* is Lu (1948), which enumerates a large number of *ba* constructions and classifies them into several patterns. Lu's paper initiated many subsequent studies on both *ba* and *bei*. The most representative analysis of these function words as simple prepositions can be found in Zhu (1982). Zhu summarizes three points about *ba* (1982:178-179, 185-189): (1) it functions to introduce a *patient* for a follow-up verb or VP, including complementary VP and verb-object constructions; (2) it is unlikely that *ba* moves a post-verbal object into a pre-verbal position; (3) what follows *ba* is always a **patient**-subject clause, therefore *ba* is closely related to clauses of this type. Zhu also mentions a number of *ba* constructions in which a post-*ba* NP is not the patient[3] of the post-*ba* verbs, e.g., sentences (1) and (5) below, and simply declares that in such cases, the post-*ba* VP is an **agent**[4]-subject clause. This obviously leads to confusion about the relation between the post-*ba* NP and VP, as well as to inconsistency in *ba*'s syntactic properties. Rather, it is argued here that *ba* should have **homogeneous** properties with **common** principles underlying possible variants of *ba* constructions.

As for *bei*, Zhu's (1982:178-179) conclusions are: (1) as a preposition, *bei* introduces an agent-actor NP, and its equivalents, such as *jiao, rang, gei*, etc., function similarly; (2) the object of *bei* is the agent of the action in post-*bei* VP, whereas its patient shows up in the subject position of

[2] Note that the term *bei*-phrase is used only if *bei* is analyzed as a single-valence preposition, as in Li (1990) and Tan (1991). There is no corresponding *bei*-phrase in our approach, since it is treated as having multi-valence.

[3] Note that *patient* in Zhu's term is only associated with transitive verb. It is not a term interchangeable with *theme* as in contemporary linguistics.

[4] Note that the *agent*-subject NPs following Zhu's terminology in some sample sentences, e.g., (1) and (2.a), are usually known, subtlely though, as *theme* in contemporary terms. Others, e.g., the post-*ba* NPs in (5), are neither agent nor patient/theme, but other semantic roles.

the sentence; (3) if the post-*bei* VP contains a patient-object, the subject of the sentence becomes its **indirect** or **generalized patient**; (4) if *bei* takes no object, it is because the agent of the action is unknown or unnecessary to mention; and lastly; (5) Zhu treats the *bei* constructions with an intransitive verb in post-*bei* VP as special cases and points out their grammatical similarity to pivotal constructions except for the fact that function words such as *bei, rang* or *gei* do not have any concrete lexical meanings as do pre-pivotal verbs.

Obviously, there is a conflict between (1) and (4) above: if *bei* functions to introduce an NP, *why does it always appear preceding the major verb even when there is no NP to introduce*? In such cases, it loses all the properties of a preposition in the conventional sense[5]. Furthermore, even when *bei* takes an NP, it is still unclear what grammatical role the NP plays within the sentence, in particular, its grammatical relation with post-*bei* VP. Is it the SUBJ in the VP?

In contrast to Zhu, Li (1980, 1986) argues that *bei* does not simply introduce an **agent** NP but serves 'to form a passive sentence and usually put a **patient** NP in a sentence-initial position' (1986:221-222). That is, *bei* is a passive marker, which looks extremely like a *postposition*[6]. However, no matter whether you label it as preposition, passive marker or even postposition, the following problems remain. (1) A pre-*bei* NP is not always the patient of a post-*bei* verb if the verb (a) is intransitive - this seems to have been overlooked in Li (1986), or (b) has already had an object NP as patient. Notice that labeling it as 'indirect or generalized patient' leads to neither a grammatical solution nor a reasonable explanation. (2) What grammatical role does the object of *bei* play within a sentence? Is a Chinese *bei*-phrase grammatically equivalent to a English *by*-phrase? (3) What is the inherent grammatical relationship between the pre-*bei* NP, *bei* itself, the post-*bei* NP and VP? By which grammatical mechanism does *bei*'s object NP also become the subject of the post-*bei* verb? In order to approach the underlying principles for these questions, we not only need resort to a proper theoretical framework, e.g. LFG, to unify all these various patterns of *ba* and *bei* constructions, but also we need to bear in mind **the basic assumption that *ba* and *bei* in all syntactic patterns should bear consistent grammatical properties.**

A number of observations suggest that such consistency is to be found in their verb-like argument-taking characteristics. In the early 1950's, Ding (1953:119) first classified them into *jianyu-dongci* (pre-pivotal verbs) but refers to them as *co-verbs* (or *sub-verbs*) in order to indicate that they are semantically different from normal verbs. Chao (1968:126) also admits that many function words, like *ba, bei, rang*, etc., are in fact pre-pivotal verbs, although he, interestingly, ends up treating them just as simple prepositions (for simplicity, perhaps). Rao (1960, 1988) lists a number of co-verbs in several classes and attempts to specify their syntactic properties in a traditional framework. Gong (1988) observes that the *ba* construction is a special case of pivotal constructions with the degenerative verb *ba* as pre-pivotal verb. However, while all these studies appear to be headed in the right direction, they still suffer from the inadequate computational power of their linguistic models owing to their failure to account for the subcategorization of these words and the coreferential relations between GFs.

A noticeable treatment of *bei* as a main verb in early transformational analysis is Hashimoto (1971). Teng's (1975) account of *bei* as a passive particle, rather than a preposition or verb, is also in the transformational framework. But both do not pay much attention to *bei*'s multi-valency, the most important syntactic property to distinguish it from both simple prepositions and authentic verbs.

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[5] The fact that *bei* introduces no object but still shows up may suggest that it is a *postposition* rather than a *preposition*. This may be argued on the ground that it always adheres to the subject NP indicating it as the patient of a successive verb. See also next note.

[6] Li's argument apparently implies that *bei* is somehow a *postposition*. But this doesn't make sense for two reasons: first, it is well-known Chinese has no postpositions but directional/locative nouns (*fangwei-ci*); second, if it were, how about its equivalents *rang, you, gei*, etc., which bear certain modal meaning? It is unlikely that there is only one postposition in a language.

