The dynamic syntax of Chinese passive constructions

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Abstract

This paper addresses the issue of *bei* constructions as passive constructions in Chinese within the framework of Dynamic Syntax (Kempson et al. 2001). On the basis of a detailed examination of the basic facts about *bei* constructions, it is claimed that (i) the morpheme *bei* is actually a voice particle devoid of any semantic content, precisely an indicator of the inverse direction of action; it is by virtue of this peculiar function that *bei* is generally regarded as marker of passives and *bei* sentences are universally considered as passives in Chinese; (ii) from the typological perspective, the voice behaviour in Chinese is a type of pragmatic voice; from the functional perspective, *bei* constructions share certain similarities with topic constructions. Under the dynamic approach, various patterns of *bei* constructions have been successfully characterised in an original and elegant way.[1]

1 Introduction

The identification of the *bei* construction as a form of passive in Chinese has long been of great interest and controversy among linguists, and a number of different accounts of the construction have been made in the literature. Nevertheless, a unified account of the *bei* construction remains to be achieved, and even the status of the morpheme *bei* itself remains to be articulated. This may be attributed to the fact that *bei* construction exhibits a surprisingly diverse set of properties as demonstrated in (1) below.[2]

(1) a. *Zhangsan bei Lisi da guo.*
Zhangsan BEI Lisi beat EXP
Zhangsan has been beaten by Lisi.

b. *Zhangsan bei Lisi ma guo.*
Zhangsan BEI Lisi scold EXP
Zhangsan has been scolded by Lisi.

c. *chuanghu bei za le.*
window BEI smash PFV
The window was smashed.

d. *fangzi bei chai le.*
house BEI demolish PFV
The house was demolished.

The pair of sentences (1a,b) represent the canonical agentive pattern where the pre-*bei* constituent, which is associated with the 'gap' in the postverbal object position, acts as the patient and the post-*bei* constituent as the agent;[3] (1c,d) pertain to the other canonical pattern where the agent is absent because, as in English, it is unknown, at least to the speaker, or is unnecessary to mention.

Two other patterns are shown in (2) which are more problematic. In (2a,b), there is an NP in the object position (a 'retained object' within analyses of traditional and generative grammars), while (2c,d) exhibit a pattern which involves another well-known grammatical structure in Chinese, the *ba* construction, where *ba* is generally taken to be an object marker.

(2) a. *Zhangsan bei Lisi daduan le tui.*
Zhangsan BEI Lisi break PFV leg
Zhangsan's leg was broken by Lisi.

b. *Zhangsan bei Lisi jian le toufa.*
Zhangsan BEI Lisi cut PFV hair
Zhangsan's hair was cut by Lisi.

c. *Zhangsan bei Lisi ba tui daduan le yi-tiao.*
Zhangsan BEI Lisi BA leg break PFV one-CL
One of Zhangsan's legs was broken by Lisi.

d. *Zhangsan bei Lisi ba toufa jian le yi-cuo.*
Zhangsan BEI Lisi BA hair cut PFV one-lock
One lock of Zhangsan's hair was cut by Lisi.

In this paper, we investigate the analysis of the *bei* construction within the framework of Dynamic Syntax (Kempson et al. 2001) and provide a principled account of the canonical patterns shown in (1) and the problematic patterns in (2). By treating the *bei* construction as a type of left dislocation, we argue that: (i) the morpheme *bei* is a voice particle whose fundamental function is to signal that the pre-*bei* argument functions as the internal argument of that verb and is primarily affected by the action described by the main verb, hence the generally held view that *bei* is a passive marker; (ii) from a typological perspective, we argue that the passive in Chinese is a type of pragmatic voice; (iii) from the functional perspective, *bei* constructions are similar to topic constructions. Under the dynamic analysis, we show that the various patterns exhibited by the *bei* construction can be characterised in an original and explanatory fashion.[4]

The paper is organised as follows. Section 2 critically reviews a number of existing influential analyses of the *bei* construction. In section 3, we provide a preliminary analysis of the canical *bei* constructions while section 4 briefly introduces the theory and methodology of Dynamic Syntax which is used to provide a formal account of the descriptive generalisations made. In section 5, the initial analysis is extended to the problematic patterns and section 6 summarises with a conclusion.

2 Previous Analyses

Previous analyses of *bei* constructions have centred on the properties and status of the morpheme itself. Although *bei* has been generally acknowledged as the morphological marker of

passive sentences in Chinese, there has been no consensus so far on its syntactic function and even its part of speech. There have been three principal influential analyses in the current literature with respect to the status of the word *bei* which we now review.

2.1 The preposition and dual function hypotheses

A popular hypothesis is that the word *bei* is a preposition, because in many cases what immediately follows it is an agent NP (e.g. J.Li 1955, C.Li and Thompson 1981, J.Zhang 1987, B.Zhang and Hu 1989). The treatment of *bei*, on a par with the preposition *by* in English, has been extensively employed in the work, for instance, of generative linguistics (e.g. Xu and Langendoen 1985, Xu 1986, Huang 1993). The advantage with this proposal is that the presence of the agent NP in *bei* sentences like (1a,b), repeated below, receives a natural explanation under the preposition analysis.

(1) a. *Zhangsan bei Lisi da guo.*
Zhangsan BEI Lisi beat EXP
'Zhangsan has been beaten by Lisi.'

b. *Zhangsan bei Lisi ma guo.*
Zhangsan BEI Lisi scold EXP
'Zhangsan has been scolded by Lisi.'

One problem with this analysis is that it requires the verbs in such sentences to be interpreted as passive. As is pointed out in Chao (1968) and Lü (1982), however, verbs in Modern Chinese do not show voice distinctions and verbs thus do not exhibit passive meaning directly. The second principal disadvantage with this analysis is that it entails that the omission of the agent, as in (1c,d) repeated below, gives rise to the stranding of a preposition.

(1) c. *chuanghu bei za le.*
window by smash PFV
'The window was smashed.'

d. *fangzi bei chai le.*
house by demolish PFV
'The house was dmolished.'

As is well-known, however, prepositions and postpositions in Chinese are not allowed to be stranded in any type of construction. In the light of this fact, some authors like Xu and Langendoen (1985) maintain that the appearance of the morpheme *bei* in the agentless pattern can be regarded as an exception to this general restriction. Accordingly, despite the absence of the agent NP in sentences like (3), they still treat *bei* as the counterpart of the English preposition *by*, although they refer to it as a 'particle'.

(3) *wo bei da le.*
I **by** beat PFV
'I was hit.' (Xu and Langendoen 1985: 11)

As a language where prepositions can be stranded, even English does not allow the appearance of the preposition *by* when the agent is absent from the sentence (and not simply in a dislocated position), as can be seen in the English translation of (3). One cannot help asking how a preposition can behave so exceptionally in a language like Chinese where preposition stranding is prohibited. Moreover, there are alternative ways in Chinese to form a sentence where *wo* 'I' still has patient status (cf. H.Wang 1983), instead of employing a bizarrely standed preposition. For example, the verb *ai* 'receive' can be used which takes a nominalised verb or clause as its object, as in (4).

(4) *wo ai le da.*
I get PFV beat
'I got a beating.'

Given the strong restriction on preposition and postposition stranding, the preposition analysis is highly implausible.

In view of the 'distributional' problem of *bei*, Lü et al. (1980) put forward 'the dual function hypothesis ' whereby the morpheme *bei* has a double function: namely, it is a preposition with the presence of the agent NP, but a 'helping particle' with the absence of the agent NP. This analysis implies that there are two *bei* morphemes in Chinese: one functions as the trigger of the agent NP, the other functions as a passive morpheme which occurs immediately before the verb.[5] This analysis has also been quite influential, as can be seen in the literature. Shi (1997), for instance, alternatively postulates a two-morpheme hypothesis by modifying Lü et al's: the *bei* in passive constructions encodes two different morphemes, one preposition and one passive marker.[6] Shi's analysis is intrinsically the same as Lü et al's except that it is more explicit.

Under the double function analysis, the problems arising from the 'distribution' of *bei* disappear automatically, viz. the preposition *bei* accounts for agentive cases like (1a,b) because it is supposed to introduce an NP, whereas the helping particle *bei* accounts for agentless cases like (1c,d) because it is supposed to help the verb to specify passive voice. One crucial question that immediately arises from this proposal is how the same word, *bei*, can have such different functions within a single, passive, construction. Shi (1997) attributes the so-called two *bei* analysis to the phenomenon of haplology. His explanation is that: "every passive sentence is marked with the passive morpheme *bei*. If the agent NP is also present, it appears in an adjunct phrase headed by the preposition *bei*. When two *bei*s occur in the same sentence, the second *bei* is deleted by the process of haplology." (p.49). Although there is evidence for such a process in Chinese, the properties of *bei* appear to be somewhat different from those elements that appear to be involved in this. Unlike other elements that appear to give rise to haplology (such as the homonym *zai*, a preposition meaning 'in' and a particle indicating an ongoing action), *bei* never appears after an agent noun phrase and so the independence of *bei* as passive marker from its proposed function as a preposition is difficult to prove empirically.[7] The 'change' of *bei*'s status in 'different' positions thus has little syntactic motivation.

More damaging to any hypothesis that analyses *bei* as a preposition is that the evidence indicates that *bei* is unlikely to be agent-oriented and thus any supposed parallels with agentive prepositions found in other languages are misconceived. If *bei* is not connected with the presence of the agent (the post-*bei* constituent), then it is reasonable to assume that it has some its association with the pre-*bei* position where a patient (normally) occurs. Although

it is true that the pre-*bei* patient can also be absent under certain circumstances, its absence is significantly different from that of the agent. Consider the following examples:

(5) a. *zhe jiahuo bei baba da guo duo ci, jiushi bu gai.*
this guy BEI dad beat EXP many times just not change
'This guy had been beaten many times by Dad, but he just didn't change.'

b. *bei da guo duo ci, zhe jiahuo jiushi bu gai.*
BEI beat EXP many times this guy just not change
'Having been beaten many times, this guy just didn't change.'

c. **zhe jiahuo bei da guo duo ci, baba jiushi bu gai.*
this guy BEI beat EXP many times Dad just not change
'This guy having been beaten many times, Dad just didn't change.'

d. *bei da guo duo ci, jiushi bu gai.*
BEI beat EXP many times just not change
'(Zhangsan) having been beaten many times, he just didn't change.'

(5a) has two juxtaposed clauses one of which is a *bei* clause where both the patient and agent are present. The *bei* clause of (5b), which is adapted from (5a), has neither a patient nor an agent, but native speakers identify the patient as the topic of the following clause, but cannot identify the agent without contextual clues. Hence, the patient's absence in the first clause is syntactically motivated, because the two clauses share the same topic *zhe jiahuo* 'this guy'. In contrast, the absence of the agent is pragmatically motivated, depending on context salience and information structure. This pattern is confirmed by the ungrammaticality of (5c), where the second clause has a different topic (*baba*) from the first (*zhe jiahuo*), and the fact that (5d) must be interpreted only as 'Having been beaten many times, he just didn't change' and not as 'Having been beaten by him$_i$ many times, he$_i$ just didn't change'. The absence of the pre-*bei* NP is thus a matter of syntax whereas the absence of the post-*bei* NP is a matter of pragmatics. We thus conclude that not only is *bei* not a preposition like English *by*, it is not even grammatically associated with the agent noun phrase.

It is, we hypothesize, the occurrence of *bei* that consistently marks the relevant sentences with an overtly passive flavour, unambiguously identifying the expression before it as the patient or internal argument of the predicate. As further evidence, consider the following example:

(6) *laoshi jiao le toufa.(Shi 1997:45)*
teacher cut PFV hair
'The teacher cut (someone's) hair.'
'The teacher, (someone) cut his hair.'

In Chinese, sentences like (6) exhibit ambiguity with regard to agenthood and patienthood and so admit two possible interpretations, as illustrated by the English translations. But with the use of *bei*, the resulting sentences are unambiguous: the initial noun phrase identifies the patient of some (possibly complex) action as in (7).

(7) *laoshi bei jiao le toufa.*
teacher BEI cut PFV hair
'The teacher's hair was cut.'

Bei's disambiguating capacity provides further evidence for our claim that the morphology marking passive sentences is related to the patient rather than the agent. Specifically, *bei* consistently identifies the pre-*bei* noun phrase as the internal argument of the main predicate and indicates that it is strongly affected by the action. This function of *bei*, so far as we are aware, has been overlooked, although the morpheme in question has been generally accepted as the marker of Chinese passives. If this argumentation is on the right track, *bei*'s function can provide a natural explanation of the grammatical status of *bei* constructions of whatever pattern without any special stipulations: *bei* sentences are labelled as passives just because they contain a morpheme which always signals that the internal argument is fronted, appearing before the marker and interpreted as being acted on by the verb. What is variable is the presence or absence agent NP which, as discussed above, is pragmatically motivated and is unrelated to the grammatical voice of the sentence.

If it is the presence or absence of *bei* that determines the grammatical voice of the sentence, similar sentences that involve object-fronting without *bei*, such as those in (8), must be treated as instances of the topic construction, as are the examples in (9) where there is no overt agent NP.

(8) a. *Zhangsan Lisi da guo.*
Zhangsan Lisi beat EXP
'Zhangsan, Lisi has once beaten.'

b. *Zhangsan Lisi ma guo.*
Zhangsan Lisi scold EXP
'Zhangsan, Lisi has once scolded.'

(9) a. *chuanghu za le.*
window smash PFV
'The window, (someone) smashed.'

b. *fangzi chai le.*
house demolish PFV
'The house, (someone) demolished.'

There are many sentences in Chinese like those in (9) in particular, where a patient NP appears in the preverbal position but are not obviously topic structures as the examples in (**??**). Although they appear to express a sort of a passive meaning, sentences of this type are generally treated as topic sentences with the inital NP being the topic (e.g. Huang 1982, A.Li 1990, Shi 2000). One difference between such topicalised sentences and those containing *bei* is shown in the short dialogue in (10) where the first speaker pauses after uttering *bei* and the second responds with an event-oriented question about what happened to Zhangsan.

(10) A: Zhangsan bei ...
B: Zhangsan bei zenmo le?
Zhangsan bei how SFP
A: bei (Lisi) da le.
BEI (Lisi) hit PFV
He was beaten (by Lisi).

Zenmo in the question above can be construed as 'What happened (to Zhangsan)?' or 'How did someone dispose of (Zhangsan)?'. Such an effect is not seen in dialogues involving a simple topic construction such as in (8) since the argument status of the initial noun phrase cannot be determined at this early point in the processing of the sentence, and the hearer cannot infer that Zhangsan is the object of the verb. These data show two things: firstly, the pre-*bei* NP in the sentence-initial position behaves like the topic of the sentence, with the post-*bei* clause serving as a comment on it; and secondly, the morpheme clearly signals the function of the pre-*bei* constituent as object or patient. We take this as further evidence that the function of *bei* is not to identify the agent of an action.

