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# Papers in Dynamic Syntax

Eleni Gregoromichelaki & Ruth Kempson (eds.)

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# The *bei* construction in Chinese: a dynamic approach

RONNIE CANN AND YICHENG WU

## 1.1 Introduction

The analysis of the *bei* construction in Chinese<sup>1</sup> as a form of passive has long been of great interest and controversy among linguists, and there are a number of different accounts of the construction published in the literature. Nevertheless, a fully unified account of the *bei* construction remains to be achieved, and the status of the morpheme *bei* itself remains to be articulated. This controversy is attributable to the fact that the *bei* construction exhibits a somewhat diverse set of properties that are not fully consistent with the interpretation of the passive in languages like English. Consider the data in (1) below where (1a) represents the canonical agentive pattern, with the pre-*bei* constituent interpreted as the patient and the post-*bei* constituent as the agent and the examples in (1b,c) illustrate the “short” passive where the agent is not specified.<sup>2</sup>

- (1) a. Zhangsan bei Lisi ma guo.  
       Zhangsan BEI Lisi scold EXP  
       ‘Zhangsan has been scolded by Lisi.’

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<sup>1</sup>As is standard, throughout this paper the term *Chinese* when referring to the language should be interpreted as Standard Modern Mandarin Chinese.

<sup>2</sup>The following abbreviations are used throughout the paper: 1, first person; 2, second person; 3, third person; CL, classifier; EXP, experiential; LOC, locative; PFV, perfective; Q, question; PRT, particle.

- b. Zhangsan bei ma guo.  
Zhangsan BEI scold EXP  
'Zhangsan has been scolded.'
- c. chuanghu bei za le.  
window BEI smash PFV  
'The window was smashed.'

The examples above look similar to the English passive in having an apparently fronted object noun phrase with an optional agent and so, despite the fact that Chinese verbs exhibit no passive morphology, could be considered to be analysable in a similar way. However, there are other patterns which indicate that more is happening in this construction than simple 'promotion of object to subject'. In (2a,b), not only is there an apparently fronted object noun phrase before *bei* but also one that appears in the canonical object (post-verbal) position (a 'retained object' within analyses of traditional and generative grammars).

- (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.'

Furthermore, there are examples like (3a,b) which exhibit a pattern which involves another well-known grammatical structure in Chinese, the *ba* construction, where *ba* is itself generally taken to identify the following noun phrase as an object.

- (3) a. 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.'
- b. 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.'

It is these latter examples that cause most controversy in the analysis of the *bei* construction, as they call into question the standard view of passive as involving some sort of 'promotion' of object to subject (however this notion may be defined in specific theoretical frameworks).

In this paper, we investigate the analysis of the *bei* construction within the framework of Dynamic Syntax (Kempson et al. 2001, Cann et al. 2005) and provide a principled account of the canonical patterns shown in (1) and the problematic patterns in (2,3). By treating the *bei* construction as a type of hybrid topic/subject construction, we argue

that the morpheme *bei* is a grammaticalised particle whose fundamental function is to signal that the **pre-*bei*** argument functions as an affected argument of the event expressed by the following clause, giving rise to a pragmatic passive interpretation. Under the dynamic analysis, we show that the various patterns exhibited by the *bei* construction follow without further stipulation.<sup>3</sup>

## 1.2 *Bei* and its satellites

Wu (this volume) reviews analyses of *bei* as a preposition, a passive particle and as a verb. Although plausible hypotheses in themselves, each gives rise to significant unanswered questions or stipulative solutions to problems for them to be taken as robust explanations for the synchronic analysis of this particle. In this section, we suggest that *bei* is best analysed in terms of the function it performs in the interpretations of sentences in which it appears. We will conclude that *bei* is a grammaticalised particle with a specific function, as in one part of the dual function hypothesis. However, we argue that this morpheme is not there specifically to mark passive voice or to license the appearance of an agentive nominal but to identify an argument affected by the event expressed by the following clause from which a (pragmatic) passive-like interpretation may be derived. The fact that a non-agent appears before *bei* gives rise to the appearance of left dislocation and so to interpretation of the initial constituent as a kind of topic.