Within LFG framework, there are two opposing viewpoints. Ma (1985) and Her (1990) argue for *bei* being a matrix verb (just like a pre-pivotal verb) that subcategorizes for a SUBJ, an OBJ and an XCOMP, where (XCOMP SUBJ) is controlled by the OBJ of *bei*. Kit (1992, 1993a) is also in this camp. In contrast, Tan (1991), following Shi (1987)[7] and Li (1990), treats *bei* simply as a single-valence preposition and the corresponding *bei*-phrase as an adjunct to the main verb, with highlight on its parallelism to English *by*-phrase. In this paper, I share Ma and Her's view on *bei*'s subcategorization, but regard the FC mechanism they proposed as being oversimplified. Moreover, their assertion that *bei* is a verb is not convincing in the semantic aspect. Tan's treatment appears inadequate in providing a reasonable explanation for the functional coreference relation between the OBJ of *bei* and a missing SUBJ in the post-*bei* XCOMP.

In this paper, I hope to remedy the weakness of previous studies and further develop a more comprehensive model within LFG framework for *ba* and *bei* as well as for other Chinese multi-valence prepositions. The work will be based on numerous sample sentences of variant syntactic patterns and will, more importantly, observe the **basic assumption** that *ba* and *bei* bear consistent grammatical properties in all syntactic patterns.

3 Syntactic patterns

3.1 Patterns of *ba* construction

There are several equivalents to *ba*, e.g., *jiang*. A *ba* construction usually takes the syntactic pattern [NP_1 *ba/jiang* NP_2 VP], where NP_2 cannot be empty even on the surface. The post-*ba* VPs fall into various types, in terms of their syntactic configurations.

3.1.1 Pattern 1: post-*ba* VP $\Rightarrow$ V_i + complement(s)

As shown in (1), it is obvious that the object of *ba* in this pattern is the potential subject of the post-*ba* verb *zou* (walk). This is realized by FC (see later sections). Notice that only a limited number of intransitive verbs can show up in this pattern. Many sentences previously cited by others as belonging to this pattern, in fact, involve transitive verbs, e.g., those in (2).

(1) *Zhe duan lu ba wo* zou lei le.
(This CL road BA me walk tire ASP)
Walking over this road made me exhausted.

(2) a. *Wangmian ba fuqin* si le.
(Wangmian BA father die ASP)
Wangmian lost his father.

b. *Ni ba zhi ji* gei pao le?
(You BA CL chicken AUX run-away ASP)
Did you lose a chicken (because it ran away)?

c. **Wo ba zhe duan lu* zou lei le.
(I BA this CL road walk tire ASP)
**Walking over this road made me exhausted.*

The fact that the verbs *si* (die) and *pao* (run) are transitive is shown in (3). In comparison with (3.a), *si* in (3.b) obviously takes an OBJ, though an aspect *le* seems also indispensable. So is *pao* in

[7] I don't have direct access to Shi (1987), but follow Tan (1991) and Li (1990) to attribute this viewpoint to Shi.

(3.c). In contrast, the ungrammaticality of (2.c) shows that *zou* in (1) is truly intransitive, though it can be transitive within other contexts.

(3) a. *Wangmian* si *le.*
(Wangmian die ASP)
Wangmian died.

b. *Wangmian* si *le* *fuqin.*
(Wangmian die ASP father)
Wangmian lost his father.

c. *Ni* pao *le* *zhi* *ji?*
(You run-away ASP CL chicken)
Did you lose a chicken (because it ran away)?

3.1.2 Pattern 2: post-*ba* VP $\Rightarrow$ V_t + ϕ(NP) + {complement(s)}

(4) a. *Ta* *ba* *beizi* dapo ϕ le.
(He BA cup break ASP)
He broke the cup.

b. *Wo* *ba* *ta* qing ϕ lai le.
(I BA he invite come ASP)
I had him come by my invitation/request.

This is the typical pattern for the *ba* construction that is usually cited to exemplify *ba*'s causativization effect. We can see that the OBJ of *ba*, e.g., *beizi* (cup) and *ta* (he/him) above, coincides with the unexpressed OBJ of the post-*ba* verb, e.g, *dapo* (invite) and *qing* (invite), respectively, and also to the SUBJ of another VP complement (e.g., *lai le* in (4.b)) within the post-*ba* VP. Actually, such causativization is just a special case of *ba*'s FC, as shown in the next sections.

3.1.3 Pattern 3: post-*ba* VP $\Rightarrow$ V_t + NP

(5) a. *Tamen* *ba* *qiangkou* duizhun diren.
(They BA muzzle aim at enemy)
They aimed their guns at the enemy.

b. *Ta* *ba* *beizi* dapo le gai'er.
(He BA cup break ASP lid)
He broke the lid of the cup.

In these examples, the post-*ba* verbs have an OBJ, so they do not take over the OBJ of *ba* as their OBJ by FC. That is, causativization doesn't take place in this pattern. It shows that causativization is only one case of *ba*'s inherent properties. The syntactic relation between post-*ba* OBJ and the VP appears very complicated (see next sections).

3.1.4 Pattern 4: post-*ba* VP $\Rightarrow$ V_t + ϕ(NP) + PP

(6) a. *Ta* *ba* *beizi* fang ϕ zai zuozi shang.
(He BA cup put on table onside)
He put the cup on the table.

b. *Wo* *ba* *na* *ben* *shu* song ϕ gei Lisi le.
(I BA that CL book give to Lisi ASP)
I gave Lisi the book.

c.	*Wo*	*ba*	*na*	*ben*	*shu*	gei	Lisi	ϕ le.
	(I	BA	that	CL	book	give	Lisi	ASP)
	I gave Lisi the book.							