The discussion so far points to three initial conclusions: that there is no need to postulate two instantiations of *bei*; that *bei* is not a preposition; and that *bei*is not agent-oriented but signals that the pre-*bei* noun phrase is a patient or internal argument.

2.2 The Verb Hypothesis

In view of the inadequacy of the previous two analyses, a few authors (e.g. Hashimoto 1987, Tan 1987, Ting 1998, J Huang 1999) argue that the puzzling morpheme should be analysed as a verb, which historically it was, meaning 'receive' in Classical Chinese. This verb analysis is based on the assumption that *bei* as a verb can take a clause as its complement whose subject is the agent NP and whose predicate is the verb. In this analysis, a sentence like (11a) has the underlying representation in (11b).

(11) a. *na-jian shiqing bei ta zhidao le.*
that-CL matter BEI 3rd know PFV
'That matter was known by him.'

b. [$_S$ [$_{NP}$ na-jian shiqing] [$_{VP}$ bei [$_S$ ta [$_{VP}$ zhidao le [$_{NP}$ na-jian shiqing]]]]]

Under this analysis, the Chinese passive construction, unlike its English counterpart, involves a complex sentence: what follows *bei*, acccording to Hashimoto, is a nominalised sentence with the object omitted. The omission of the object after the second (main) verb is attributable to the fact that it is identical to the subject, so undergoes deletion. The possible absence of the agent NP is also explained, as it can be treated as a special case of null subject.

Although many of the problems with the previous analyses are given a satisfactory solution under these assumptions, the treatment of *bei* as a special verb faces a number of serious problems. The authors quoted above, for instance, agree that the use of *bei* is compatible with certain transitive verbs like *ai*, *shou*, etc., which all have a similar meaning, 'receive', 'get', etc., and all are able to take a complement clause. As is shown by the glosses, however, these verbs have significant semantic content, while *bei* does not appear to have an independent meaning 'receive'. If this is the case, why is it that only the construction with *bei* is interpreted as a basic passive, and not the constructions with these other verbs?

More importantly there is syntactic evidence against treating *bei* in the same way as these other verbs. For example, verbs like *ai* and *shou* can take an aspect marker (12a) and can also be used in the V-not-V form (12b), but *bei* cannot (cf. A Li 1990).

(12) a. *Lisi ai/*bei le laoshi ma.*
Lisi get/BEI PFV teacher scold
'Lisi got a scolding of his teacher.'

b. *Lisi ai-mei-ai/*bei-ma-bei laoshi ma?*
Lisi get-not-get/BEi-not-BEI teacher scold
'Did Lisi get a scolding of his teacher?'

These facts suggest either that *bei* is not the same type of verb as those mentioned above or that it is not a verb at all. That the latter is likely to be the case is further evidenced by the comparison of *bei* with its so-called variants *rang*, *jiao* and *gei* which are generally considered to function in the same fashion as *bei* in passive constructions. Although all four morphemes can appear in agentive sentences like (13a), only *bei* can be used in agentless sentences like (13b). If the morpheme *bei* is not a verb in Modern Chinese these facts can be easily explained without recourse to the assumption that *bei* is a verb without common verbal properties.

(13) a. *wo bei/gei/jiao/rang ta tou le lian kuai qian.*
I BEI/GEI/JIAO/RANG 3SG steal PFV two dollar money
'I had two dollars stolen by him/her.' (Li and Thompson 1981: 506)

b. *wo bei(*jiao/*rang/?*gei) tou le lian kuai qian.*
I BEI steal PFV two dollar money
'I was stolen two dollars.' (Ibid)

Semantically, *bei* appears to have no identifiable lexical content, whereas the other verbs all have a lexical content with independent meanings: *rang*, *jiao* and *gei* may appear as full lexical verbs, meaning 'let or allow', 'tell, order' and 'give' respectively. As pointed out by C.Li and Thompson (1981), the constructions containing these variants may have a different syntactic structure from the *bei* construction, which explains why sentences like the above unambiguously have a passive reading when marked by *bei*, but they may be ambiguous when marked by the other three words: so (13a) with *gei* sentence could also mean ' I stole two dollars for him'; with *jiao* 'I told him to steal two dollars'; and with *rang* 'I allowed him/her to steal two dollars'. The unacceptability of the non-agentive pattern with these verbs (13b) clearly reveals that they retain their verbal properties even in passive constructions because they normally take an NP as direct object.

The contrast between the invariable behaviour of *bei* and the changeable behaviour of its variants provides evidence that *bei* has been grammaticalised from a content word into a function word, while its variants *rang*, *jiao* and *gei* maintain their status as verbs.

In summary, we conclude that none of the discussed analyses provides a good basis for the analysis of *bei*. The fact that both pre- and post-*bei* constituents can be omitted indicates that it is not a preposition or postposition. Differences in the omission of agent and patient arguments indicates that the morpheme is patient oriented rather than agent oriented. The differences in syntactic and semantic behaviour between *bei* and other 'passive' expressions further strongly indicate that the expression is not a verb. We conclude, therefore, that *bei* is a functional marker that induces passive interpretation by virtue of identifying the noun phrase immediately before it as the internal (patient) argument of the verb.

3 Preliminary Analysis

In this section, we provide a preliminary analysis of the canonical *bei* construction based on the conclusions drawn in the previous section, which is to be taken as a template for treating

the problematic patterns. Based on the observations and discussion presented in section 2, we analyse *bei* as neither as a preposition or a verb, but as a grammatical word or particle, hence, the *sui generis* glossing of *bei* as BEI.

3.1 Topic and Passive

The invariable function we attribute to *bei* is that it is a voice marker, consistently assigning an object role to the argument that immediately precedes it and signalling that this term is the passive recipient of the action. Our evidence for this has in part been rehearsed above, but in further support we point to data like those in (14). (14a) shows a simple canonical *bei* sentence (= (1a), while (14b-e) show that only the object can appear in the pre-*bei* position, the object cannot appear after the verb in the canonical construction and that only the object, not the subject, can appear in initial position. Contrast these data with the variants without *bei* in (15).

(14) a. *Zhangsan bei Lisi da guo.*
Zhangsan BEI Lisi beat EXP
Zhangsan has been beaten by Lisi.

b. **Bei Lisi da guo Zhangsan.*
BEI Lisi beat EXP Zhangsan

c. *Lisi bei da guo Zhangsan.

d. *Bei da guo Zhangsan.

e. Zhangsan bei da guo.

f. *Lisi Zhangsan bei da guo.

g. *Bei Lisi Zhangsan da guo.

(15) a. Lisi da guo Zhangsan.
'Lisi beat Zhangsan'.

b. Zhangsan, Lisi da guo.
'Lisi beat Zhangsan'.

c. Lisi Zhangsan da guo.
'Lisi beat Zhangsan'.

Taken together with the evidence discussed above, it appears that *bei* relates only to the patient., not to the agent. Furthermore, such data indicate that it is *bei* that is responsible for the fronting of the object, as in standard Indo-European passive constructions, but that this initial position is not *subject* position but topic. If the position occupied by the object were subject, we have two problems: (a) what is the position occupied by the agent?; and (b) why can the agent not be fronted, with or without *bei* before it? Since we have rejected the idea that *bei* is a preposition, it follows that the agent must remain in subject position in which case the object must be in Topic position, which explains why the agent cannot appear to its left.

The *bei* construction does share certain points of similarity with topic constructions, as has been noticed in Hashimoto (1968), Lapolla (1988), Y huang (2000) and many others. Compare the *bei* sentences (1a,b), repeated below with their *bei*-less counterparts (16a,b), respectively.

(1) a. *Zhangsan bei Lisi da guo.*
Zhangsan BEI Lisi beat EXP
'Zhangsan has been beaten by Lisi.'

b. *Zhangsan Lisi da guo.*
Zhangsan Lisi beat EXP
'Zhangsan, Lisi has beaten.'

(16) a. *Zhangsan bei Lisi ma guo.*
Zhangsan BEI Lisi scold EXP
'Zhangsan has been scolded by Lisi.

b. *Zhangsan Lisi ma guo.*
Zhangsan Lisi scold EXP
'Zhangsan, Lisi has scolded.'

The similarity between (1a,b) and (16) is striking: (i) syntactically, the constituent *Zhangsan*, whether in the *bei* or topic constructions, is left-dislocated in sentence-initial position; (ii) semantically, *bei* sentences are truth-conditionally the same as topic sentences. This generalisation turns out to be correct even if we look at more data such as those in (17-18).[8]

(17) a. *qiang shang bei haizimen wa le yi-ge dong.*
wall on BEI children dig PFV one-CL hole
'A hole was dug on the wall by children.'

b. *qiang shang, haizimen wa le yi-ge dong.*
wall on children dig PFV one-CL hole
'On the wall, children dug a hole.'

c. *haizimen zai qiang shang wa le yi-ge dong.*
children LOC wall on dig PFV one-CL hole
'Children dug a hole on the wall.'

(18) a. *chitang li bei cuimin yang le henduo yu.*
pond in BEI villagers raise PFV many fish
'A lot of fishes were raised in the pond by villagers.'

b. *chitang li, cuimin yang le henduo yu.*
pond in someone raise PFV many fish
'In the pond, villagers raised a lot of fishes.'

c. *cuimin zai chitang li yang le henduo yu.*
someone LOC pond in raise PFV many fish
'Villagers raised a lot of fishes in the pond.'

(17a)-(18a) are *bei* sentences with a locative phrase occurring before the voice marker and functioning as the topic of the sentence while (17b)-(18b), resulting from the omission of *bei*, are clearly topic sentences with the locative phrase serving as the topic.[9] These two types of sentences still have in common the above-mentioned syntactic and semantic attributes. Compared with the canonical sentences in (17,18c), both the passive sentences in (17,18a) and topic sentences in (17,18b) can be treated as a species of left dislocation.

As noted above, it is not the pre-*bei* NP but the post-*bei* NP that is the subject of the sentence, with respect to the universal subject property generalised by Keenan (1976:321) that '(basic)-subjects normally express the agent of the action, if there is one'.[10] Structurally, what precedes *bei* is the topic of the sentence and what follows *bei* is a comment-like clause providing some information about what happens to the sentence initial patient. The functional similarity of passivisation with topicalisation has already been discussed by a number of linguists like Givón (1979: 186), who defines passivisation as 'the process by which a non-agent is promoted into the role of a main topic of the sentence', and Roberts (1998: 112) who claims that 'passivisation can be regarded as one way of making a functional topic more prominent syntactically'. Our claim, therefore, is that passive in Chinese involves the promotion of object not to subject but to (unique) topic and that it is *bei* that induces the dislocation of the object to sentence initial (topic) position.

Nevertheless, we are fully aware that there still exist some differences both in syntax and semantics between passivisation and topicalisation in Chinese, which precludes the possible conclusion that they should be regarded as entirely the same. Syntactically, what is passivised can only be an object of a transitive verb, whereas what is topicalised is not subject to this constraint, as illustrated in (19)-(20).

(19) a. **Lisi bei da guo Zhangsan.*
Lisi BEI beat EXP Zhangsan

b. *Lisi ta/zhe jiahuo da guo Zhangsan.*
Lisi 3SG/this guy beat EXP Zhangsan
'Lisi, he/this guy has beaten Zhangsan.'

(20) a. **Lisi bei ma guo Zhangsan.*
Lisi BEI scold EXP Zhangsan

b. *Lisi ta/zhe jiahuo ma guo Zhangsan.*
Lisi 3SG/this guy scold EXP Zhangsan
'Lisi, he/this guy has scolded Zhangsan.'

The ungrammaticality of (19a) and (20a) contrasts sharply with the grammaticality of (19b) and (20b). The former can be accounted for by the fact that *Lisi* as the agent cannot occur before *bei* since only the patient is licensed to do so, whereas the latter can be attributed to the fact that NPs in any argument position are allowed to be topicalised in Chinese.

3.2 Pragmatic voice

Bei's function in inducing dislocation of an object noun phrase can explain why such sentences are considered as passives in Chinese. In effect, the use of the morpheme highlights the semantic aspect of the affectedness inherent in the patient relation (cf. Shibatani 1985). Consider the following example:

(21) a. *jingcha kanjian le Zhangsan.*
police see PFV Zhangsan
'The policeman saw Zhangsan.'

b. *Zhangsan bei jingcha kanjian le.*
Zhangsan BEI police see PFV
'Zhangsan was seen by the policeman.'

The active sentence (21a) simply describes a seeing event in which the affectedness of the patient is not salient. With the use of *bei*, however, the patient is fronted to sentence-initial position which marks the entity as the most prominent argument of the verb. The syntactic prominence resulting from displacement makes the argument the focus of attention. In the presence of the voice particle *bei* which, we suggest, always signals the message 'attention, please, what precedes me is the object acted upon', the object properties of the fronted argument naturally become salient. One of the standard properties of patient objects is affectedness, which, we suggest, potentially gives rise to a pejorative meaning as it emphasizes the passivity of the patient of the action. Such an interpretation is bolstered by the remnant of the semantics of the verb that *bei* once was: the subject of such a verb being the recipient, a non-agentive role. Hence, (21b) implies an unfavourable situation that *Zhangsan* faced subsequent to the seeing event, i.e. he might be suspected of doing something bad or might be questioned later. The adverse implication of *bei* sentences, we argue, is thus reached inferentially through the signalling by *bei* that its preceding noun phrase has an object, typically patient, role and through the remnant indication that this same term is the recipient/goal of the action described by the verb.[11]

Our claim, then, is that *bei* changes the voice of a sentence from active to passive by means of assigning not only a semantic object role to the pre-*bei* NP but also a marked pragmatic status. This it does without altering the morphosyntactic or semantic relations between the verb and its arguments. In other words, the *bei* construction in Chinese is passive by virtue of the fact that it encodes action notionally devolving from the standpoint of the patient of a transitive verb (cf. Klaiman 1991). This voice is undoubtedly passive, because the verbs occurring in *bei* sentences, in the words of Lyons (1968: 372), are characterised by "signifying the state of 'being acted upon' or 'suffering the effects of the action"', as can be attested by the fact that they generally take a perfective aspect marker *le* or an experiential aspect marker *guo*.

Klaiman (1991), on the basis of a cross-linguistic survey, introduces a threefold classification of voice types: derived voice (passivisation phenomena), basic voice (active-middle systems) and pragmatic voice. According to Klaiman, the pragmatic voice as a distinct type is manifested by voice alternations signaling the variable assignment to sentential arguments of some special pragmatic status or salience. Let us consider the following example quoted by Klaiman (p.34) from Ayres, a Mayan language.