One of the assumptions behind the hypothesis that *bei* is a preposition is that it operates in a similar fashion to the preposition *by* in English: to mark an oblique (adjunct) agent. One corollary of this analysis is that the noun phrase that immediately precedes *bei* is interpreted as the subject of the passive verb. The status of subjects, like much else in Chinese syntax, is a controversial subject, and one that we cannot tackle properly in this paper, for reasons of space, but it is most generally accepted that Chinese is a topic prominent language<sup>4</sup> and what we argue here is that the pre-*bei* noun phrase has both topic and subject properties.

### 1.2.1 Topic and passive

The functional similarity of passivisation with topicalisation has been discussed by a number of linguists like Givón (1979: 186), who de-

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<sup>3</sup>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.

<sup>4</sup>Li and Thompson 1981, but see Tan 1991 for arguments that this is incorrect.

finer 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’. The similarity between the *bei* construction and topic constructions in Chinese is noted in Hashimoto (1968), LaPolla (1989), Y. Huang (2000) and many others. Compare the *bei* sentences (1a), repeated below as (4), with the *bei*-less example in (5). In both sets of examples, there is an initial noun phrase associated with an object gap in the following clause. Both topic and passive sentences are truth-conditionally equivalent and to the equivalent sentences without a fronted object (6).

- (4) Zhangsan bei Lisi ma guo.  
 Zhangsan BEI Lisi scold EXP  
 ‘Zhangsan has been scolded by Lisi.’
- (5) Zhangsan, Lisi ma guo.  
 Zhangsan Lisi scold EXP  
 ‘Zhangsan, Lisi has scolded.’
- (6) Lisi ma guo Zhangsan  
 Lisi scold EXP Zhangsan  
 ‘Lisi has scolded Zhangsan.’

The *bei* construction shares other properties with the topic construction. For example, topics, rather than subjects, tend to control null anaphors in subsequent sentences (7) and they do not require a ‘gap’ in the main clause (8). These properties are also exhibited by the pre-*bei* noun phrase as in (9).

- (7) a. Zhangsan, zhuren ma guo ta, ye ma guo zhuren.  
 Zhangsan head scold EXP 3SG also scold EXP head  
 ‘As for Zhangsan<sub>i</sub>, the head scolded him<sub>i</sub> and he<sub>i</sub> scolded the head too.’  
 b. jiu-ge miyu, Lisi caidui le liu-ge, tai rongyi le.  
 nine-CL riddle Lisi resolve PFV six too easy PFV  
 ‘Nine riddles, Lisi solved six. They are too easy.’
- (8) a. shenghuo, Wangwu xihuan xiao chengshi.  
 life Wangwu like small city  
 ‘As for life, Wangwu loves towns.’  
 b. yuyanxue, Zhangsan pian’ai yuyixue.  
 linguistics Zhangsan prefer semantics  
 ‘As for Linguistics, Zhangsan prefers semantics.’

- (9) a. zhe jiahuo bei baba da guo duo ci,  
 this guy BEI dad hit EXP many times  
 jiushi bu gai.  
 just not change  
 ‘This guy<sub>i</sub> had been hit many times by Dad,  
 but he<sub>i</sub> just didn’t change.’
- b. \*zhe jiahuo bei da guo duo ci,  
 this guy BEI hit EXP many times  
 baba jiushi bu gai.  
 Dad just not change  
 ‘This guy having been hit many times,  
 Dad just didn’t change.’
- c. Zhangsan bei Lisi jian le toufa.  
 Zhangsan BEI Lisi cut PFV hair  
 ‘Zhangsan’s hair was cut by Lisi.’

If the *bei* construction is a form of topic construction, then whatever licenses gapless topics and discourse control in the latter can explain the problematic cases of retained objects in this construction and the discourse control properties of the pre-*bei* noun phrase.

One final property links the *bei* construction with the topic construction and that is that the fronted expression need not be a direct object. In (10), for example, a postpositional locative phrase *qiang shang* is fronted in both the *bei* (10a) and topicalised variants (10b) (cf. Xu and Langendoen 1985).<sup>5</sup>

- (10) 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.’