In this pattern, the PPs play the role of OBL_{th} in *f*-structure. The relation between post-*ba* OBJ and the VP is similar to that in pattern 2 above. (4.c) is closely related to (4.b). A ditransitive verb *gei* (give) is involved in the post-*ba* VP. Another pattern of the post-*ba* VP, though trivial, can be recognized from (4.c) as the following:

Pattern 5: post-*ba* VP $\Rightarrow$ V_t + NP + ϕ(NP)

3.2 Patterns of *bei* construction

Like *ba*, *bei* also has several equivalents, such as *gei, rang, you*, etc. The main pattern exhibited by *bei* constructions is [NP_1 *be/gei/rang/*...NP_2 VP], in which the NP_2 is optional in the surface configuration. The *bei* constructions can also be classified into several types in terms of the post-*bei* NPs.

3.2.1 Pattern 1: post-*bei* NP $\Rightarrow$ V_i + complement(s)

(7)	*Ni*	*bei*$^?$*/rang/gei*	*ta*	*paodiao*	*le?*
	(You	BEI/RANG/GEI	he	escape	ASP)
	Did you let him escape?				

In this pattern[8], the NP_2 (i.e., the object of *rang/gei/bei*) is obligatory even on the surface. The post-*bei* verb *paodiao* (run away) will take this NP as its potential subject.

3.2.2 Pattern 2: post-*bei* VP $\Rightarrow$ V_t + ϕ(NP) + {complements}

(8)	a.	*Ta*	*bei*	*jingcha*	daibu	ϕ	le.
		(He	BEI	policeman	arrest		ASP)
		He was arrested by the policemen.					
	b.	*Beizi*	*bei*	*ta*	*dapo*	ϕ	*le.*
		(Cup	BEI	he	break		ASP)
		The cup is broken by him.					

This pattern is most frequently cited by linguists to demonstrate the passivization effect of *bei*, i.e., to introduce an agent actor for the post-*bei* verb. Therefore *bei* is always compared with the English preposition *by* to show their 'similarity'. However, such passivization effect is not the intrinsic nature of *bei*, but just happens to be realized by its FC in this particular pattern. Otherwise, it is impossible to explain why *bei* still exists in pattern 4 below, where an 'agent actor' does not show up at all.

[8] It is pointed out that the *bei* here is somewhat marginal. Actually, native Chinese speakers from different areas or dialects have different intuition about its appropriateness. A *bei* in this pattern seems really bad to people from northern China, but to many people from the south, it is relatively acceptable. The exact counterpart of this sentence in Cantonese, as below, is entirely perfect.

Neih	*bei*	*kuih*	*jauhlat*	*zo*	*a?*	(in Yale Scheme)
(You	BEI	he	escape	ASP	Q)	
Did you let him escape?						

3.2.3 Pattern 3: post-*bei* VP $\Rightarrow$ V_t + NP

(9) a. *Ta bei renjia* tou le qianbao.
(He BEI others steal ASP wallet)
She 'had' her wallet stolen by somebody.

b. *Lisi bei dahuo* shao le fangzi.
(Lisi BEI big-fire burn ASP house)
Lisi 'had' his house burned by a big fire.

Notice that the *'had'*, corresponding to *bei* in the above translation, doesn't means 'to cause something to happen'. Rather, *bei* implies 'to suffer from what happened'.

In this pattern, the post-*bei* verb has a direct object, so the subject of the sentence can no longer be taken as its potential object, instead it becomes the maleficiary (or beneficiary) of the post-*bei* VP action, semantically. From this we can see that the subject of *bei* does not always become the potential object of a post-*bei* verb. **This is another very strong piece of evidence in favor of the position that *bei* is not a passive marker in Chinese, since the post-*bei* verb is not passivized.** From the GB point of view (Chomsky 1981; Jaeggli 1986), we can see that the external thematic role to its subject is not absorbed and the case (if any in Chinese) to its object is assigned as normal. Viewed from the LFG (Bresnan 1982; Bresnan and Kanerva 1989) perspective, the subject of the verb is not suppressed but just raised to the object position of *bei*. It is implausible in this case to argue for the position that the subject is suppressed once and then re-introduced back by the so-called *bei*-phrase as an adjunct, like the *by*-phrase in English. Because if this *bei*-phrase is taken as an adjunct, the pre-*bei* NP (e.g., *Ta* (he) in (9.a) and *Lisi* in (9.b)) will become the subject of the main verb. Although resulting in a rather odd meaning, this will, unexpectedly, still support the position that the subject of the post-*bei* verb is not suppressed.

3.2.4 Pattern 4: post-*bei* NP_2 $\Rightarrow$ ϕ(NP)

(10) a. *Ta bei ϕ daibu le.*
(He BEI arrest ASP)
He was arrested.

b. *Beizi bei ϕ dapo le.*
(Cup BEI break ASP)
The cup was broken.

c. *Ta bei ϕ tou le qianbao.*
(She BEI steal ASP wallet)
She 'had' her wallet stolen.

This pattern shows that *bei*'s OBJ is optional on the surface and that *bei* is still obligatory in the sentence even though there is no apparent 'agent actor' for it to introduce. That is, *bei*'s existence is not to introduce an NP but instead to organize the whole sentence, in the sense that, in contrast to OBJ, a SUBJ and a VP complement (i.e., XCOMP) are obligatory to *bei*.

3.3 Syntactic category

It is important in this study to answer whether *ba* and *bei* are verbs, co-verbs or prepositions. I would argue that *they are neither verbs nor simple prepositions*. Syntactically, they indeed share the argument-taking property of verb. But since they lack concrete semanticity, they are incapable of being a predicate for a sentence, i.e., semantically they are unqualified to be verbs. Although it is feasible and, more importantly, necessary to recognize their verb-like subcategorizations in syntactic analysis within LFG framework, they should not be classified as verbs, in order not to cause any confusion in the semantic component of LFG theory for Chinese, since the semantic interpretation of function words **with no predicate meaning** is in principle different from that of authentic verbs. Thus, following Kit (1993a), we refer to them as *multi-valence prepositions* or *co-verbs*, in order to distinguish them syntactically from simple prepositions and semantically from authentic verbs.