(22) a. *A- k'oni in ta'n uula.*
2SG ERG shoot 1SG ABS with sling
'You shot me with a sling.'

b. *Uula a- k'oni –b'e in*
sling 2SG ERG shoot index 1SG ABS
'With a sling you shot me.'

In (22a), an oblique nominal appears sentence-finally, whereas in (22b), this argument, stripped of the preposition, is fronted in sentence-initial position. The suffix *–b'e* is an index of instrumental focus which means that the oblique-instrumental argument is the locus

of informational salience in the sentence. As for Chinese, its passive by and large behaves in a similar fashion to that of Ayres, cf. (23) (cf. L.Li: 1980: 402)

(23) a. *ta yong na-kuai bu zuo le yi-tian kuzi.*
3SG with that-CL cloth make PFV one-CL trousers
'He made a pair of trousers with the cloth.'

b. *na-kuai bu bei ta zuo le yitiao kuzi.*
that-CL cloth BEI 3SG make PFV one-CL trousers
'The cloth was made into a pair of trousers by him.'

As with the Mayan example in (22a), (23a) has an oblique nominal in sentence-final position, whereas in (23b), the nominal stripped of the preposition is fronted in sentence-initial position. Just like the suffix *–b'e*'s assignment of informational salience to the oblique-instrumental argument, *bei* signals the assignment of pragmatic salience to the pre-*bei* argument, i.e. the cloth has been used, unfortunately improperly.

By comparison, the voice behaviours in Chinese and Ayres share at least two characteristics: (i) the voice change from active to passive entails no alternation in morphosyntactic relations between the verb and its nominals; (ii) the voice change from active to passive involves "the assignment to sentential arguments of some salience whose basis is in the situation of speaking, or pragmatic salience" (Klaiman 1991:35).

To sum up, we claim that *bei* is a functional element that gives rise to a form of pragmatic passive construction in Chinese. The morpheme induces the left dislocation of an object noun phrase into the initial topic position, thus highlighting its affectedness by the verb, and further signals that this expression is the goal of the action. In the next section, we provide an analysis within the framework of Dynamic Syntax.

4 Dynamic Syntax

Before presenting a dynamic account of the canonical *bei* constructions based on the above observations, we provide in this section an introduction to the framework of Dynamic Syntax (Kempson et al 2001). According to this theory, natural language understanding is a process of monotonic tree growth defined over the left-right sequence of words, with the goal of establishing some propositional formula as interpretation. Specifically, The paradigm seeks to develop a grammar formalism for characterising the structural properties of language by means of modeling the dynamic process of interpretation. What is novel about this formal articulation of the parsing process is that it purports to provide an explanation of syntactic properties of natural language. The dynamism in this framework is clear: the focus is on the process, rather than the result, of establishing structures as interpretation in which explanations of properties of sentences are couched.

A number of significant observations have been reflected in the design of the Dynamic Syntax (henceforth DS) model. Firstly, human language understanding is highly dependent on context and that change of context is not merely sentence by sentence, but also word by word. Secondly, processing, like other cognitive activities, involves the manipulation of partial information: in parsing, the specific task is to manipulate partial information, represented as logical forms, as interpretation is incrementally built up. This paradigm extends incomplete specifications from semantics and pragmatics to the domain of syntax,

and thus allows the interaction between three types of actions, computational, lexical and pragmatic in the interpretive process.

Intrinsic to this process are concepts of syntactic underspecification which is manifested in a number of different ways and whose resolution is driven by the notion of requirements. For immediate purposes, we only introduce some of the machinery of the DS model needed for handling the construction under investigation.

4.1 Requirements and tree growth

The logical form corresponding to the interpretation of a string is represented as a tree which itself represents the argument structure of a clause, and the parsing process is the attempt to establish some appropriate tree on the basis of the words provided. The starting point of tree growth is to build a tree the root node of which is the goal of interpretation formalised as a universal requirement $?Ty(t)$, where ? indicates the requirement, Ty is a label indicating type and t is the type of a proposition. So the requirement, $?Ty(t)$, is a requirement to build a representation of propositional content.[12] To satisfy a requirement, a parse relies on information from three sources. First of all, there are computational rules which restrict the way trees are built and which may be universally or specifically available to a language. A general computational rule determines that a tree rooted in $?Ty(Y)$ may be expanded to one with an argument daughter $?Ty(X)$ and a functor daughter $?Ty(X \rightarrow Y)$. By this rule, the initial requirement $?Ty(t)$ can be expanded to a partial tree with two subgoals: to find the subject a predicate of the proposition. This is shown in the display as in Figure 1 which shows the development of the initial partial tree on the left to the more articulated tree on the right. The diamond, $\Diamond$, is the 'pointer' which is used to identify the particular node under development. By convention, the pointer is placed at the most local argument node, unless other constraints operate.[13]

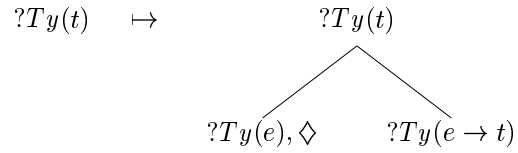

Figure 1: A initial expansion of the tree

Secondly, information about tree building may come from actions encoded in lexical entries which are accessed as words are parsed. Take the utterance *David loves Mary* as an example. A lexical entry for the word *David*, for instance, contains conditional information initiated by a trigger (the condition providing the context under which subsequent development takes place), a set of actions (here involving the annotation of a node with type and formula information) and a failure statement (commonly an instruction to abort the parsing sequence) if the conditional action fails. The lexical specification further determines, through the annotation $[\downarrow]\bot$, that the node in question is a terminal node, a general property of contentive lexical items.[14]

(24) Lexical entry for *David*:

IF	$?Ty(e)$	*Trigger*
THEN	$put(Ty(e), Fo(David), [\downarrow]\bot)$	*Actions*
ELSE	ABORT	*Failure*

The information derived from parsing *David* provides an annotation for the subject node and thus satisfies the requirement on that node for an expression of Ty(e). Then, the pointer moves on to the functor node.

Lexical entries may make reference to nodes in the tree other than the trigger node, either building them or annotating them, by employing a few instructions such as `make()`, `put()`, `go()` (with obvious interpretations). To formulate both computational and lexical actions in these terms, DS adopts The Logic of Finite Trees (LOFT) (Blackburn and Meyer-Viol 1994), a modal logic for describing finite trees. This logic is central to the DS framework because it allows reference to any node in a tree from any other node, using operators such as those in (25). and utilizes a number of operators as follows:

(25) $\langle\uparrow\rangle, \langle\uparrow_0\rangle, \langle\uparrow_1\rangle, \langle\downarrow_0\rangle, \langle\uparrow_0\rangle, \langle\uparrow_*\rangle, \langle\downarrow_*\rangle$.

These modalities are interpreted by a discrete relation between the nodes in a tree: $\downarrow$ is evaluated over the daughter relation, so $\langle\downarrow_0\rangle$ and $\langle\downarrow_1\rangle$ are defined over the argument daughter and functor daughter relations respectively; conversely $\uparrow$ is the inverse, mother relation, thus $\langle\uparrow_0\rangle$ and $\langle\uparrow_1\rangle$ point to a mother node from argument and functor daughters, respectively. The two modalities $\langle\downarrow_*\rangle$ and $\langle\uparrow_*\rangle$ are underspecified modalities referring to the dominance relation and its the inverse, respectively. Both relations are defined as the reflexive and transitive closure of the appropriate relation so that $\langle\uparrow_*\rangle\alpha$ states that α holds of the current node or the mother of the current node or of some node dominating the mother of the current node (i.e. $\langle\uparrow_*\rangle\alpha =_{def} \alpha \vee \langle\uparrow\rangle\langle\uparrow_*\rangle\alpha$).

By the use of LOFT operators it is possible to encode complex actions within lexical entries as illustrated by the parse of the verb *loves*. The pointer is manipulated by the lexical actions to annotate different nodes. Firstly, it moves to the first open $Ty(t)$ node which is annotated with present tense information, then returns to the predicate node. The functor daughter is then built, and annotated with a type and a formula (the two place predicate representing the relation which the verb is taken to denote). The argument daughter is then built and decorated with a requirement to construct a formula of type e. The pointer remains on this node, indicating that this is to be developed next. The effect of these actions is shown in Figure 2 which illustrates the transition from the tree showing a parse of *David* to the one that results from *David loves*.

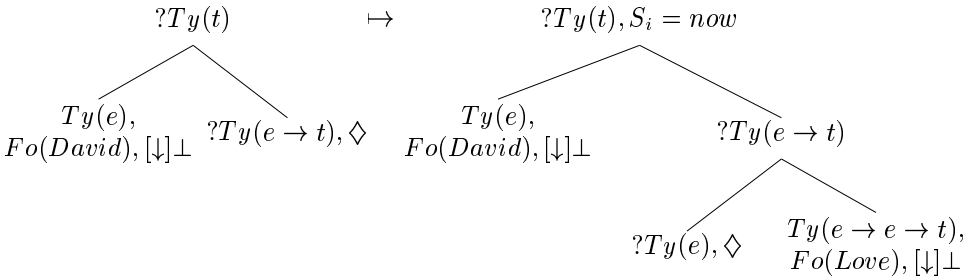

Figure 2: Parsing *David loves*

Finally, *Mary* is parsed to satisfy the open term requirement in the internal argument position, the processing of which is the same as for the subject *David*, except for the content of the term. The parsing process is not yet finished, however, as some requirements on the tree remain to be satisfied. Completion of the tree involves functional application of functors

over arguments, driven by modus ponens over types, yielding expressions which satisfy the type requirements associated with intermediate nodes. Figure 3 shows the completed tree with no outstanding requirements, the root node of which is decorated with a $Ty(t)$ formula value.

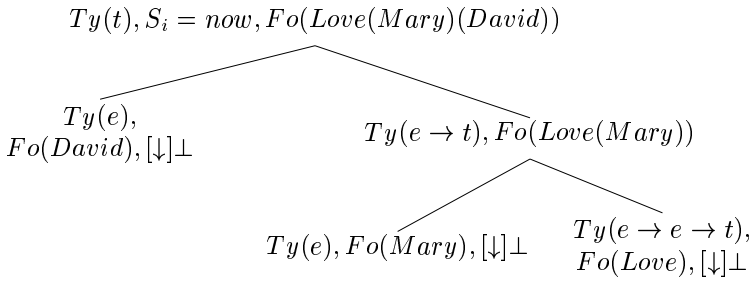

Figure 3: Completing *David loves Mary*

4.2 Formula underspecification

DS also allows pragmatic actions a role in the parsing process, which can be illustrated by the processing of anaphoric expressions, the assignment of interpretation to a pronoun. The linguistic phenomenon of content underspecification, which is taken in a representationalist spirit (see Kempson et al 2001, chapter 1), involves the articulation of pronouns as projecting a metavariable to be replaced by some proper representation. Put in another way, the pronoun can be construed as a bound variable or a place-holder which can be substituted by some selected term from the context. The substitution process is pragmatic in the sense that it is strictly context-dependent.[15]

Consider the parsing of pronous like *she* and *him* in the utterance *David loves Mary, but she doesn't love him.* In processing the first pronoun *she*, the subject node of the conjunct clause is first decorated with a metavariable **U**, with an associated requirement $?\exists \mathbf{x}.Fo(\mathbf{x})$, to find a contentful value for the formula label, as shown by (26).

		IF	$?Ty(e)$
(26)	*her*	THEN	$put(Fo(\mathbf{U}), Ty(e), ?\exists \mathbf{x}.Fo(\mathbf{x}), ?\langle\uparrow_0\rangle Ty(t), [\downarrow]\bot)$
		ELSE	ABORT

Construed in the context provided, substitution will determine that the formula **U** is replaced by *Fo(Mary)*, since 'she' requires to be identified with a referent that is female or that can be attributed with female properties.

Formula underspecification does not figure largely in this paper, but the concepts presented here form the basis of our sketch of an analysis of pro-drop in Chinese. Chinese freely omits arguments when it is clear what those arguments should be from the context. Thus, all the strings in (27) are grammatical in appropriate contexts:

(27) a. *Lisi ma guo Zhangsan*
Lisi scold EXP Zhangsan
Lisi scolded Zhangsan

b. (Who did Lisi scold?)
ma guo Zhangsan

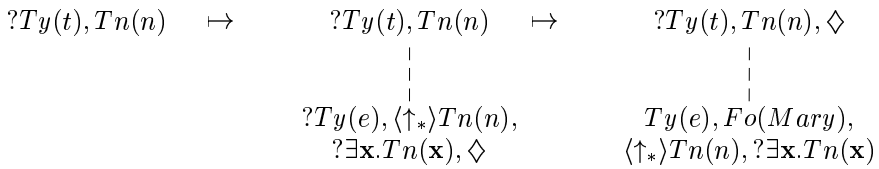

Figure 4: Parsing a left dislocated string

c. (Who scolded Zhangsan?)
Lisi ma guo

d. (What did Lisi do to Zhangsan?)
ma guo

This freedom is omitting arguments can be accounted for by allowing a 'free-ride' set of lexical actions that allows for any type e requirement to be satisfied by the postulation of a metavariable just in case the relevant node is terminal (i.e. no expansion of the open node has already occurred).

		IF	$?Ty(e)$	
		THEN	IF	$\langle\downarrow\rangle\bot$
(28)	Pro-drop:		THEN	$\mathtt{put}(Ty(e), Fo(\mathbf{U}))$
			ELSE	ABORT
		ELSE	ABORT	

Such an account freely allows the pro-drop examples in (27) above, by ensuring that the open argument nodes are decorated by a metavariable whose value is provided through pragmatic substitution in the relevant context.[16]

4.3 Left Dislocation

The third sort of underspecification considered here is that of a tree relation, associated with a requirement to identify where in a tree a node should be fixed. This type of underspecification is associated with the modalities $\langle\downarrow_*\rangle$ and $\langle\uparrow_*\rangle$ (dominance and its inverse) introduced above. Thus, expressions may be parsed without initially having a fixed position within the tree but being asserted to be only dominated by some node above, $\langle\uparrow_*\rangle Tn(n)$ where Tn is the Treenode predicate that identifies the address of a node in a tree, an address being a string of 0s and 1s with 0 the address of the topnode and argument daughters being assigned an additional 0 while functor daughters are marked with 1.[17] Unfixed nodes also carry a requirement $?\exists\mathbf{x}.Tn(\mathbf{x})$ to identify a fixed address within the current tree.