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<sup>5</sup>An anonymous reviewer points out that in (10a) there is a selectional restriction between the verb *wa* and the fronted constituent *qiang shang* as the spatial term is required and cannot be omitted without yielding ungrammaticality. Such a selectional restriction is explained on a movement analysis, but not on a topic analysis without a dependency site in the main clause. Our response is that the selectional property is semantic and, given the analysis presented below, it follows that this will need to be satisfied whether the expression is construed as a direct argument of the main verb or not.

‘Peculiar passives’ such as (11) are known in English (Davison 1980) and there are languages such as Sanskrit (12) that can promote adjuncts.

- (11) a. This bed was slept in by Mary Queen of Scots.  
 b. ?This plate has been eaten meat off/from.

- (12) a. Ratho gramam gacchati.  
 cart-nom village-acc go-3sg.pres.act  
 ‘The cart is going to the village.’  
 b. Rathēna grāmo gamyate  
 cart-inst village-nom go-3sg.pres.pass  
 ‘The cart is going to the village.’  
 (Lit. ‘The village is being gone to by the cart.’)

The phenomenon of promoting non-direct objects in Chinese, however, appears to be more productive, certainly than is the case in English, applying also to non-locative adjuncts, such as (13) where the substance from which a garment is made is passivised. The ability to front a range of different categories of expression is more typical of topic constructions, rather than passives of the sort found in Indo-European languages.

- (13) a. ta yong na-kuai bu zuo le yi-tiao kuzi.  
 3SG with that-CL cloth make PFV one-CL trousers  
 ‘He made a pair of trousers with the cloth.’  
 b. <sup>6</sup> na-kuai bu bei ta zuo le yi-tiao kuzi.  
 that-CL cloth BEI 3SG make PFV one-CL trousers  
 ‘The cloth was made into a pair of trousers by him.’

Although there are strong similarities between passivisation and topicalisation in Chinese, there are nevertheless differences. Syntactically, what is passivised is usually (but not exclusively, see above) the patient argument or something related to the patient in retained object constructions. The pre-*bei* noun phrase can never be associated with the Agent. What is topicalised is not subject to this constraint, as illustrated in (14).

- (14) a. \*Lisi bei ma guo Zhangsan.  
 Lisi BEI scold EXP Zhangsan  
 (Intended: ‘Lisi scolded Zhangsan.’)  
 b. Lisi ta/zhe jiahuo ma guo Zhangsan.  
 Lisi 3SG/this guy scold EXP Zhangsan  
 ‘Lisi, he/this guy has scolded Zhangsan.’

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<sup>6</sup>L. Li (1980:402).

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Furthermore, while topicalisation can involve a long distance dependency, the dependency in the *bei* construction must always be local.

- (15) a. ?\*Zhangsan bei Lisi renwei Wangwu pai jingcha zhua le.  
 Zhangsan BEI Lisi think Wangwu send police catch PFV
- b. Zhangsan, Lisi renwei Wangwu pai jingcha zhua le.  
 Zhangsan Lisi think Wangwu send police catch PFV  
 ‘Zhangsan, Lisi thought that Wangwu had sent the police to catch.’

Although (15a) is taken in Huang (1999) to be grammatical, it is rejected by our native speaker informants who report a clear contrast in acceptability between the dispreferred *bei* example and the ordinary topic construction. Furthermore, as Huang notes as his reason for adopting an operator movement analysis, the pre-*bei* noun phrase can never have a dependency into an apparently finite clause (however finiteness is to be defined within Chinese). See (16) taken from Huang (1999) example 28.

- (16) \*Zhangsan bei Lisi shuo jingcha zhua-zou le.  
 Zhangsan BEI Lisi say police arrest PFV

Additionally, although topic constructions allow a resumptive pronoun to appear in the following clause, these are generally considered to be unacceptable in the *bei* construction (see e.g. Wang 1959, Chao 1968, Lü 1982).<sup>7</sup>

- (17) a. Zhangsan, Lisi da guo ta.  
 Zhangsan Lisi hit EXP him  
 ‘As for Zhangsan, Lisi hit him.’
- b. \*Zhangsan bei Lisi da guo ta.  
 Zhangsan BEI Lisi hit EXP him

Although there are differences between the passive and topic constructions, there are nonetheless significant similarities. In particular, the *bei* construction exhibits a subset of the properties exhibited by the topic construction, such as discourse control of null topics in subsequent sentences and variability in the type of expression that appears in initial position. These properties, we believe, provide sufficient evidence for taking the pre-*bei* noun phrase to be a kind of topic. As we discuss below in relation to our specific analysis, we attribute the topichood of the pre-*bei* constituent to its apparently being left dislocated from the

<sup>7</sup>We return to this issue in section 1.4.

position in which it would normally be expected to occupy. However, the restrictions on the left dislocation of non-agents with dependencies only in local domains and the exclusion of resumptive pronouns are what give rise, we suggest, to the interpretation of this construction as a form of passive.