There are arguments against them being verbs. For example, Li (1990) lists several tests for Chinese verbs, e.g., a verb can (1) take an aspect like '*lai* le', (2) take V-not-V form like '*lai* bu *lai*', and (3) be a simple answer to a question. Although there are a few exceptions to (1) and (2), e.g., copula-like verbs do not take any aspect or V-not-V form, such as *'*renwei* (think, believe) le', *'*you* (have) bu *you*', these tests truly reveal a general syntactic divergence between most verbs and non-verbs in Chinese. The last one, equivalent to Zhu's (1982) argument that a verb should be capable of being a predicate, is crucially valid. Neither *ba* nor *bei* can pass any of these tests. It confirms our position that they are unqualified to be verbs. Ding (1953), Rao (1960, 1988) and Gong (1988), among many others, also repeatly show that they have departed from authentic verbs.

Within LFG, as discussed in Bresnan (1977, 1982), constituent structure categories should be classified (or defined) in terms of two categorical features, namely, *predicative* and *transitive*, which may be defined in terms of the functional primitives SUBJ and OBJ. The features and types of major categories assumed in LFG are quoted from Kaplan and Bresnan (1982:295) as below:

	predicative	*transitive*	
V	+	+	verbal
P	+/−	+	pre- or post-positional
N	+/−	−	nominal
A	+	−	adjectival
	−		sentential

Figure 1 Feature matrix of major categories in LFG

We can see that classifying *ba* and *bei* into multi-valence prepositions or co-verbs is in line with these criteria. Furthermore, we employ an extra one, namely, *semantic denotation*, to separate co-verbs with both [*predicative* +] and [*transitive* +] from authentic verbs with the same features. Not only does his treatment highlight these prepositions' verb-like properties, but also preserves the autonomy of syntax and semantics.

Along this line, for lexical encoding of the mapping between their argument structures and functional configurations, we assume that there are some remnant thematic roles beneath the GFs of such degenerative verbs. These remnant roles are invisible before their coinciding with the semantic roles of a post-*ba*/*bei* verb. So, their lexical entries can be defined, in general, as below with a pair of braces indicating the invisibility of remnant roles.

(11) a. *ba*, CV, PRED 'BA<($\uparrow$SUBJ) ($\uparrow$OBJ) ($\uparrow$XCOMP)>'
agent patient

b. *bei*, CV, PRED 'BEI<($\uparrow$SUBJ) ($\uparrow$OBJ) ($\uparrow$XCOMP)>'
patient agent

where CV stands for co-verbs. Note that an OBJ is obligatory in *bei*'s subcategorization, though its correspondent constituent is optional in surface configuration. It could be understood that, generally speaking, *ba* imposes an action (i.e., post-*ba* VP) upon its OBJ, which is initiated or caused by its SUBJ; whereas *bei* assumes post-*bei* VP is an action forced upon its SUBJ, which initiated by its OBJ. This could be the residue 'semantics' in such degenerative verbs.

An advantage in syntactically encoding them like verbs is that it leads to the **uniformity** in context-free rules of the grammar, in that VP rules headed by a co-verb, e.g., *ba/bei* constructions, can be unified with others headed by an authentic verb, e.g., pivotal constructions. This uniformity is not trivial, in that we avoid a P heading a VP rule or a PP heading an S. The VP-rules for *ba/bei* constructions, as well as for other Chinese co-verbal constructions, are formulated as below.

(12) a. $\mathrm{VP} \rightarrow \mathrm{CV} \quad \underset{(\uparrow\mathrm{OBJ})=\downarrow}{(\mathrm{NP})} \quad \underset{(\uparrow\mathrm{XCOMP})=\downarrow}{\mathrm{VP}}$

b. $\mathrm{VP} \rightarrow \mathrm{V} \quad \underset{(\uparrow\mathrm{OBJ})=\downarrow}{(\mathrm{NP})} \quad \underset{(\uparrow\mathrm{OBJ}_2)=\downarrow}{(\mathrm{NP})} \quad \underset{(\uparrow\mathrm{XCOMP})=\downarrow}{(\mathrm{VP})}$

c. $\mathrm{VP} \rightarrow \mathrm{V} \quad \underset{(\uparrow\mathrm{XCOMP})=\downarrow}{\mathrm{ADJP}}$

d. $\mathrm{VP} \rightarrow \mathrm{V} \quad \underset{(\uparrow\mathrm{XCOMP})=\downarrow}{\mathrm{S'}}$

The only difference between authentic VPs and co-verbal VPs is that any well-formed predicative phrases can be a possible post-pivotal VP complement (i.e., XCOMP above) (Kit and Webster 1992), whereas the post-*ba/bei* VPs are strictly limited to the genuine verbal ones. That is, only verb-headed VP rules such as the above can extend a post-*ba/bei* VP. Note that some literature may use VCOMP, ACOMP and SCOMP for the XCOMP associated with VP, ADJP and S', respectively.

4 Functional control

A post-*ba/bei* verb usually has a SUBJ and/or an OBJ missing. It is important to understand from where the verb can acquire such an unexpressed GF(s) in its *f*-structure. The above rules provide no means for this. Instead, FC is the grammatical mechanism in LFG for such coreferential relations between GFs of different verbs in a sentence. The FC relations between *ba/bei*'s SUBJ/OBJ and the post-*ba/bei* (XCOMP SUBJ/OBJ) are believed to be embedded in the lexical properties of the two function words.

4.1 Can OBJ be controlled?

Whether an OBJ is controllable is critical to our approach. Many contemporary linguistic theories, such as GB and LFG, either simply assume, or endeavor to prove, that only SUBJ can be controlled. Bresnan (1982) devotes lengthy discussion on this. Such postulation seems to be out of theoretical considerations. But I would argue there are linguistic facts which appear to contradict it?