Such locational underspecification is used to account for long distance dependencies which are analysed in terms of initially unfixed nodes whose position in the emergent tree structure is fixed at some later stage in the parsing process. For example, analyzing the string *Mary, David loves* in these terms is illustrated in Figure 4 with an initially projected unfixed node allowing the parse of the word *Mary*. At this point, the parse of the string proceeds exactly as before to yield the tree in Figure 5. At the point when all words in the string have been

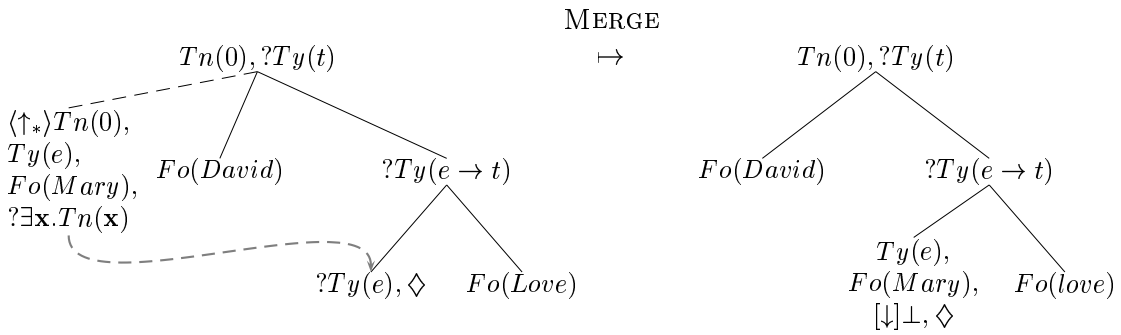

Figure 5: Parsing *Mary, David loves*

processed, there remains outstanding an unfixed node and a requirement to construct a node of type e. In this environment, a process of Merge can take place which unifies the unfixed treenode with the current node. Ultimately, completion of parsing the utterance derives a full proposition *(Love(Mary))(David).*[18]

Notice how this modeling of natural language structure replaces the static configurational approach: concepts such as c-command defined over a fixed structure are in general replaced by the dynamic concept of left to right processing. That is, with the added dimension of tree growth following a left-right sequence of words, not all explanations need to be provided in the form of hierarchical relationships between fixed elements in a structure.

4.4 Simple sentences in Chinese

As Chinese is characterised typologically as an SVO language, one would expect the analysis of basic sentences to be identical to that sketched for English above. However, because of data such as those in (29), in which the number of post-verbal noun phrases varies, we will adopt a slightly different approach to the parsing of verbs sketched above which will also provide a basis for analysing the problematic *bei* patterns discussed in the next section..

(29) a. *Zhangsan qu guo Lundun*
Zhangsan go EXP London
Zhangsan went to London

b. *Zhangsan qu guo rang-ci*
Zhangsan go EXP two-time
Zhangsan has been twice.

c. *Zhangsan qu guo Lundun rang-ci*
Zhangsan go EXP London two-time
Zhangsan has been to London twice.

In order to account for such sentences, we take up the proposal put forward in Marten (2002) to account for prepositional and other verbal adjuncts within DS. We will not go into much detail here, but the basic idea is that verbal adjuncts are treated as arguments of the verb not

as functors over predicates and that all verbs are introduced with a type that underspecifies the number of arguments they can take. The treatment of verbs as underspecified involves blurring the traditional notion of subcategorisation which encodes a distinction between arguments, which are said to be obligatory, and adjuncts, which are said to be optional. As has been noticed and argued by a number of authors (e.g. McConnell-Ginet 1982, Chierchia 1989, Grimshaw 1990, Jackendoff 1990, Bouma et al. 1998), the distinction is not a clear-cut, because some adjuncts behave like arguments and some arguments behave like adjuncts in (e.g.) their optionality. Marten treats all adjuncts and arguments as subcategorised by the verb, PP (and NP) adjuncts themselves receiving a uniform type, $Ty(e)$. He postulates that all verbs have an underspecified type which he represents as $e* \rightarrow t$ where $e*$ is interpreted as Kleene closure over $e \rightarrow$. So, verbs may be instantiated as having variable types, including $Ty(t), Ty(e \rightarrow t), Ty(e \rightarrow e \rightarrow t), Ty(e \rightarrow e \rightarrow e \rightarrow t)$ and so on.

This approach can be readily applied to Chinese where there are a lot of argument-like adjunct NPs, such as the frequency phrase in (30a), the duration phrase in (30b), and the extent phrase in (30c). Since these adjunct NPs appear to be syntactically on a par with nominal expressions and semantically obligatory, Chao (1968: 312-315) calls them 'cognate objects' that both transitive and intransitive verbs can take.

(30) a. *women pao le san-tang.*
1PL run PFV three-times
We have made three trips.

b. *tamen deng le ban-tian.*
3PL wait PFV half-day
They waited for a long time.

c. *nimen chi le yi-bu.*
2PL late PFV one-step
You were late by one step.

We thus adopt Marten (2002)'s approach to verbal type underspecification here, with the difference that we specify the number of 'internal 9obligatory) arguments' a verb takes: intransitive verbs are thus of type $e* \rightarrow e \rightarrow t$ and transitive verbs are of type $e* \rightarrow e \rightarrow e \rightarrow t$. In parsing a string, therefore, it is only when the whole postverbal material has been parsed that a verb's type can be resolved (see Marten 2002 for details).

One of the consequences of this move is that verbs must be parsed as decorating an initially *unfixed* node within a tree which is fixed once the number of arguments is determined. The rule that we adopt derives, from a tree with an open predicate requirement with no daughters, another tree that has an unfixed node dominated by the open predicate node that carries a requirement for a predicate of underspecified arity. This is shown in the use of the metavariable **U** in Figure 6 in the type requirement of the unfixed node which ranges over types. The requirement $?\mathbf{U} \rightarrow e \rightarrow t$ may thus be satisfied by any formula whose output type is that of a one-place predicate, e.g. $e \rightarrow t$, $e \rightarrow e \rightarrow t$, $e \rightarrow e \rightarrow e \rightarrow t$, $t \rightarrow e \rightarrow t$, $(e \rightarrow t) \rightarrow e \rightarrow t$, and so on.

Using the construction rule in Figure 6 allows us to analyse *Zhangsan qu guo Lundun rang-ci* 'Zhangsan went to London twice'. As illustrated in Figure 7, subject and predicate requirements are created, allowing the parse of *Lisi*. At this point the unfixed predicate rule applies to give the first tree. Assuming that the lexical entry for verbs is now assumed to be

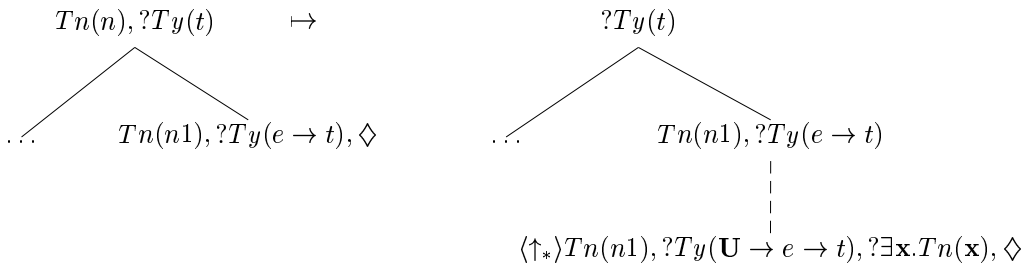

Figure 6: Unfixed Predicates

triggered by an underspecified type requirement as exemplified in (31), parsing *qu* yields the second tree with the predicate type requirement of the unfixed node now satisfied and the pointer at the open main predicate node.

		IF	$?Ty(\mathbf{U} \rightarrow e \rightarrow t)$
(31)	*Qu*	THEN	$\mathtt{put}(Ty(e* \rightarrow e \rightarrow e \rightarrow t), Fo(Qu))$
		ELSE	ABORT

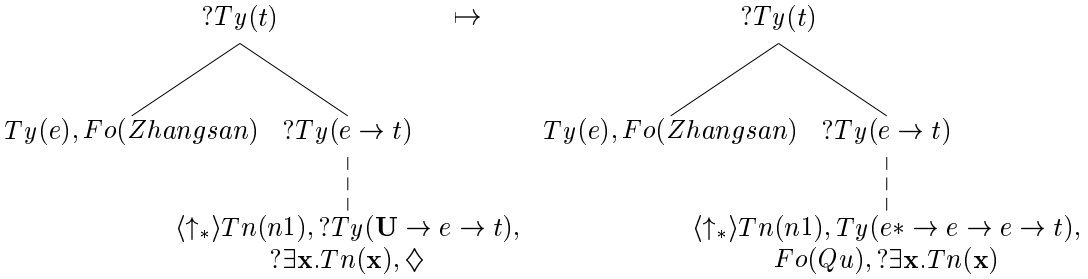

Figure 7: Parsing *Zhangsan qu (guo)*

General tree construction rules may now apply to create the internal argument and two place predicate nodes with open type requirements. This allows the parse of *Lundun* and the pointer moves to the functor node and general rules apply once more to provide a further two subgoals. The phrase *rang-ci* 'twice' may now be parsed and the unfixed predicate node merges with the open functor node of type $e \rightarrow e \rightarrow e \rightarrow t$.

This produces a tree that compiles to give a proposition with formula value $Qu(Rang-ci)(Lundun)(Zhangsan)$ with the innermost argument being interpreted as some sort of event modifier so that the semantics might cash out, after inference over *rang-ci* , as 'there are two events of going with Zhangsan as the agent and London as the goal ($\exists e[Qu(e) \wedge Agent(e, Zhangsan) \wedge Loc(e, Lundun) \wedge Two(e)]$ in some event semantics).[19] Although this may seem a lot of machinery to account for a simple transitive sentence, none of the machinery is ad hoc to this construction and we will see the advantages of the approach in the next section.

Before developing an analysis of the canonical *bei* constructions, we should say a brief word about noun phrase interpretation in Chinese. As noted above, all noun phrases in DS are construed as projecting content of type e. Given that bare common nouns may appear

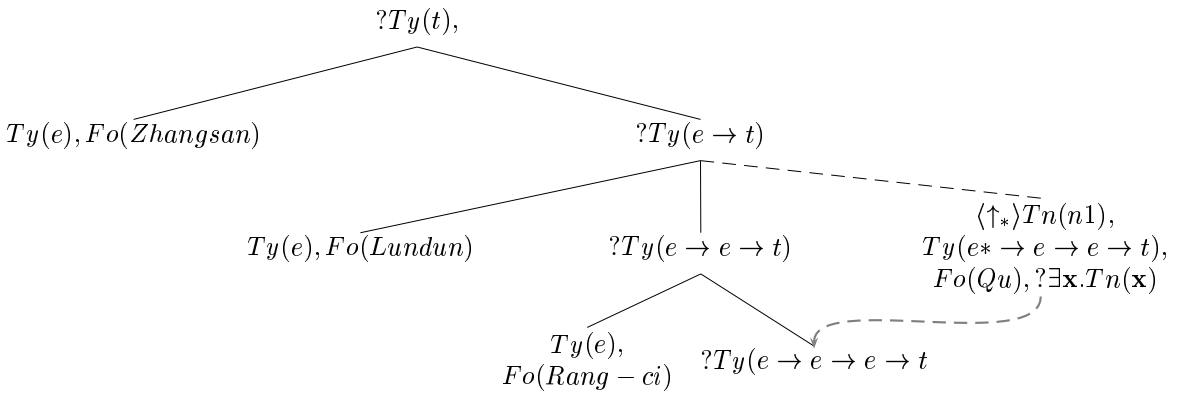

Figure 8: Parsing *Zhangsan qu (guo) Lundun*

in any argument position as full noun phrases, a decision needs to be taken with respect to the representation of the content of such expressions which can be interpreted as definite, indefinite or generic depending on context, as illustrated in (32).

(32) *Lisi jian le toufa*
Lisi cut PFV hair
Lisi cut some hair.
Lisi cut the hair.
Lisi cut hair.

In this paper, we adopt the proposal of Chierchia (1998) that bare nouns in Chinese should be analysed as projecting expressions of type e, not that of the type of common nouns in languages like English, and that they should be interpreted as kinds rather than properties. A noun like *tui* 'leg' will be associated with the simple set of actions illustrated in (33).

(33)
IF	$?Ty(e)$
THEN	$\texttt{put}(Ty(e), Fo(Leg), [\downarrow]\bot)$
ELSE	ABORT

There is no space here to go into details of interpretation in different contexts and with respect to the interaction of classifiers. However, certain elements in conjunction with a classifier, such as demonstratives, have an individuating function, denoting functions from kinds to individual entities.[20] Other factors also tend towards an individuating interpretation. So subjects will tend to pick out individuals rather than kinds as will the objects of certain verbs. However, such interpretations are context dependent and we will see in the next section how local context can affect the way a bare noun is interpreted.

4.5 Representing and interpreting the 'bei' construction

Having spelled out the grammatical characteristics of the *bei* construction in Section 3, we now turn to its analysis within Dynamic Syntax. Recall that we have argued that the pre-*bei*

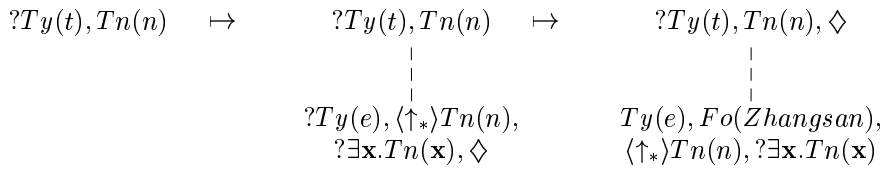

Figure 9: Parsing *Zhangsan*

constituent is a topic, a left dislocated expression. Given this, it is natural to analyse this constituent in terms of an initially unfixed node, with an entirely open dominance relation to the topnode as with ordinary topic constructions. Parsing *bei* then identifies this unfixed node as the internal argument of the main verb. In other words, *bei* restricts the locality of the node associated with the dislocated, pre-*bei*, expression quite precisely, even though it remains strictly unfixed at this point of the parse.

This locality restriction is achieved by imposing a further two requirements on the unfixed node. The first is a requirement that, at some stage in the parse, the node has a predicate node as mother: $?\langle\uparrow_0\rangle Ty(e \rightarrow t)$ 'I must be the argument daughter of a predicate node'. The second restriction has to do with the fact that the node must be identified as the argument daughter of the *highest* predicate node. This is because the *bei* construction generally does not allow long distance extraction as exemplified in (34):

(34) a. **Yuehan bei Mali renwei Dawei da guo.*
John BEI Mary think David beat EXP

b. *Yuehan Mali renwei Dawei da guo.*
John Mary think David beat EXP
john, Mary thinks that David beat.