### 1.2.2 Agent and Topic

If the pre-*bei* noun phrase is a type of topic, as argued above,<sup>8</sup> one question that remains is what its relationship is to any overt post-*bei* noun phrase, typically an agent. As noted above (and in many places in the literature), the distinction between topic and subject is notoriously difficult and controversial, and this is particularly true of Chinese.<sup>9</sup> However, there is one property that subjects in Chinese have incontrovertibly: they function as the controllers in syntactic control structures. Thus, in (18a) the subject/agent of the matrix verb *shefa* ‘try’ also functions as the subject of the second verb *da* ‘hit’. This control pattern is not affected if the object is fronted as topic (18b). This pattern is maintained in the *bei* construction (19).

- (18) a. Lisi shefa da Zhangsan.  
 Lisi try hit Zhangsan  
 ‘Lisi tried to hit Zhangsan.’  
 b. Zhangsan, Lisi shefa da (ta).  
 Zhangsan Lisi try hit (him)  
 ‘As for Zhangsan, Lisi tried to hit him.’  
 (NOT ‘\*As for Zhangsan<sub>i</sub>, Lisi tried for him<sub>i</sub> to hit (someone).’)
- (19) Zhangsan bei Lisi shefa da le.  
 Zhangsan BEI Lisi try hit PFV  
 ‘Lisi tried to hit Zhangsan (and succeeded).’  
 (NOT ‘Zhangsan tried to be hit by Lisi.’)

It would appear from these data that the pre-*bei* noun phrase is not the subject of the sentence that follows and the inference to be derived is that it is the post-*bei* constituent, the subject of the ‘active’ sentence, remains the subject of the ‘passive’ clause.

Huang (1999), however, points out that a property is shared between the pre- and post-*bei* noun phrases is the possibility of binding the anaphor *ziji*. *Ziji* in Chinese is typically analysed as a subject oriented,

<sup>8</sup>Note that we do not claim that the pre-*bei* constituent behaves exactly like all left displaced topics, but merely that it shares *some* properties with them.

<sup>9</sup>See C. Li 1976 and C. Li & Thompson 1981 for a detailed exploration of this debate.

possibly long distance, reflexive as illustrated in (20).

- (20) a. Zhangsan da le ziji.  
 Zhangsan hit PFV self  
 ‘Zhangsan hit himself.’  
 b. Zhangsan shuo Lisi da le ziji.  
 Zhangsan say Lisi hit PFV self  
 ‘Zhangsan<sub>i</sub> said that Lisi<sub>j</sub> hit him<sub>i</sub>/himself<sub>j</sub>.’  
 c. Zhangsan da le ziji xiaohai.  
 Zhangsan hit PFV self child  
 ‘Zhangsan hit his (own) child.’

In certain circumstances, both satellites of *bei* may bind the anaphor:

- (21) Zhangsan bei Lisi guan zai ziji de jiali.  
 Zhangsan BEI Lisi lock at self DE home  
 ‘Zhangsan was locked by Lisi in his home.’ (his = Zhangsan or Lisi)  
 (Huang 1999: example 15)

However, not all instances of the anaphor can be bound by both constituents. For example, the *bei* counterpart of (20c), shown in (22), can have only the interpretation that it is Lisi’s child that Lisi hit, not Zhangsan’s. This has the effect of rendering the example pragmatically unacceptable because of the difficulty of construing Zhangsan as some sort of object of Lisi’s beating his own child.