I propose that the OBJ is controllable, at least computationally, based on two points. First, no asymmetry is observed between SUBJ and OBJ in *f*-structure, in that the trivial shift of their positions doesn't change an *f*-structure at all at the representational level. This is apart from the conceptions of subject and object in GB, which are defined in terms of tree structures. Second, we have both *ba* and *bei* constructions in Chinese as linguistic data to show that the OBJ of the post-*ba/bei* verb is deterministically function-controlled by *ba*'s OBJ and *bei*'s SUBJ, respectively, thus resulting in the causativization and passivization. There is little functional uncertainty in such cases. In this sense, we assume OBJ is controllable in Chinese co-verbal sentences.

Furthermore, in order to formulate lexical FC rules for *ba/bei*, it is also necessary to assume both SUBJ and OBJ are computationally determinable by a lexical head observing grammatical context. Lexical properties of a head and the grammatical context where it appears need to be taken into account together, in order to reduce the redundancy in grammar encoding. How an FC mechanism observes grammatical context is another point to be highlighted in our approach.

4.2 Conditionality in functional control

It is worth noting that FC is in fact conditional. This conditionality can be observed from its original notion in Bresnan (1982:317), i.e., **only if** there is a missing SUBJ in an open function like XCOMP or XADJ, **then** one of the FC rules defined below becomes applicable.

(13) *Lexical Rule for Functional Control* (Bresnan 1982:322):

Let L be a lexical form and F_L its grammatical function assignment.[9]
If XCOMP$\in F_L$, add to the lexical entry of L:

a. $(\uparrow \mathrm{OBJ}_2)=(\uparrow \mathrm{XCOMP\ SUBJ})$ if $\mathrm{OBJ}_2 \in F_L$; otherwise
b. $(\uparrow \mathrm{OBJ})=(\uparrow \mathrm{XCOMP\ SUBJ})$ if $\mathrm{OBJ} \in F_L$; otherwise
c. $(\uparrow \mathrm{SUBJ})=(\uparrow \mathrm{XCOMP\ SUBJ})$.

Furthermore, conditionality in FC is also embedded inside (13), as in 'if XCOMP$\in F_L$', 'if $\mathrm{OBJ}_2 \in F_L$', 'if OBJ$\in F_L$'. They determine which FC rule (or equation) is to be applied in certain context. These conditions are actually an implicit specification about the functional subcategorization (FS) (i.e., F_L above) of a matrix verb, i.e.,

(14) a. 'if $\mathrm{OBJ}_2 \in F_L$' $\Rightarrow$ FS=$\{$SUBJ, OBJ, OBJ_2, XCOMP$\}$
b. 'if OBJ$\in F_L$' $\Rightarrow$ FS=$\{$SUBJ, OBJ, XCOMP$\}$
c. 'otherwise' $\Rightarrow$ FS=$\{$SUBJ, XCOMP$\}$

Of course, (13) also implies that direct GFs (i.e., SUBJ and OBJ) in the matrix verb's FS should have been fully realized, either in surface or by other FC, for that only a realized GF can be a potential controller. In contrast, (13) gives much less information about the *functional configuration* (*f*-config) of the XCOMP, but only that (XCOMP SUBJ) is unexpressed and to be realized by FC. By *f*-config, we refer to an FS with specification about which GF has been realized and which has not yet. A fully specified *f*-config of an post-*ba*/*bei* XCOMP is about which GFs in the head verb's FS have been surface-realized.

Now, it is clear that even in classic LFG, FC actually observes not only the subcategorization of a matrix/control verb but also the *f*-config of XCOMP. These two aspects are exactly what we refer to by the term *grammatical context*[10] in association with FC. Also, we achieve a more general way to read the FC rules such as (13), i.e., **if** having the FS of a matrix verb like (14.a/b/c) **and** having a partial *f*-config of the XCOMP indicating that the (XCOMP SUBJ) is missing, **then** apply an FC rule (i.e., equation)[11] in (13.a/b/c), respectively.

Next, we will further extend such conditionality to deal with FC in Chinese co-verbal sentences, considering not only missing SUBJ but also missing OBJ. It will rely on a fully, instead of partially, specified *f*-config of XCOMP.

[9] An interchangeable term with *subcategorization* or *functional subcategorization* in classic LFG.
[10] In Kit (1993a), it is referred to as *grammatical environment*.
[11] In Kit (1993a) and next sections, the two sides of such FC equations are reversed, in order to highlight that (XCOMP SUBJ) is a 'variable' to be assigned, or to acquire, a value from its controller through FC. Bresnan's equations only tell a coreferential relation, without specification of where a value is from and where it goes.

4.3 Functional head: syntactic *vs.* semantic

In a *ba/bei* construction, the co-verb behaves like a matrix verb in determining FC relations. It is worth noting that in Chinese not only control verbs, e.g., *daying* (promise) and *shuifu* (persuade), but also many functional words, e.g., co-verbs and even 'expletive' particles like *-d* (of, 's), *di* (-ly) and *de* (so…that, to the point that), can take charge of determining FC. In other words, they are **at least** as capable as control verbs. For example, in a Chinese adjective subclause, the particle *-d* has to manage the FC. Below is a sample quoted from Kit (1993a).

(15) a. *Xiaohai chang ge.* ⇒ *Xiaohai chang ge.*
(Child sing song) SUBJ PRED OBJ
The/A child sang a song.

b. *Xiaohai chang -d ge.* ⇒ *Xiaohai chang* ϕ_i *-d ge*$_i$*.*
(Child sing PRT song) [SUBJ PRED $\underline{\text{OBJ}}_i$]$_{XADJ}$ PRT $\underline{\mathsf{OBJ}}^?_i$
The song that the child sang. i.e., (XADJ OBJ) = $\mathsf{OBJ}^?$

c. *Chang ge -d xiaohai.* ⇒ ϕ_i *chang ge -d xiaohai*$_i$*.*
(Sing song PRT child) [$\underline{\text{SUBJ}}_i$ PRED OBJ]$_{XADJ}$ PRT $\underline{\mathsf{OBJ}}^?_i$
The child who sang a song. i.e., (XADJ SUBJ) = $\mathsf{OBJ}^?$

Obviously, it is the particle *-d* that conveys its $\mathsf{OBJ}^?$ (or *quasi*-OBJ, perhaps) to XADJ's as the head verb's SUBJ or OBJ, depending on grammatical context, i.e., depending on which is missing. In a sense, FC is the conveyance of GFs between verbs or, more precisely, between functional heads. There is a syntactic head that conducts such conveyance. All *ba*, *bei* and *-d* behave as such kind of heads.