This further locality requirement may be represented through the complex modality: $?\langle\uparrow_0\rangle\langle\uparrow^1_*\rangle Tn(0)$ which requires the current node to be the argument daughter of some node which is dominated by $Tn(0)$ solely through functor nodes.[21]

To illustrate the proposed analysis of the *bei* construction, we first tackle the canonical agentive pattern, with (1a) (*Zhangsan bei Lisi da guo*) as an example. From the universal requirement to create a tree of type t, the first step is to utilise the general rule for introducing unfixed nodes on the left periphery illustrated in Figure 4 which allows the parse of the string-initial constituent *Zhangsan* shown in Figure 9. Having parsed *Zhangsan*, the pointer now moves back to the root node of the tree and the voice particle *bei* is then scanned, giving rise to the lexical actions in (35) which impose the locality constraints on fixing the position of the unfixed node discussed above. The result of parsing *bei* is shown in Figure 10.

(35) Lexical entry for *bei*

IF	$?Ty(t)$
THEN	$\texttt{go}(\langle\downarrow_*\rangle Ty(e))$,
	$\texttt{put}(?\langle\uparrow_0\rangle Ty(e \rightarrow t), ?\langle\uparrow_0\rangle\langle\uparrow^1_*\rangle Tn(0))$,
	$\texttt{go}(\langle\uparrow_*\rangle ?Ty(t))$
ELSE	ABORT

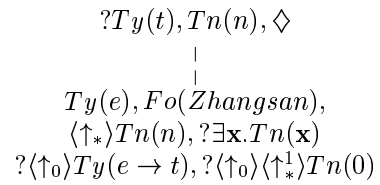

Figure 10: Parsing *Zhangsan bei*

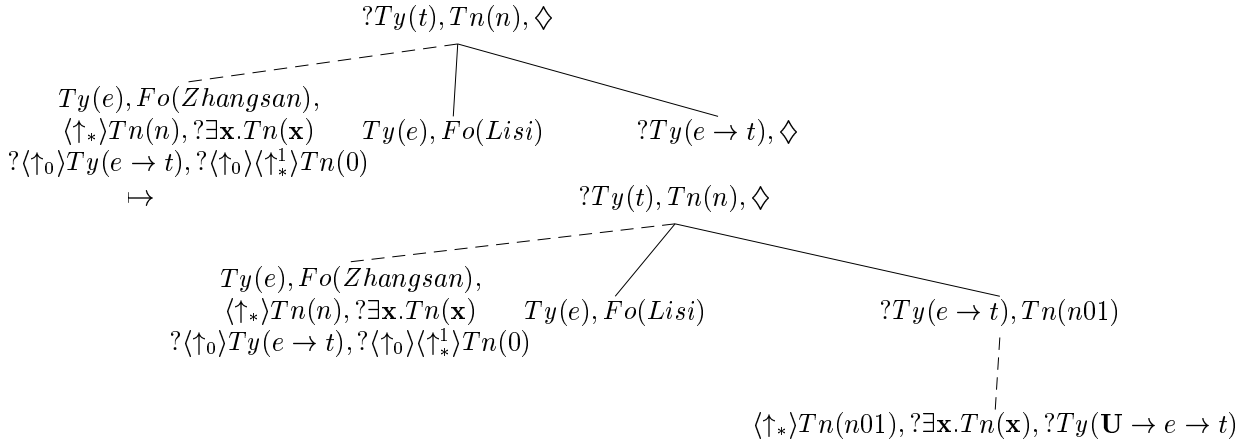

Figure 11: Parsing *Zhangsan bei Lisi*

The parse now proceeds as before with nodes for subject and predicate being introduced, allowing the parse of the agent *Lisi*, at which point the context is such as to allow the projection of an unfixed node to permit the parse of the verb, as discussed in the previous section and illustrated in Figure 11. Parsing the verb satisfies the type requirement of the unfixed n-place predicate node and then, as we have seen above, the predicate node is unfolded as two further subgoals: to find the content of an internal argument and a two-place predicate. By convention, the pointer first moves to the argument node and this provides the context in which the merge of the pre-*bei* constituent can take place, as shown in Figure 12.

After the merger of the unfixed node with that of the internal argument, the pointer moves to the open two-place predicate position, where merge of the unfixed predicate node takes place, as shown in Figure 13. Completion of the predicate node satisfies the predicate requirement associated with the parsing of *bei*, while completion of the whole tree satisfies its other locality requirement. The final output of the parse is shown in Figure 14.

This analysis provides a template for analyzing various patterns of *bei* constructions. In all cases, a left-peripheral argument, signalled by the voice marker *bei*, merges with the internal argument daughter of the one-place predicate to derive a well-formed proposition. The agentless pattern is straightforwardly analysable: the lack of the subject expression is a simple instance of pro-drop. Thus in *Zhangsan bei da guo*, after the first two words have been parsed to given an unfixed node, an application of the pro-drop rule in (28) induces a

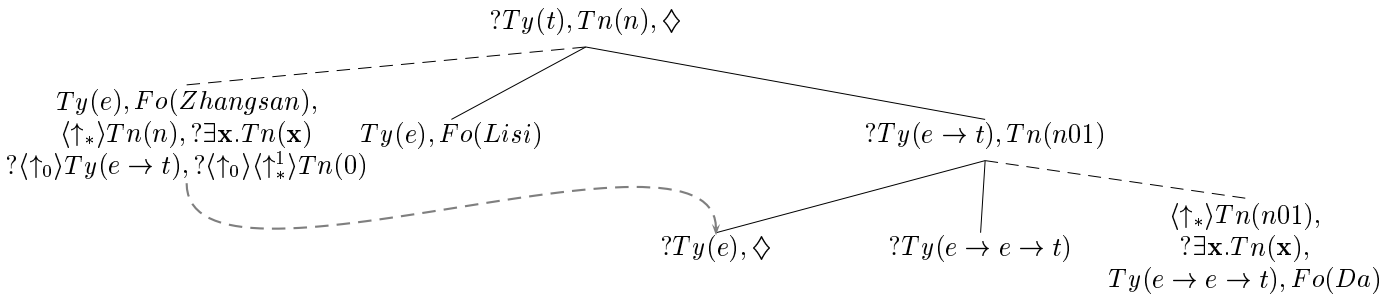

Figure 12: Parsing *Zhangsan bei Lisi da (guo)*

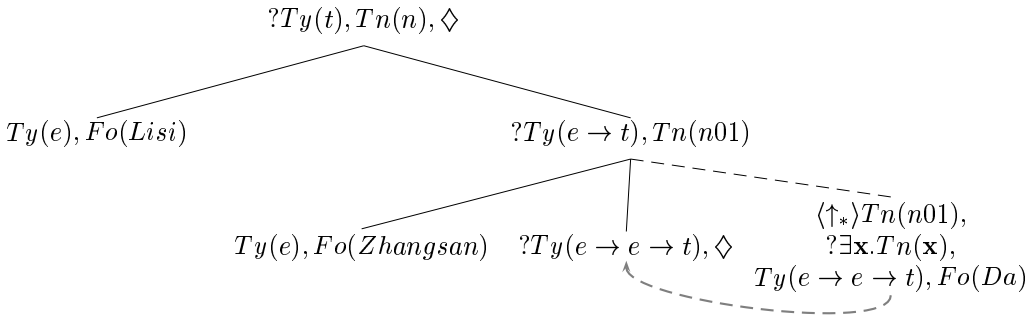

Figure 13: Parsing *Zhangsan bei Lisi da (guo)*

metavariable to satisfy the type-requirement to be replaced by some term in context. In parsing a string like *chuanghu bei za le* 'The window was smashed', the post-bei 'gap' is replaced by a metavariable with a requirement to find some content, either a salient substituend or In favour of this analysis is the fact that after an utterance like (36a), an agent-oriented question like (36b) is felicitous.

(36) a. *chuanghu bei za le.*
window BEI smash PFV
The window was smashed.

b. *bei shui za le?*
BEI who smash PFV
'By whom was (the window) smashed?'

Substitution for this metavariable could be of some arbitrary term standing for 'someone'. However, in spoken discourse, native speakers prefer to use a generic NP like *ren* 'people' in the post-*bei* position instead of a null agent if the agent is unknown to them or unnecessary to specify, as shown in (37).

(37) a. *Zhangsan bei (ren) da le.*
Zhangsan BEI people beat PFV
Zhangsan was beaten by someone.

b. *chuanghu bei (ren) za le.*
window BEI people smash PFV

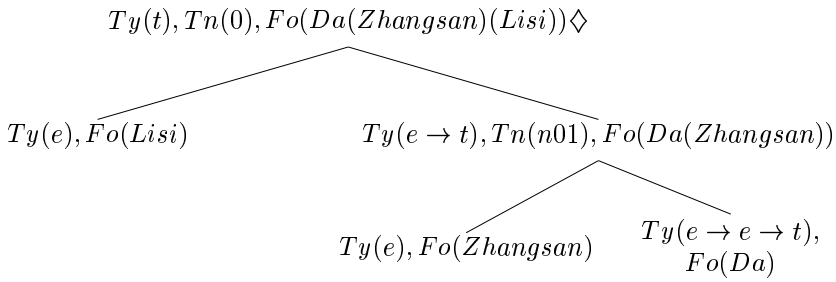

Figure 14: Completing *Zhangsan bei Lisi da (guo)*

The window was smashed by someone.

These data imply that the agentless pattern has obligatory pragmatic effects in the sense that the agent, albeit absent in the syntax, is pragmatically 'present' in the mind of the hearer.[22] [23]

One of the aspects of the *bei* construction that we have not so far implemented in the analysis is the fact that not only is the pre-*bei* constituent interpreted as the internal argument of the main predicate, but it is also interpreted as being strongly affected by the action denoted by the verb, an affected patient. Although, as discussed in section 3.2, we can derive part of the affectedness reading from the topic properties of fronting and internal argument identification imposed by *bei*, the fact that affectedness or goal-of-event readings always apply (even if pejorative interpretations do not, see footnote 14), indicates that this remnant of the verbal interpretation of *bei* should be represented in the content of the proposition.

We provide this information in the form of a 'presupposition' attached to the term constrained by *bei*. This is shown as α_{AFF} where α is the term and AFF is intended to be a constraint on interpretation such that whatever the thematic role of the main predicate the term is identified with it must also involve strengthening to an affected role. The lexical actions of *bei* must be revised to take this into account as in (38).

(38) *bei*

IF	$?Ty(t)$	
THEN	IF	$\langle\downarrow_*\rangle(Ty(e) \wedge Fo(\alpha))$
	THEN	$\texttt{go}(\langle\downarrow_*\rangle), \texttt{put}(?\langle\uparrow_*\rangle Ty(e \rightarrow t), ?\langle\uparrow_*^1\rangle Tn(0)$ $Fo(\alpha_{AFF})), \texttt{go}(\langle\uparrow_*\rangle)$
	ELSE	ABORT
ELSE	ABORT	

Since the internal argument of *da* 'beat' is an affected patient, the propositional formula derived from the parse of (1a), i.e. $Da(Zhangsan_{AFF})(Lisi)$ may be interpreted simply as 'there is an event of beating in which Lisi is the agent and Zhangsan the patient' ($\exists e[Da(e) \wedge Agent(e, Lisi) \wedge Patient(e, Zhangsan)]$) without any inferential effect.[24] However, in an example like that in (21b) *Zhangsan bei jingcha kanjian le* 'Zhangsan was seen by the policeman', the experiencer role assigned by the verb to its internal argument must be strengthened to give the added information that Zhangsan was affected directly by the seeing event. So $Kanjian(Zhangsan_{AFF})(Jingcha)$ must be interpreted as something like 'there is an event

of seeing with the police as agents and Zhangsan as the experiencer and this event affected Zhangsan' ($\exists e[Kanjian(e) \wedge AGENT(e, Jingcha) \wedge EXPERIENCER(e, Zhangsan) \wedge AFFECTED(e, ZH$

In this analysis, we have provided a characterisation of the *bei* construction that captures its relationship with topic constructions but also shows how the passive reading is induced by the explicit encoding that the pre-*bei* NP must be interpreted as an object of the verb, hence the interpretation of the construction as a passive. such an account directly accounts for both agentive and agentless passives without further stipulation and without assuming that *bei* has more than one function. To consolidate the analysis, we will now explore whether it can apply to the problematic patterns discussed in section 1.

5 The Problematic Patterns

As noted above, there are two problematic patterns with the *bei* construction that we are considering here, both effectively involving the 'retention' of an object, something that should not be permissible if, in fact, *bei* identifies an initial noun phrase as the internal argument of the main verb. Both constructions involve the appearance of an initial noun phrase marked by *bei* with another noun phrase also apparently to be construed as the direct object of the verb.

5.1 The *bei* construction with a retained object

In the first problematic construction illustrated in (2a,b) repeated below, an NP occupies the postverbal position, even though an initial noun phrase is followed by *bei*.

(2) a. *Zhangsan bei Lisi daduan le tui.*
Zhangsan BEI Lisi break PFV leg
Zhangsan's leg was broken by Lisi.

b. *Zhangsan bei Lisi jian le toufa.*
Zhangsan BEI Lisi cut PFV hair
Zhangsan's hair was cut by Lisi.

In some analyses within traditional and generative grammars, the pre-*bei* NP is termed the 'moved object' and the NP in the object position the 'retained object'. For convenience of discussion, we maintain these terminologies, despite the differences in analysis, and accordingly refer to this pattern as the *bei* construction with a retained object (henceforth BCRO).

Although there appear to be two objects in these examples, their status is quite different. In the first place, there are differences in anaphoric reference. While it is possible to refer directly to the 'moved' object with a following anaphor (either overt or null) as in (39), it is not possible to refer anaphorically to the 'retained' object as shown in (39b,c).

(39) a. *Zhangsan bei Lisi daduan le tui, (ta) bu neng shangban.*
Zhangsan BEI Lisi break PFV leg 3SG not could go to work
Zhangsan's leg was broken by lisi and he could not go to work.

b. *Zhangsan bei Lisi jian le toufa, (ta) kanqilai hen jingshen.*
Zhangsan BEI Lisi cut PFV hair 3SG look very smart
Zhangsan's hair was cut by Lisi and he/*it looked very smart.

c. *Zhangsan bei Lisi ma le niang. ta hen qifen.*
Zhangsan BEI Lisi curse PFV mother 3SG very angry
Zhangsan's mother was cursed by Lisi. He/*She was very angry.

This lack of anaphoric potential for 'retained objects' is further reflected in the fact that such expressions cannot be overtly referential. This is shown in the impossiblity of modifying them with demonstratives like *zhe* 'this' or *na* 'that', as shown in (40).[25]

(40) a. **Zhangsan bei Lisi daduan le zhe-/na-tiao tui.*
Zhangsan BEI Lisi break PFV this/that-CL leg

b. **Zhangsan bei Lisi jian le zhe/na-cuo toufa.*
Zhangsan BEI Lisi cut PFV this/that-lock hair

Furthermore, it is the 'moved' object that is interpreted as being affected by the action described by the verb rather than the retained object. This can be seen more clearly in examples like those in (39c) above and (41):

(41) *Zhangsan bei Lisi haisi le die.*
Zhangsan BEI Lisi kill PFV father
'Zhangsan was the victim of father-killing action done by Lisi.