- (22) \*Zhangsan bei Lisi da le ziji xiaohai.  
 Zhangsan BEI Lisi hit PFV self child

This again indicates that it is *Lisi* that acts as subject of the clause that follows *bei*, not *Zhangsan*. To indicate that the children being hit by Lisi are Zhangsan’s a resumptive pronoun needs to be used:

- (23) ?Zhangsan bei Lisi da le ta xiaohai.  
 Zhangsan BEI Lisi hit PFV he children  
 ‘Zhangsan’s child was hit by Lisi.’

However, not even a resumptive pronoun replacing *ziji* can make (22) completely acceptable (although (23) is better than (22) according to our informants), partly because the retained object cannot be a definite NP (as indicated by all the examples given in our paper), but an indefinite NP or a kind-denoting NP only.

However, there appear to be examples where *ziji* can be bound by a pre-*bei* noun phrase: when the reflexive appears in the post-*bei* position

(at least with prosodic stress on *ziji*).<sup>10</sup>

- (24) Zhangsan bei ziji pian le.  
 Zhangsan BEI self cheat PFV  
 ‘Zhangsan cheated himself.’

Thus, with respect to *ziji*-binding, we have a mixed pattern in the *bei* construction: the pre-*bei* noun phrase is subjectlike in being able to bind the anaphor when it occurs in an adjunct expression (a PP in 21) or in embedded subject position, but not when it occurs in object position.

There is one respect in which a pre-*bei* noun phrase behaves fully in a subjectlike manner: it allows the appearance of temporal and locative expressions between it and *bei*. This parallels the appearance of such phrases between subjects and the following verb. Compare the *bei* examples in (25) with their possible ‘active’ counterparts in (26).

- (25) a. Zhangsan zuotian bei Lisi ma le.  
 Zhangsan yesterday BEI Lisi scold PFV  
 ‘Zhangsan was scolded by Lisi yesterday.’  
 (NB. \*Zhangsan bei Lisi [zuotian] ma le.)  
 b. Zhangsan zai xuexiao bei Lisi da le.  
 Zhangsan in school BEI Lisi hit PFV  
 ‘Zhangsan was hit by Lisi in the school.’ (NB \*Zhangsan bei Lisi [zai xuexiao] da le.)
- (26) a. Lisi zuotian ma le Zhangsan.  
 Lisi yesterday scold PFV Zhangsan  
 ‘Lisi scolded Zhangsan yesterday.’  
 b. Lisi zai xuexiao da le Zhangsan.  
 Lisi in school hit PFV Zhangsan.  
 ‘Lisi hit Zhangsan in the school.’

As Huang (1999) suggests, it thus appears that the pre-*bei* noun phrase does behave as a subject with respect to adverbial placement, and to a certain extent with respect to *ziji*-binding. It does not behave, however, as a subject with respect to control structures where the post-*bei* noun phrase acts as a controller or reflexive binding into argument positions. How then can these mixed properties be accounted for? This question will be answered with respect to the particular theoretical analysis that we provide in section 1.4. Before then, we explore the function of the expression *bei* itself.

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<sup>10</sup>We are grateful to an anonymous referee for bringing these data and the significance of reflexive binding to our attention and to Wenshan Li for this particular example (although its acceptability remains controversial amongst our informants).

**1.2.3 Locus of effect and the function of *bei***

In the preceding discussion, we argued that the pre-*bei* noun phrase behaves to some extent as both topic and subject, although not fully functioning in all respects as either. We have also argued that *bei* is neither a preposition nor a verb. The implications of these two hypotheses is that *bei* is not directly associated with the noun phrase that immediately follows, as assumed in the preposition hypothesis. Instead, it seems to be the case that the function of *bei* has nothing to do with the agent of the clause or even directly with the verb, but is essentially a device to identify the *preceding* phrase as the topic of the sentence which, while interpreted as a non-subject argument of the clause that follows, nevertheless has subjectlike characteristics. The question is: what are the properties of *bei* that give rise to these characteristics?

One of the interesting things about *bei* in discourse can be seen in (27). Here the first speaker pauses after uttering *Zhangsan bei* and the second responds with an event-oriented question about what happened to Zhangsan.

- A: *Zhangsan bei* ...
- B: *Zhangsan bei zenme le?*
- (27) Zhangsan bei how PRT
- A: *bei (Lisi) da le.*
- BEI (Lisi) hit PFV
- ‘He was hit (by Lisi).’