In LFG, a functional head plays dual roles: (1) determining a well-formed *f*-config for a clause in term of well-formedness conditions, e.g., completeness and coherence, and also taking care of FCs, if necessary; (2) contributing predicate meaning for further semantic interpretation of the *f*-structure. Thus, it is reasonable to understand that a functional head is a merger of two parts: a *syntactic head* for task (1) and a *semantic head* for task (2).

By comparing *ba/bei* with post-*ba/bei* verbs bearing concrete semantics, we can see more clearly that splitting up a functional head into syntactic and semantic heads is indispensable in formulating a grammar for Chinese co-verbal sentences. It might also be a significant move in LFG theory as well. On the one hand, Chinese co-verbs like *ba* and *bei* hardly contribute any semantics to a clause/construction, but instead strictly take charge of organizing the whole structure of the clause/construction. They pack up all necessary arguments for a post *ba/bei* verb via FC. On the other hand, post *ba/bei* verbs determine the predicate meaning of a clause but do not take care of the overall structure of the clause, except to wait there for arguments to be fed to them by a co-verbal syntactic head. Of course, they have to manage the well-formedness within the XCOMP. *ba* and *bei* are typical syntactic heads, and post *ba/bei* verbs are samples of a semantic head. Decomposition of a functional head into a syntactic head and a semantic head seems necessary in extending LFG theory to practical description and analysis of Chinese co-verbal sentences.

4.4 Conditional functional control

Following the conditionality in FC discussed above, we can develop a more generalized FC schema, namely, *conditional functional control* (CFC), which takes into account not only a missing SUB but also a missing OBJ in XCOMP. CFC is the lexical properties of a head word. It observes grammatical context.

In formulation of CFC rules specifically for *ba/bei* constructions, we will focus on how the missing GFs in XCOMP acquire their values. Since the FS of the matrix heads (i.e., *ba/bei*) is always {SUBJ, OBJ, XCOMP}, we can assume the direct GFs are both fully realized while considering how they are conveyed into XCOMP. Instead, the f-config of the XCOMP plays a more important role as grammatical context in determining the coreference relation between GFs in our CFC schema. According to our observation about Chinese linguistic data, CFC rules for *ba/bei* constructions are formulated as below, with names in bold face indicating the realized GFs.

4.4.1 CFC rules for *ba*

The CFC rules for *ba* are presented in Figure 2. These rules, though perhaps not an exhaustive list yet, nevertheless reveal *ba*'s competence in structuring a sentence and determining FCs. Note that OBL_{th} conventionally subsumes OBL_{go}, OBL_{ben}, OBL_{loc}, etc.

	XCOMP f-config		CFC rules
1.	{ SUBJ }	⇒	(↑XCOMP SUBJ)=(↑OBJ)
2.	{ SUBJ, **OBJ** }	⇒	(↑XCOMP SUBJ)=(↑OBJ)
3.	{ SUBJ, OBJ }	⇒	(↑XCOMP SUBJ)=(↑SUBJ) (↑XCOMP OBJ)=(↑OBJ)
4.	{ SUBJ, **OBJ**, OBJ_2 }	⇒	(↑XCOMP SUBJ)=(↑SUBJ) (↑XCOMP OBJ_2)=(↑OBJ)
5.	{ SUBJ, OBJ, $\mathbf{OBL}_{th}$ }	⇒	(↑XCOMP SUBJ)=(↑SUBJ) (↑XCOMP OBJ)=(↑OBJ)
6.	{ SUBJ, **OBJ**, OBL_{th} }	⇒	(↑XCOMP SUBJ)=(↑SUBJ) (↑XCOMP OBL_{th})=(↑OBJ)

Figure 2 CFC rules for *ba*

Below are illustrations of these rules with sample sentences, where the coincident indices should be understood as indicating coreference relation at the f-structure level. Notice that ϕ is not a trace nor an empty category on the surface, but a position in f-structure as a destination for the *information flow* from a concrete GF with an identical index at a higher level of the f-structure. That is, an information flow is always from $\mathrm{G}_{i/j}$ to $\phi_{i/j}$ below.

(16)

1.

Zhe-duan-lu	*ba*	*wo*$_i$	ϕ_i	*zou-lei*	*le.*	(=(1))
SUBJ	BA	OBJ$_i$	[SUBJ$_i$	walk-tire	ASP]$_{XCOMP}$	

Walking over this road made me exhausted.

2.

Ta$_i$	*ba*	*beizi*	ϕ_i	*dapo*	*le*	*gai'er.*	(=(5.b))
SUBJ$_i$	BA	OBJ	[SUBJ$_i$	break	ASP	OBJ]$_{XCOMP}$	

He broke the lid of the cup.

3.

Ta$_i$	*ba*	*beizi*$_j$	ϕ_i	*dapo*	*le*	ϕ_j.	(=(4.a))
SUBJ$_i$	BA	OBJ$_j$	[SUBJ$_i$	break	ASP	OBJ$_j$]$_{XCOMP}$	

He broke the lid of the cup.

4.

Wo$_i$	*ba*	*na-ben-shu*$_j$	ϕ_i	*gei*	*Lisi*	ϕ_j	*le.*	(=(6.c))
SUBJ$_i$	BA	OBJ$_j$	[SUBJ$_i$	give	OBJ	OBJ_{2j}	ASP]$_{XCOMP}$	

I gave Lisi the book.

5.