Intuitively, *niang* 'mother' in (39c) and *die* 'father' in (41) do not refer to any particular mother or father but to the type of female or male parents. (41a) is thus not to be interpreted as 'Zhangsan's mother was cursed by Lisi', since it is not Zhangsan's mother but Zhangsan who is affected by the action and no direct cursing of his mother need have taken place at all.[26] Similarly in (41a), the focus is on Zhangsan and not on his father. While this sentence strongly implicates that it is Zhangsan's father who was killed (by Lisi), this results rather from inference over father-killing actions and those affected by them (typically the father's children) than a direct encoding of that information. The interpretation of the sentences in (2a,b) should thus rather be 'Zhangsan was the object of leg-breaking by Lisi' and 'Zhangsan was the object of hair-cutting by Lisi'. The fact that it is Zhangsan's leg and Zhangsan's hair is inferred from the assumption that Zhangsan is (directly) affected by the action of leg-breaking and hair-cutting.

The lack of focus on the 'retained object' is further illustrated by the data in (42) where (42c) is infelicitous as an answer to the question in (42a), but acceptable in response to (42b), whereas for (42d) felicity is reversed.

(42) a. *Lisi jian le shenmo?*
Lisi cut PFV what
What did lisi cut?

b. *Zhangsan chu le shenmo shi?*
Zhangsan happen PFV what matter
What happened to Zhangsan?

c. *(Zhangsan) bei (Lisi) jian le toufa*
(Zhangsan) BEI (Lisi) cut PFV hair
Zhangsan's hair was cut (by Lisi).

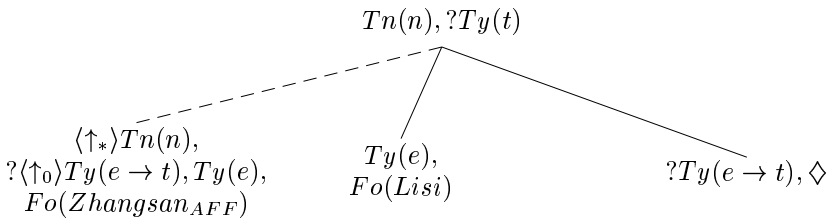

Figure 15: Parsing *Zhangsan bei Lisi*

d. *(Zhangsan de) toufa bei (Lisi) jian le.*
(Zhangsan DE) hair BEI (Lisi) cut PFV
Zhangsan's hair was cut (by Lisi).

These properties of the 'retained object', viz. the lack of anaphoric reference, the inability to be overtly definite and the inability to act as focus of the sentence, are all properties that have been shown to hold of incorporated objects (Baker 1988, Zubizarreta 1987). Under such an assumption, the verb and the 'retained object' NP combines into a complex verb which itself has an internal argument, the pre-*bei* NP. The combination of the verb and the NP object are thus interpreted in the same way as compound verbs like *ma-ren* (lit. scold-people) 'scold' and *da-ren* (lit. beat-people) 'beat', where the bare NP *ren* is an internal object without any particular reference. In other words, in the 'retained object' construction the postverbal noun phrase can only be interpreted as referring to a kind and not to some (particular) individual. As such it functions as an event modifier, not as a thematic-role bearing element. The reason for this is that the pre-*bei* expression by being identified as the internal argument of the verb and by being associated with an affected-role, necessarily requires inference to identify the properties of the event that affects the 'moved object'. Thus, although the retained object must be of a kind such as to satisfy the object thematic role of the predicate, in order to specify a property that applies to the pre-*bei* noun phrase, it must do so in such a way that it creates with the verb a complex predicate. This it can only do if it is interpreted as a kind.

On the basis of the discussion above, we are now able to formalise this problematic pattern by encoding the idea that the moved NP is the internal argument of the main predicate, while the postverbal noun phrase, although an argument of the verb, functions as an event modifier. Consider the analysis of (2a) *Zhangsan bei Lisi daduan le tui* 'Zhangsan's leg was broken by Lisi'. The first three words in the string are parsed as we have seen before: *Zhangsan* decorates an unfixed node with type and formula information; *bei* imposes locality restrictions on this node and specifies that Zhangsan is affected by the action; and *Lisi* is analysed as the subject. This is illustrated in Figure 15 where some of the decorations on the unfixed node are omitted. At this point, an unfixed predicate is introduced which allows the parse of the verb which specifies the type from $\mathbf{U} \to e \to t$ to $e* \to e \to e \to t$ and adds its formula decoration. General construction rules then create the internal argument and

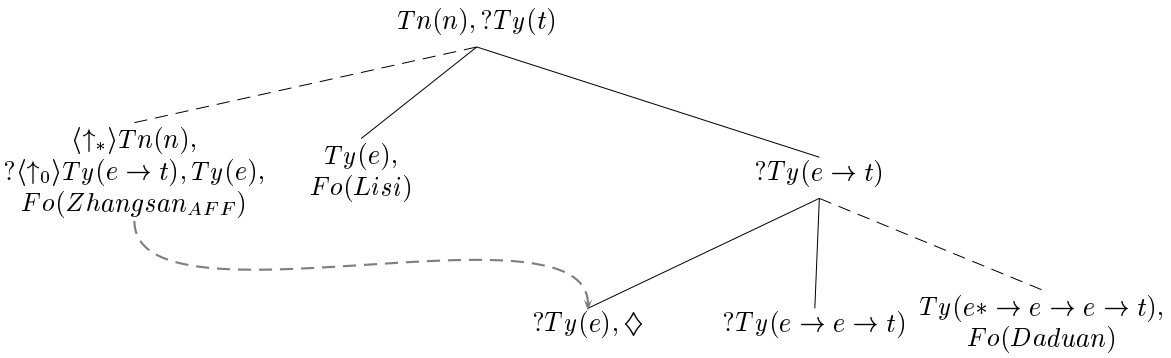

Figure 16: Parsing *Zhangsan bei Lisi daduan (le)*

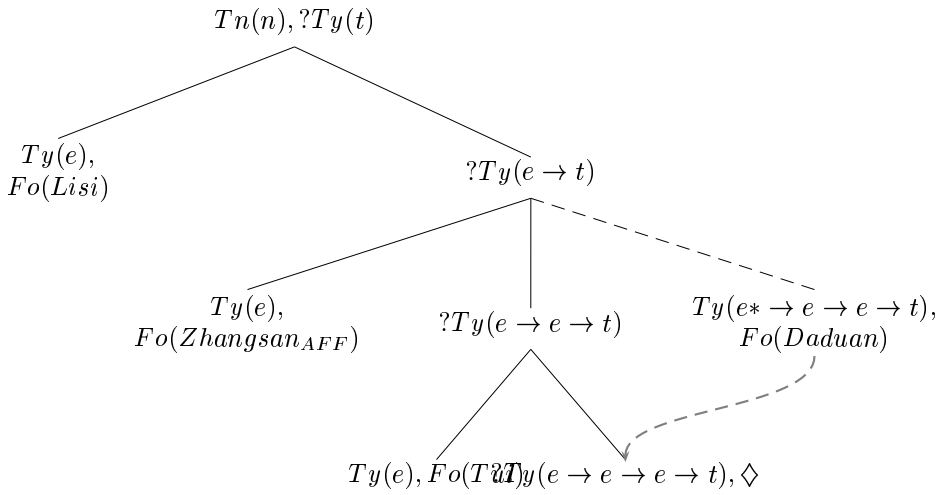

Figure 17: Parsing *Zhangsan bei Lisi daduan (le) tui*

2-place predicate nodes as previously and the unfixed node merges (necessarily to satisfy the locality constraint) with the former position to yield the structure in Figure 16. Subsequent to the fixing of the type e unfixed node, general rules unfold two further subrequirements to allow for the parse of the postverbal noun *tui*. The pointer then moves to the functor node with which the unfixed predicate node merges. This resolves the verbal underspecification as $Ty(e \to e \to e \to t)$, as shown in Figure 17. Completion of the parse yields a complete propositional formula, as $Fo(Daduan(Tui)(Zhangsan_{AFF})(Lisi))$.

One question that arises at this point is: if Chinese bare nouns can occur in any argument position and can have a variety of interpretations (cf. Cheng and Sybesma 1999), why does a postverbal noun in the *bei* construction only have a kind reading? The answer is straightforward but illustrates the importance of context on the construction of the content of strings. The reason that the postverbal object must be interpreted as a kind (essentially modifying the event denoted by the verb) is that the 'moved object' has already been assigned the role of internal argument by *bei* with a requirement to have an affected thematic role assigned. The NP encountered after the verb cannot therefore be the primary object of the

verb and so must be a modifier of some kind. Since the NP is not locational, temporal or otherwise potentially associated with adjunct material, the only way in which it can be construed is non-referentially. Further evidence that the retained object is modificational comes from the fact that adjunct NPs can also appear in *bei* sentences, as exhibited in (43).

(43) a. *Zhangsan bei da guo san-ci.*
Zhangsan BEI beat PFV three-time
Zhangsan has been beaten three times.

b. *Zhangsan bei Lisi daduan le yi-hui tui.*
Zhangsan BEI Lisi break PFV one-time leg
Zhangsan's leg was broken once by Lisi.

c. *Zhangsan bei Lisi jian le liang-ci toufa.*
Zhangsan BEI Lisi cut PFV two-time hair
Zhangsan's hair was cut twice by Lisi.

If the retained object is interpreted as a kind term giving rise to a complex predicate whose internal (affected) argument is provided by the moved object, how is such an interpretation derivable from the analysis proposed above? It is generally agreed that the relation between the moved and retained objects is not random, but confined to possessor-possessee (2), kinship (39) and part-whole (55) relations. On the basis of this observation, A.Li (1990) proposes that the relationship between the two NPs can be schematised as NP_2+de+NP_1, where NP_1 is the retained object and NP_2 the moved object. This generalisation, as Shi (1997) pointed out, is too restrictive to be accurate. Consider the examples in (45,46) where the two objects cannot be expressed in the form formulated by A.Li.

(44) a. *wu-ge li bei Lisi chi le san-ge.*
five-CL pear BEI Lisi eat PFV three-CL
Three of the five pears were eaten by Lisi.

b. *jiu-ge miyu bei Lisi cai-dui le liu-ge.*
nine-CL riddle BEI Lisi guess-right PFV six-CL
Six of the nine riddles were solved by Lisi.

(45) a. *na-kuai bu bei ta zuo le yitiao kuzi.* *(L.Li 1980:402)*
that-CL cloth BEI 3SG make PFV one-CL trousers
The cloth was made into a pair of trousers by him.

b. **na-kuai bu de yitiao kuzi bei ta zuo le.*
that-CL cloth 's one-CL trousers BEI 3SG make PFV

(46) a. *yifu bei huo shao le yi-ge kulong.* *(L.Li 1980: 402)*
clothes BEI fire burn PFV one-CL hole
A hole was burnt into the clothes by fire.

b. **yifu de yi-ge kulong bei huo shao le.*
clothes's one-CL hole BEI fire burn PFV

What appears to be happening is that a weak relation between the retained and moved objects is derived from the concept denoted by the complex predicate applied to the term expressed by the moved object, mediated by the affectedness presupposition of the latter. For something to be affected by an action applied to something else, there must be some relation that can be established between these two things. Most obviously this may be construed as part-whole or possessive, but it may be the result of the action that supplies the affected interpretation (such as the hole being burnt into the clothes in (46)).

Consider then the possible interpretation of *Zhangsan bei Lisi daduan le tui* 'Zhangsan's leg was broken by Lisi'. The propositional output of parsing this string is, as noted above, $Daduan(Tui)(Zhangsan_{AFF})(Lisi)$. This may be interpreted as there being a leg-breaking event by Lisi that affected zhangsan (roughly $\exists e[(Daduan(Tui))(e) \wedge AFFECTED(e, Zhangsan) \wedge AGENT(e, Lisi)]$) from which one can infer that an actual leg was broken (by Lisi) ($\exists e', x[Daduan(e') \wedge^{\cup} Tui(x) \wedge PATIENT(e', x)]$). Since this event must form part of the event e which affects Zhangsan, it is straightforward to infer that the leg that was broken was Zhangsan's (i.e. $\exists e', x[Daduan(e') \wedge^{\cup} Tui(x) \wedge PATIENT(e', x) \wedge POSS(Zhangsan, x)]$).

The affectedness of the pre-*bei* noun phrase means that there are certain active sentences that do not have a straightforward passive counterpart. Consider the following representative example which has been considered to pose a serious problem.

(47) a. *ni ken bei bieren zheyang zhaogu ma?*
you willing BEI others so take-care-of Q
Are you willing to be taken care of by others in such a way?

b. *bieren ken zheyang zhaogu ni ma?*
others willing so take-care-of you Q
Are others willing to take care of you in such a way?

Our intuition is that (47a) is pragmatically anomalous. The verb *ken* 'be willing to' is agent-oriented, implying the intentionality of its subject. However, the use of *bei* constrastively emphasizes the affectedness (passivity) of the patient of the embedded verb. The co-occurrence of *ken* and *bei* thus renders the sentence pragmatically contradictory. If, however, *bei* is replaced by verbs like *gei*, *jiao* and *rang* (meaning *give, tell* and *let* respectively), the resulting sentences are acceptable, because the pre-*bei* can be interprted as directly affected by the action of the main predicate (*zhaogu*).

(48) *ni ken gei/jiao/rang bieren zheyang zhaogu ma?*
2SG willing GEI/JIAO/RANG others so take-care-of Q
Are you willing to give others a chance (or tell/allow) others to take care of you in such a way?

What we have shown here is that the canonical analysis of the *bei* construction given in Section 4.5 can be applied straightforwardly to the more complex pattern where there appear to be two objects competing for a single function in the string. We have also shown how the interpretive possibilities of this construction (in particular, the relation between the two objects) can be derived inferentially from the propositional structure projected.

5.2 the *Bei* construction with an embedded *Ba* construction

We now turn to the other problematic pattern involving *bei* and show how we can adapt our basic analysis to account for this as well. This construction ins one in which a fronted noun

phrase is marked by *bei* but there is also a pre-verbal object marked by the object marker *ba*, as illustrated in (2c,d) repeated below.

(2) c *Zhangsan bei Lisi ba tui daduan le yi-tiao.*
Zhangsan BEI Lisi BA leg break PFV one-CL
One of Zhangsan's legs was broken by Lisi.

d *Zhangsan bei Lisi ba toufa jian le yi-cuo.*
Zhangsan BEI Lisi BA hair cut PFV one-lock
One lock of Zhangsan's hair was cut by Lisi.

Before we tackle this problematic pattern, we provide a preliminary analysis of the *ba* construction within the framework of DS.

5.2.1 The Ba Construction

Unlike *bei*, there is a general consensus that *ba* is a preposition or a meaningless object marker, since the post-*ba* NP is usually the direct object of the verb, as exemplified in (49).

(49) *Zhangsan ba fangzi mai le.*
Zhangsan BA house sell PFV
Zhangsan sold the/his house.

a. *Zhangsan mai le fangzi.*
Zhangsan sell PFV house
Zhangsan sold the/his house.

b. *Zhangsan ba qiche diu le.*
Zhangsan BA car lose PFV
Zhangsan lost the/his car.

c. *Zhangsan diu le qiche.*
Zhangsan lose PFV car
Zhangsan lost the/his car.

Ba-marked objects appear before the verb, unlike in canonical sentences and so it is reasonable to analyse the post-*ba* NP within DS as decorating an unfixed node. Since this possibility is induced by parsing *ba*, we may assume that it is the lexical actions of this word that constructs an unfixed node within the predicate structure, as in (50).

(50) Lexical entry for *Ba*

IF	$?Ty(e \rightarrow t)$	
THEN	IF	$\langle\downarrow_*\rangle\bot$
	THEN	$\mathtt{make}(\langle\downarrow_*\rangle), \mathtt{go}(\langle\downarrow_*\rangle),$ $\mathtt{put}(?Ty(e), ?\langle\uparrow_0\rangle Ty(e \rightarrow t), ?\exists \mathbf{x}.Tn(\mathbf{x}))$
	ELSE	ABORT
ELSE	ABORT	

What the actions in (50) do is to project an unfixed node with a type e requirement just in case there is nothing else within the predicate domain at this point of the parse. This is to ensure that the verb has not yet been parsed, thus accounting for the ungrammaticality of (51).

(51) **Zhangsan diu le ba qiche*
Zhangsan lose PFV BA car

Furthermore, as with the *bei* construction there is a restriction on the final position of the unfixed node to be the argument daughter of the predicate node. to parse a sentence like (49a), therefore, is straightforward. The subject and predicate nodes are created and the subject is parsed, leaving the pointer at the open predicate requirement. At this point, *ba* is parsed to give the structure shown in Figure 18.

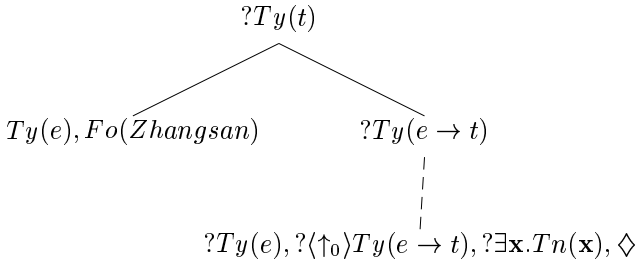

Figure 18: Parsing *Zhangsan ba*

The pointer is now at a node with a requirement for a type e expression and so the object, post-*ba*, NP can be processed and the unfixed predicate node projected. This allows the verb to be parsed and the construction of the internal argument and two place predicate nodes to take place. The unfixed $Ty(e)$ node then merges with the internal argument position and the unfixed predicate node merges with the functor node as graphically shown in figure 19. Completing the semantic tree ultimately yields a full propositional formula as *Mai(Fangzi)(Zhangsan).*

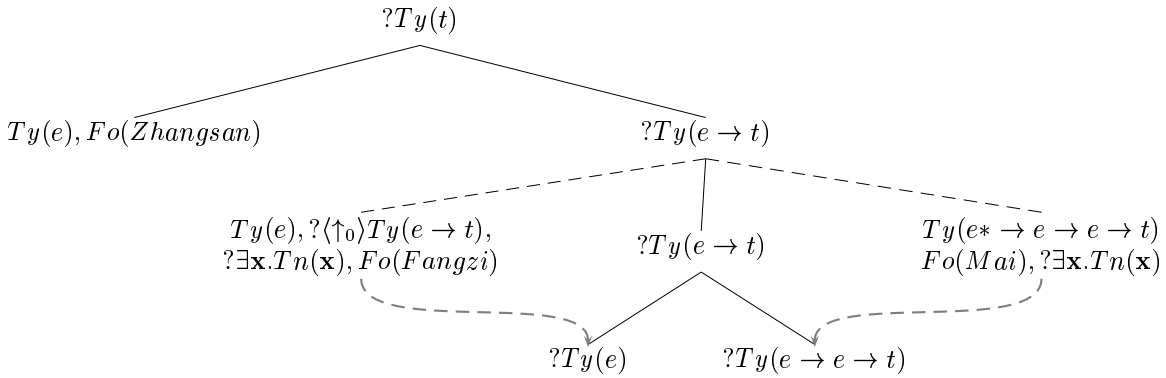

Figure 19: Parsing *Zhangsan ba fanzi mai (le)*

As has been noticed by a number of linguists (e.g. Wang 1959, Li and Thompson 1981), there is a parallelism in many regards between *ba* constructions and *bei* constructions. In particular, *ba* constructions, just like *bei* constructions, can also have a noun phrase in the postverbal object position, as illustrated in (52).[27]

(52) *Zhangsan ba qiche jia le you.*
Zhangsan BA car add PFV petrol
Zhangsan refilled the/his car.

(53) *Zhangsan chang ba lang dangzuo gou.*
Zhangsan often BA wolf take-for dog
Zhangsan often takes wolfs for dogs.

Semantically, the post-*ba* NP in (52), just like the pre-*bei* NP, is subject to the selectional restrictions of the complex verb formed from the verb plus its following noun phrase. The resulting sentences would be anomalous if the post-*ba* NPs *che* 'car' and *lang* 'wolf' are replaced by, say, *shouji* 'mobile' and *niao* 'bird' respectively, because the mobile phone does not need refilling and the class 'birds' does not resemble the class 'dogs' at all.

Because of this property, there are many *bei* sentences that have a *ba* sentence as more or less equivalent, as illustrated in (54) which are truth conditionally equivalent to (2a,b) and the examples in (55,56) which may be construed as active/passive pairs. The translation from *bei* constructions into *ba* constructions at least supports the hypothesis that there is a close relationship between them, in particular that they both involve the left dislocation of an object noun phrase (but in different domains).

(54) a. *Lisi ba Zhangsan daduan le tui.*
Lisi BA Zhangsan break PFV leg
Lisi broke Zhangsan's leg.

b. *Lisi ba Zhangsan jian le toufa.*
Lisi BA Zhangsan cut PFV hair
Lisi cut Zhangsan's hair.

(55) a. *wu-ge li bei Lisi chi le san-ge.*
five-CL pear BEI Lisi eat PFV three-CL
Three of the five pears were eaten by Lisi.

b. *Lisi ba wu-ge li chi le san-ge.*
Lisi BA five-CL pear eat PFV three-CL
Lisi ate three of the five pears.

(56) a. *jiu-ge miyu bei Lisi cai-dui le liu-ge.*
nine-CL riddle BEI Lisi guess-right PFV six-CL
Six of the nine riddles were solved by Lisi.

b. *Lisi ba jiu-ge miyu cai-dui le liu-ge.*
Lisi BA nine-CL riddle guess-right PFV six-CL
Lisi resolved six of the nine riddles.

5.2.2 Theoretical Analysis

Let us now return to the analysis of *bei* constructions containing a *ba* construction (BCBC) as in (2c,d). Clearly, the analysis provided for both constructions should exclude co-occurence because both expressions impose the requirement that different nodes be dominated by the main predicate node. However, The successful formalisation of BCRO and the relevant *ba* construction should provide some insights into the analysis of BCBC. The important factor here is context. We have, above, characterised *ba* as requiring the term projected by its following NP to be analysed as the internal argument of the main predicate. However, DS by

its dynamic nature allows different actions to be triggered in different contexts, in particular the context provided by the partial tree that represents the content of the string at a certain point. When *ba* appears in a string containing *bei*, at the point at which the former expression is parsed, the hearer already knows that the internal argument position is to be occupied by the term projected by the pre-*bei* NP. Any interpretation of *ba*+NP as occupying the same position is thus not likely to be entertained and instead the post-*ba* NP can be construed as providing the content of the indirect object position.

To achieve this effect, we can revise the lexical entry for the *ba* as in (57).

(57) *Ba* revised:

IF	$?Ty(e \rightarrow t)$		
THEN	IF	$\langle\downarrow_*\rangle\bot$	
	THEN	IF	$\langle\uparrow_1\rangle\langle\uparrow_*\rangle\langle\downarrow_*\rangle\langle\uparrow_0\rangle ?Ty(e \rightarrow t)$
		THEN	$\mathtt{make}(\langle\downarrow_*\rangle), \mathtt{go}(\langle\downarrow_*\rangle),$
			$\mathtt{put}(?Ty(e), ?\langle\uparrow_0\rangle Ty(e \rightarrow e \rightarrow t), ?\exists \mathbf{x}.Tn(\mathbf{x}))$
		ELSE	$\mathtt{make}(\langle\downarrow_*\rangle), \mathtt{go}(\langle\downarrow_*\rangle),$
			$\mathtt{put}(?Ty(e), ?\langle\uparrow_0\rangle Ty(e \rightarrow t), ?\exists \mathbf{x}.Tn(\mathbf{x}))$
	ELSE	ABORT	
ELSE	ABORT		

The extra clauses here cause a check to see whether there is a node dominated by the topnode which carries an unsatisfied requirement to be the internal argument of a predicate (shown as $\langle\uparrow_1\rangle\langle\uparrow_*\rangle\langle\downarrow_*\rangle\langle\uparrow_0\rangle ?Ty(e \rightarrow t)$ 'my immediately dominating node dominates a node with an internal argument requirement'). In this context, a requirement is added to the projected unfixed node that it must be dominated by a two-place predicate node (type $e \rightarrow e \rightarrow t$). In any other context, the unfixed node is to be dominated by a one-place predicate node. Only a parse of *bei* will satisfy the condition for the first set of actions and so it is only in BCBC sentences that a post-*ba* NP will be interpreted as providing the content for an indirect object. This successfully accounts for the unacceptability of the string in (58a) where Zhangsan cannot be construed as the indirect object of the verb and *tui* cannot be the direct object. Compare the grammatical status of (58b) with a pronoun in possesor position and *Zhangsan* construed as a true topic.[28]

(58) a. **Zhangsan Lisi ba tui daduan le.*
Zhangsan Lisi BA leg break PFV

b. *Zhangsan Lisi ba tade tui daduan le.*
Zhangsan Lisi BA his leg break PFV
As for Zhangsan, Lisi broke his leg.

Given this revision of the actions induced by parsing *ba*, an analysis of the sentence in (2c) *Zhangsan bei Lisi ba tui daduan le yitiao* is fairly straightforward. parsing the first three words yields the first tree in Figure 20 following the analysis already specified. this develops into the second tree on parsing *ba*. (Some annotations, such as satisfied type requirements, are omitted for clarity.) At this point, the post-*ba* noun phrase may be parsed and the analysis continues with the projection of an unfixed node to allow the parse of the verb, followed by the unfolding of the fixed argument/functor nodes dominated by the predicate node as in Figure 21.

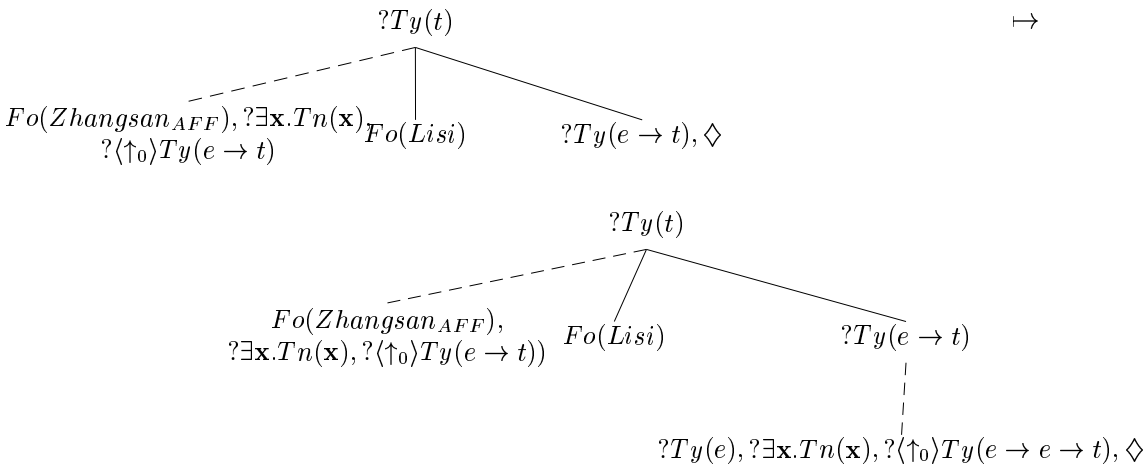

Figure 20: Parsing *Zhangsan bei Lisi ba*

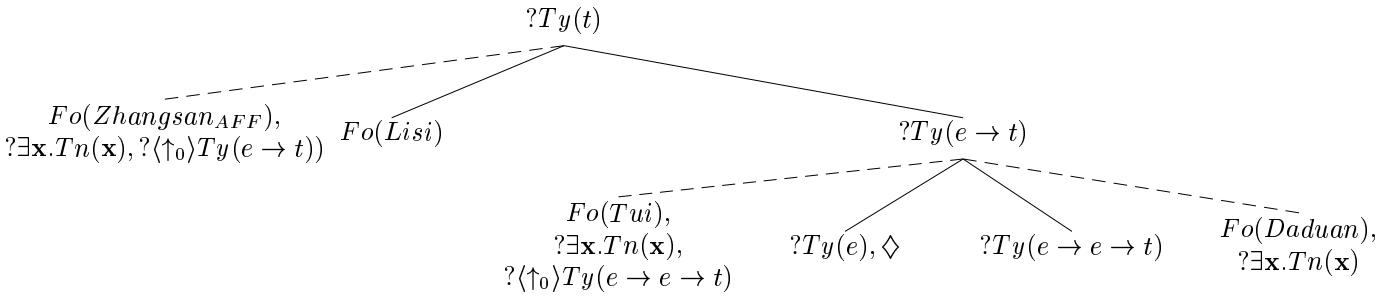

Figure 21: Parsing *Zhangsan bei Lisi ba tui daduan (le)*

The unfixed node decorated by $Fo(Zhangsan_{AFF})$ now merges with the internal argument node and two more nodes are created with requirements for a three-place predicate and a term. The unfixed node decorated by $Fo(Tui)$ merges with the latter position, satisfying its locality requirements as shown in Figure 22.