Wo$_i$	*ba*	*na-ben-shu*	ϕ_i	*song*	ϕ_j	*gei-Lisi*	*le.*	(=(6.b))
SUBJ$_i$	BA	OBJ$_j$	[SUBJ$_i$	give	OBJ$_j$	OBL_{th}	ASP]$_{XCOMP}$	

I gave the book to Lisi.

6.

Ni$_i$	*ba*	*liangxin*$_j$	ϕ_i	*wei*	*gou*	ϕ_j	le?
(You	BA	conscience		feed	dog		ASP)
SUBJ$_i$	BA	OBJ$_j$	[SUBJ$_i$	feed	OBJ	$\mathrm{OBL}_{th\,j}$	ASP]$_{XCOMP}$

Have you fed a dog with all your conscience? (You're heartless!)

4.4.2 CFC rules for *bei*

The CFC rules for *bei* are formulated in Figure 3. From these rules we can see how capably they organize sentential structures and feed arguments to a post-*bei* verb.

	XCOMP *f*-config		CFC rules
1.	{ SUBJ }	$\Rightarrow$	($\uparrow$XCOMP SUBJ)=($\uparrow$OBJ)
2.	{ SUBJ, **OBJ** }	$\Rightarrow$	($\uparrow$XCOMP SUBJ)=($\uparrow$OBJ)
3.	{ SUBJ, OBJ }	$\Rightarrow$	($\uparrow$XCOMP SUBJ)=($\uparrow$OBJ) ($\uparrow$XCOMP OBJ)=($\uparrow$SUBJ)
4.	{ SUBJ, OBJ, **OBJ$_2$** }	$\Rightarrow$	($\uparrow$XCOMP SUBJ)=($\uparrow$OBJ) ($\uparrow$XCOMP OBJ)=($\uparrow$SUBJ)
5.	{ SUBJ, **OBJ**, OBJ$_2$ }	$\Rightarrow$	($\uparrow$XCOMP SUBJ)=($\uparrow$OBJ) ($\uparrow$XCOMP OBJ$_2$)=($\uparrow$SUBJ)
6.	{ SUBJ, OBJ, **OBL$_{th}$** }	$\Rightarrow$	($\uparrow$XCOMP SUBJ)=($\uparrow$OBJ) ($\uparrow$XCOMP OBJ)=($\uparrow$SUBJ)
7.	{ SUBJ, **OBJ**, OBL$_{th}$ }	$\Rightarrow$	($\uparrow$XCOMP SUBJ)=($\uparrow$OBJ) ($\uparrow$XCOMP OBL$_{th}$)=($\uparrow$SUBJ)

Figure 3 CFC rules for *bei*

Below are sample sentences illustrating the above CFC rules. It is shown in (17.7) that the so-called 'indirect or generalized patient' in Zhu's term is in fact an OBL$_{th}$, which is usually associated with the thematic role *beneficiary*. It is a very interesting phenomenon that both *ba* and *bei* are capable of imposing an extra GF of different thematic role upon a function-saturated post-*ba*/*bei* verb.

(17) 1. *Ni gei ta$_i$ ϕ_i paodiao le?* (=(7))
SUBJ GEI OBJ$_i$ [SUBJ$_i$ escape ASP]$_{XCOMP}$
Did you let him escape?

2. *Beizi bei wo$_i$ ϕ_i dapo le gai'er.* (similar to (9))
SUBJ BEI OBJ$_i$ [SUBJ$_i$ break ASP OBJ]$_{XCOMP}$
The lid of the cup was broken by me.

3. *Beizi$_i$ bei ta$_j$ ϕ_j dapo ϕ_i le.* (=(8.a))
SUBJ$_i$ BEI OBJ$_j$ [SUBJ$_j$ break OBJ$_i$ ASP]$_{XCOMP}$
The cup was broken by him.

4. *Lisi$_i$ bei ta$_j$ ϕ_j guan le ϕ_i yi-ping-jiu.*
(Lisi BEI him pour-into ASP a-bottle-of-wine)
SUBJ$_i$ OBJ$_j$ [SUBJ$_j$ OBJ$_i$ OBJ$_2$]$_{XCOMP}$
Lisi was forced to drink a bottle of wine by him.

5. *Na-ben-shu$_i$ rang wo$_j$ ϕ_j gei Lisi ϕ_i le.*
SUBJ$_i$ RANG OBJ$_j$ [SUBJ$_j$ give OBJ OBL$_{2\,i}$ ASP]$_{XCOMP}$
The book was given (to) Lisi by me.

6. *Na-ben-shu$_i$ rang wo$_j$ ϕ_j song ϕ_i gei-Lisi le.*
SUBJ$_i$ RANG OBJ$_j$ [SUBJ$_j$ give OBJ$_i$ OBL$_{th}$ ASP]$_{XCOMP}$
The book was given to Lisi by me.

7. *Ta$_i$ bei renjia$_j$ ϕ_j tou le qianbao ϕ_i.* (=(9.a))
SUBJ$_i$ BEI OBJ$_j$ [SUBJ$_j$ steal ASP OBJ OBL$_{th\,i}$]$_{XCOMP}$
She 'had' her wallet stolen by someone.

5 Anaphoric control

As discussed above, an NP_2 as the object of *bei* is optional in surface configuration, since in many cases, e.g., in (10) above, the agent of the post-*bei* verbs may be unknown or unnecessary to mention (Zhu 1982). However, an OBJ for *bei* in obligatory in *f*-structure, because it is one of the three GFs that *bei* subcategorizes for. Otherwise, the *f*-structure would be incomplete.

Determining this kind of missing GF is obviously the task of *anaphoric control* in LFG. A functional anaphor 'PRO' is introduced into an f-structure via the following rule.