After the merging of the unfixed $Ty(e)$ node decorated by the post-*ba* NP with the argument daughter of the two-place predicate node, the pointer moves to the three-place predicate node which is further elaborated with another pair of functor/argument nodes. What comes next as input is the indefinite pronoun *yitiao* 'one', which satisfies the argument type requirement. Since there is no further input, the unfixed predicate node merges with the last open node, thereby resolving its type underspecification as four-place predicate node, as in Figure 23.

This tree complies to give the formula value $Daduan(Yi-Tiao)(Tui)(Zhangsan)(Lisi)$, showing a hierarchy among the argument nodes. That is, of all arguments of the complex predicate, viz. the pre-*bei* NP, the agent NP, the post-*ba* NP, and the postverbal indefinite pronoun, the verb first semantically selects the rightmost argument and combines it to form a complex predicate which then semantically selects the post-*ba* object NP as its argument which in turn combines the complex predicate to form a more complex predicate which

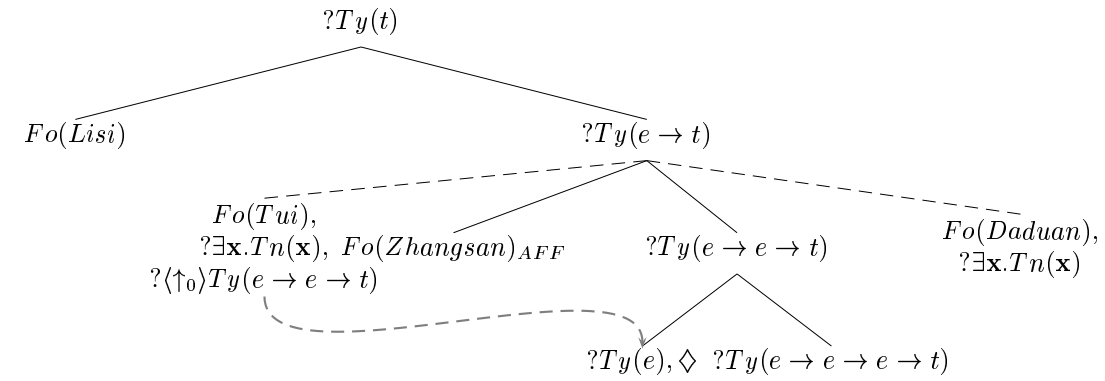

Figure 22: Parsing *Zhangsan bei Lisi ba tui daduan (le)* 2

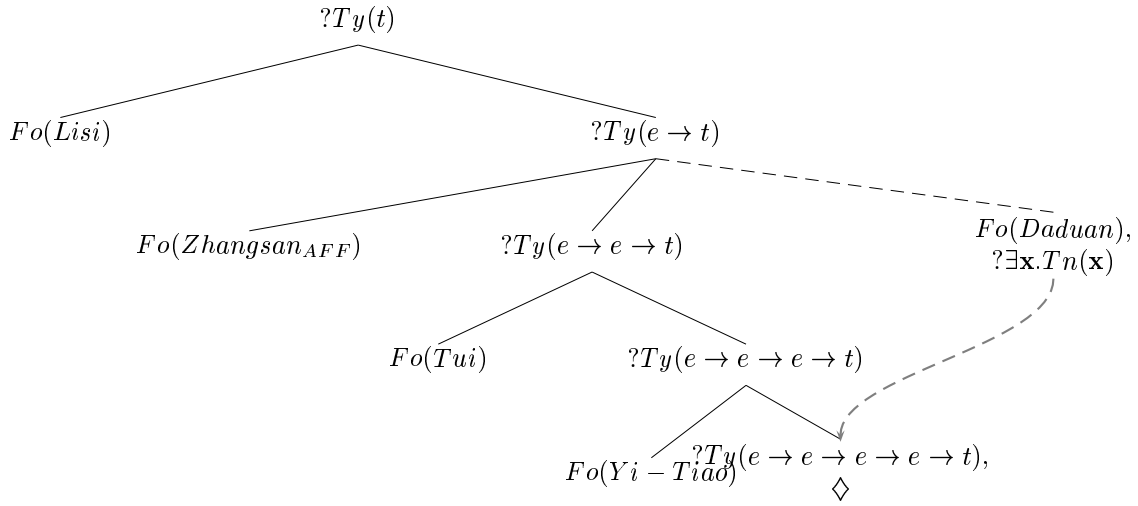

Figure 23: Parsing *Zhangsan bei Lisi ba tui daduan (le) yi-tiao*

once again selects the patient NP as it argument which in turn combines the more complex predicate to form a much more complex predicate which finally selects the subject NP as its agent argument. We do not here go into details of the interpretation of this propositional structure, but the discussion of the general interpretation of *bei* and *ba* constructions above provide the core of the analysis. For example, although in the canonical *ba* construction the post-*ba* NP may be referential or generic, in the BCBC construction it can only be interpreted as a kind in the same way as any postverbal NP in a *bei* clause. Hence, sentences in (59) are ill-formed.

(59) a. **Zhangsan bei Lisi ba na-tiao tui daduan le.*
Zhangsan BEI Lisi BA that-CL leg break PFV
That leg of Zhangsan's was broken by Lisi.

b. **Zhangsan bei Lisi ba na-cuo toufa jian le.*
Zhangsan BEI Lisi BA that-lock hair cut PFV

That lock of hair of Zhangsan's was cut by Lisi.

6 Summary and Conclusion

On the basis of a detailed examination of the basic properties of *bei* constructions, we have shown that syntactic, semantic and pragmatic information interacts with one another in the formation and interpretation of this special grammatical structure. We have argued that unlike its variants *rang*, *jiao* and *gei* which can still be employed as verbs with independent meanings, the morpheme *bei* has been fully grammaticalised from a lexical category into a functional category, precisely a voice particle who consistently signals that the preceding argument is the passive recipient of the action. By virtue of this function, *bei* has been uncontroversially regarded as the marker of passives although it is controversial when it comes to the question of what this marker really is. From the typological point of view, *bei* constructions as passives can be classed as pragmatic voice due to the nature of its pragmatic salience; from the functional point of view, *bei* constructions basically share certain similarities with topic constructions both in syntax and semantics.

Technically, we have attributed the *bei* construction to left-peripheral phenomena, and have defined a principled approach in terms of the linked structure into which an unfixed node can be introduced. Specifically, the pre-*bei* constituent as a left-dislocated argument invariably projects an unfixed node with a locational requirement, and is linked onto a type-t-requiring structure. Under the dynamic approach, we have successfully characterised the structural properties of *bei* constructions of various patterns in a straightforward way, unlike other analyses in which arbitrary stipulations have often been made in a costly way. The successful characterisation of this famous grammatical construction has demonstrated how syntax, semantics and pragmatics go hand in hand in the interpretive process of natural language. This naturally leads us to the conclusion that the dynamics of natural language understanding can and should be reflected in grammar formalisms.

Notes

[1]The authors' names are shown in alphabetical order. We are grateful for comments on presentations of this work to the members of the Syntax and Semantics Research Group at the University of Edinburgh.

[2]The following abbreviations are used throughout the paper: 1, first person; 2, second person; 3, third person; ABS, absolutive; CL, classifier; DUR, durative; ERG, ergative; EXP, experiential; LOC, locative; PFV, perfective; PL, plural; Q, question; REL, relative; SFP, sentence final particle; SG, singular.

[3] The terms 'agent' and 'patient' are used throughout this paper in the sense of Andrews (1985: 68) who defines the former as "a participant which the meaning of the verb specifies as doing or causing something, possibly intentionally", and the latter as "a participant which the verb characterises as having something happen to it, and as being affected by what happens to it."

[4]These four patterns are the most frequently used of all the constructions involving *bei* (Wang 1959). There are, however, other, more minor, patterns that are not discussed here for reasons of space, although the analysis of the canonical patterns presented in this paper can be readily extended to them.

[5] In this regard, Lü et al's treatment of *bei* as a helping particle is very close to the inflection hypothesis made by Goodall (1992), who claims that *bei* should be treated as the realisation of the inflection feature Passive and its function is to mark a passive sentence, analogous to that of the English passive morpheme, *–en*. Goodall's analysis is not reviewed here since it is much less popular than the three under discussion.

[6]Similar to Shi's two-morpheme hypothesis is Peyraube 1989's two-word analysis which states that in *bei* sentences are two different words: one is a preposition when occurring before the agent NP in agentive *bei* sentences and the other is a verb when occurring before a verb in agentless *bei* sentences. We cannot see any justification for this analysis, based on the observation and discussion presented in this section.

[7]Something that is pointed out by Hashimoto (1987) and admitted by Shi himself (p.46).

[8] The word *zai* in (17,18c) below is a marker of the prepositional phrase, and *shang* 'on' specifies the location of the hole and *li* 'in' the location of the fish (cf. Xu and Langendoen 1985).

[9]In Chinese, an NP in both argument and non-argument positions can be topicalised (see Xu and Langendoen 1985 for a detailed discussion).

[10] Here the treatment of the pre- *bei* patient as topic and the post-*bei* agent as subject definitely involves another well-discussed issue, i.e. the distinction between topichood and subjecthood. We will not provide a detailed discussion of this issue here. See C. Li 1976 and C.Li & Thompson 1981 for a detailed exploration.

[11] It is worthwhile mentioning the fact that although traditionally *bei* constructions generally have a pejorative implication, yet a certain number of *bei* sentences in Modern Chinese, as discussed in Li and Thompson (1981:496-497), are more or less free of such pragmatic commitments due to the influence of Indo-European languages. This indicates that *bei* is undergoing further grammaticalisation and losing even the remnants of the goal/recipient

interpretation.

[12] DS assumes a only small set of types, e.g., e the type of entity, $e \rightarrow t$ the type of predicate, t the type of proposition, and so on.

[13]Trees are representations of content with no reflection of linear order. Functor nodes are displayed on the right and argument nodes on the left. In this and subsequent displays, the symbol $\mapsto$ indicates that the tree on the left may be transformed into that on the right.

[14]The constraint takes the form "at all nodes below, the falsum holds", which means that the node onstructed cannot be further developed.

[15]The DS formalism focuses exclusively on the construction process of logical form, not the deduction of contextual implications.

[16] This approach is too liberal in that it allows preposition stranding. However, further constraints can be imposed to ensure that the node being decorated is not within the domain of a preposition. We do not specify what such a constraint should look like pending a theory of PPs in Chinese.

[17] Thus in Figure 3, $Fo(David)$ decoratess the node with address 00, while $Fo(Love)$ decorates that with address 011 and $Fo(Mary)$ that with address 010 (and analogously for all other nodes whether terminal or not).

[18]This process of Merge should not be confused by the process of the same name in the Minimalist Program (Chomsky 1995). In DS, the merge process simply unifies treenode decorations. Provided that no contradictory decorations result, the process is well-formed.

[19]Marten (2002) does not provide a semantic interpretation for his complex argument structures, preferring a pragmatic account of concept enrichment. However, a natural way of interpreting his structures from a semantic point of view is within event semantics, all arguments being related to the event picked out by the verb. Such relations, however, are necessarily mediated by pragmatic enrichment.

[20]This is fairly easily achieved using Chierchia's 'up' operator, $^{\cup}$, which maps a kind onto a property. A phrase like *na-tiao tui* 'that leg' receives a representation like $Fo(That(Leg))$ which is taken to be equivalent to $Fo(That', x, ^{\cup}Tui(x))$, a referential expression with a property restrictor.

[21]One counterexample to our stipulation of the locational requirement is that sometimes *bei* sentences have a pivotal construction, as shown in (i)-(ii).
i. Zhangsan bei Lisi kai qiang da si le.
Zhangsan BEI Lisi open gun shoot dead PFV
'Zhangsan was shot dead by Lisi.'
ii. Zhangsan bei Lisi fang huo shao si le.
Zhangsan BEI Lisi set fire burn dead PFV
'Zhangsan was burned to death by (the fire set by) Lisi.'
We don't think that this type of sentence poses a problem, since the conjoined verbs *kai-qiang-da-si* 'shoot dead' and *fang-huo-shao-si* 'burn to death' can be treated as complex predicates where the objects *qiang* 'gun' and *huo* 'fire' are incorporated nouns which cannot be topicalised or passivised.

[22]Our treatment of the empty node as projecting a metavariable is in spirit compatible

with the GB analysis (see Ting 1998) which treats it as a pro-form. Both analyses follow from the fact that Chinese is a pro-drop language.

[23] We have queried a group of Chinese-speaking children of ages 6-9 with regard to the interpretation of the agentless Bei *bei* sentences. Interestingly, most of them insist that such sentences are bad because the agent is missing.

[24]As above, these event semantic representations are to give the reader a better idea of the intended interpretations of the derived formulae plus any associated inferences. We are making no claim about whether or how such event-based representations are actually derived by the hearer.

[25] In the current literature, some authors have employed sentences like the following as data:

i. laoshi bei jiao le ziji de toufa. (Shi 1997:45)
teacher BEI cut PFV self's hair
' The teacher is the patient of the hair-cutting action.'

ii. Zhangsan bei wo piping le ta yidun. (Ting 1998: 322)
Zhangsan BEI I criticize PFV he once
'Zhangsan was criticized once by me.'

All the native speakers queried by us insist that these sentences are not well-formed and we accept their judgement. The reason for their ill-formedness is quite simple on our analysis. Given the fact that the pre-*bei* patient NP is the topic of the sentence, sentences of the pattern BCRO undoubtedly talk about the affectedness of the entity represented by the moved object, not that of the entity represented by the retained object (*ta* 'she' by the hair-grasping action and *laoshi* 'teacher' by the hair-cutting action, not the affectedness of the hair, i.e. being grasped or being cut). The former is syntactically determined while the latter can only be pragmatically inferred. The ill-formedness of the above sentences is closely related to the fact mentioned in section 5.1.1 that this pattern does allow a pragmatically 'transparent' reading with reference to the affectedness of the retained object. On account of this, the use of a pronominal specifier like *tade* 'his/her' or a reflexive specifier like *zijide* 'self's' before the object NP would result in pragmatic infelicity (see Wang 1959 for a discussion).

[26]The situation is thus similar to one in which a man might be called a son of a bitch.

[27]As C.Li & Thompson 1981 pointed out, there is a semantic constraint on the interpretation of the post-*ba* NP, namely, it can either have a referential reading as shown in the English translation of (52a) or a generic reading as shown in the English translation of (52b).

[28]The inutitin behind this (somewhat brute force) approach is that *ba* indicates that the term projected by its complement is assigned the highest argument role that it can be given the current context. Notmally, this this the highest Internal argument but when *bei* appears it must be the next highest.

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