(18) *Rule of Functional Anaphora* (Bresnan 1982:326):

For all lexical entries L, for all G $\in \Delta$, assign the optional pair of equations $\{(\uparrow$G PRED$)=$'PRO', $(\uparrow$FIN$)=_c \alpha\}$ to L."

where G stands for a GF, Δ is a language-specific subset of semantically unrestricted GFs {SUBJ, OBJ, OBJ_2}, and FIN (for 'finite') is also a language-specific feature whose value $\alpha = \pm$. For English, $\Delta =$ {SUBJ} and $\alpha = -$. For Chinese, in particular, for *bei* constructions, this rule has to be further parameterized. We assume $\Delta =$ {SUBJ, OBJ} and technically leave FIN unspecified, since it is too subtle (and also beyond the scope of this paper) whether a Chinese verb has FIN$= +$ or $-$. Further, it is really not so meaningful to speculate that a degenerative verb like *ba/bei* still bears a FIN feature of any value.

(19) a. *Ta_i bei* 'PRO'$_j$ ϕ_j *daibu le* ϕ_i .
SUB_i BEI OBJ_j [SUB_j arrest ASP OBJ_i $]_{XCOMP}$
He was arrested (by someone).

b. *Ta_i bei* 'PRO'$_j$ ϕ_j *tou le qianbao* ϕ_i.
SUB_i BEI OBJ_j [SUB_j steal ASP OBJ OBL_{thi} $]_{XCOMP}$x
She had her wallet stolen (by someone).

By anaphoric control, two sentences in (10) above may have the above *f*-config and CFC results in (19). It is important to properly respect that a 'PRO', which means someone or something unknown or unnecessary to mention (Bresnan 1982)[12], is introduced into this pattern of *bei* construction by anaphoric control at the level of *f*-structure. Otherwise, it would be rather easy to fall into the trap of *bei-by* parallelism that Chinese *bei*-phrase is taken as functionally equivalent to English *by*-phrase in passive sentences, whereas *bei* with no object is treated inconsistently as something else.

For example, the solitary *bei* with no OBJ is treated by some linguists as a *verbal prefix*. The idea originated in Shi (1987) and was further developed by Li (1990) and Tan (1991). However, the only motivation for this treatment seems to be to maintain, or more precisely, to make up the harmony between *bei* and *by*. Actually, this is a cut-the-foot-to-fit-the-shoe (a Chinese idiom) treatment, in that a false sense of harmony between *bei* and *by* in two different languages is maintained at the price of sacrificing the consistency of the 'two' *bei*'s (i.e., one with an object, another without) syntactic property in the same language. In our view, not only does this treatment fail philosophically but also technically. There is straightforward evidence in (20) below to show the inappropriateness of treating *bei* as a verbal prefix.

(20) a. *Fanren bei <u>mimi</u> qiangjue le.*
(Prisoner BEI secretly execute ASP)
The prisoners were secretly executed.

b. *Naxie shangpin bei <u>dijia</u> chushou.*
(Those product BEI low-price sell)
Those products were sold at a low price.

[12] Zhu (1982) and Bresnan (1982) share exactly the same idea.

The fact that an adverbial or even a noun can be inserted in between the so-called 'prefix' and its 'root' verb should be strong enough to exclude the possibility of analyzing *bei* as a verbal prefix.

6 Conclusions

Viewed from an LFG perspective, it is found that Chinese functional words *ba* and *bei* are not simple prepositions serving only to introduce an NP, but multi-valence prepositions or co-verbs to organize the whole structure of a sentence. Syntactically, they share the argument-taking characteristic of verb. They subcategorize for a SUBJ, an OBJ and an XCOMP.

Although they are not authentic verbs because they lack concrete predicate meaning, they bear similar syntactic properties to verbs, such as determining the well-formedness of a sentence and in determining various FC relations with respect to grammatical context. The most important part of grammatical context is the *f*-config of the post-*ba/bei* XCOMP that is derived from the subcategorization of a post-*ba/bei* verb. The instantiation of unexpressed GFs in XCOMP depends vitally upon the CFC by *ba* and *bei*. Causativization and passivization are, respectively, shown to be two special cases of *ba* and *bei*'s syntactic properties in this respect. A *bei* construction is not necessary to be a passive sentence and *bei* has been shown to be syntactically different from *by* in the English passive. It is also not feasible to analyze *bei* without an object as a verbal prefix but a co-verb that introduces a functional anaphor 'PRO'. In addition, we see that the syntactic power of *ba* and *bei* not only lies in how they feed arguments into the post-*ba/bei*XCOMP via CFC but also in that they can impose an extra GF upon an argument-saturated post-*ba/bei* VP as various types of OBL_{th}. Investigation into this aspect enables us to clarify some previous misconceptions, e.g., Zhu's 'generalized patient', in Chinese linguistics.

This paper may perhaps contribute to LFG theory in the following aspects. First, it is proposed that OBJ is controllable in *f*-structure. This is supported by linguistic data in Chinese co-verbal sentences. Second, the original notion of functional control is extended into a more generalized one, namely, conditional functional control. Its feasibility is illustrated with numerous lexical rules for *ba* and *bei* together with typical sample sentences. Third, most importantly, it is attempted to decompose a functional head into syntactic head and semantic head, such that LFG formalism would gain greater computational power in linguistic description of natural languages, in particular, of Chinese co-verbal sentences. Such decomposition is based on theoretical soundness and practical necessity. It highlights the autonomy of syntax and semantics.

For Chinese linguistics, this paper not only attempts to solidify the conception that prepositions may bear multi-valency, but also provides an LFG approach highly extendable to many other Chinese function words like *wei* (for), *ti* (for), *gen* (with), *bi* (than), etc., and even to expletive particles like *-d*, *di*, *de*. It is obvious that all Chinese multi-valence prepositions can be unified into the same schema as that for *ba* and *bei*, although their subcategorization and lexical CFC rules are distinct from each other.

Also, this approach, with well-defined context-free rules for constituent structure and sophisticated lexical CFC rules to derive well-formed *f*-structure, can greatly facilitate Chinese sentence parsing. Kit (1992, 1993a) and Kit and Webster (1992) have demonstrated a successful application of this formal analysis to Chinese sentence parsing within LFG framework.

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