*Zenme* in the question above can be construed as ‘What happened (to Zhangsan)?’ or ‘How did someone dispose of (Zhangsan)?’. B does not respond with a question about who did something to Zhangsan as would be expected if the function of *bei* were to identify the function of what follows it. Compare (27) with a putatively similar exchange in (28) where the event oriented question is infelicitous.

- (28) A: Zhangsan was hit ...
- B: By who?
- B: # What happened to Zhangsan?

Another way of interpreting *zenme* here is as questioning an event, as indicated by the English translations given above. One way to think of the function of *bei*, therefore, is that it links a topic/subject with an event, the event described by the following clause. But what is that linking relation?

As noted earlier, in the canonical patterns, the pre-*bei* noun phrase is interpreted as the patient argument of the main verb as in (1a), repeated below as (29).

- (29) Zhangsan bei Lisi ma guo.  
 Zhangsan BEI Lisi scold EXP  
 ‘Zhangsan has been scolded by Lisi.’

But the fronted constituent need not be a patient, but may, for example, be an experiencer (30).

- (30) 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.’

Although both sentences in (30) describe the same event, there is a significant interpretational difference between them. The active sentence (30a) simply describes a seeing event involving Zhangsan as the experiencer and the policeman as the agent. In the *bei* version, however, the fronted experiencer is interpreted as being directly affected by the seeing-event. Hence, (30b) expresses an unfavourable situation that *Zhangsan* faced as a consequence of the seeing event, e.g. he might be a suspect or on the run, or whatever. We might thus interpret (30b) as something like ‘there is an event of seeing with the police as agents and Zhangsan as the experiencer and this event affected Zhangsan (adversely)’.

Consider also examples of locative and other phrases that can be fronted in the *bei* construction such as (10a) and (13b), repeated below as (31) and (32), respectively.

- (31) 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.’  
 (‘?On the wall was dug a hole by the children.’)  
 (32) na-kuai bu bei ta zuo le yi-tiao kuzi.  
 that-CL cloth BEI 3SG make PFV one-CL trousers  
 ‘The cloth was made into a pair of trousers by him.’

In (10a) a locative postpositional phrase appears in pre-*bei* position, while in (13b) an oblique PP is stripped of its preposition and fronted. In both cases, the fronted expressions are interpreted as strongly (and perhaps adversely)<sup>11</sup> affected by the event denoted by the main verb:

<sup>11</sup> 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 lan-

the wall was (badly) affected by the children's hole-digging and the cloth has been, perhaps improperly, affected by the trouser-making. Even in cases where the pre-*bei* noun phrase has not been physically affected, as in (33) the entity denoted is nevertheless presented as being strongly affected as no longer being a pleasant or desirable place.

- (33) *chitang li bei cunmin yang le henduo eyu.*  
 pond in BEI villagers raise PFV many crocodiles  
 'A lot of crocodiles were raised in the pond by villagers.'

Example (33) shows that this affectedness relation has to be determined inferentially, rather than directly with respect to being an argument of the main verb. This is further illustrated by the way that examples of the *bei* construction with a retained object are interpreted. In these constructions, it is the pre-*bei* noun phrase that is interpreted as being affected by the action described by the verb rather than the retained object. This effect can be seen most clearly in examples like those in (34):

- (34) a. *Zhangsan bei Lisi ma le niang.*  
 Zhangsan BEI Lisi curse PFV mother  
 ta hen qifen.  
 3SG very angry  
 'Zhangsan's mother was cursed by Lisi.  
 He/\*She was very angry.'
- b. *Zhangsan bei Lisi haisi le die.*  
 Zhangsan BEI Lisi kill PFV father  
 'Zhangsan was the victim of father-killing action done by Lisi.'

*Niang* 'mother' in (34a) and *die* 'father' in (34) do not refer to any particular mother or father but to the type of female or male parents. (34a) may thus be interpreted as 'Zhangsan was mother-cursed by Lisi' rather than 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.<sup>12</sup> Similarly in (34b), 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 sentence in (2a)

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guages. This indicates that *bei* is undergoing further grammaticalisation and may be losing even the remnants of the affected interpretation.

<sup>12</sup>The situation is thus similar to one in which a man might be called a son of a bitch.

above should thus rather be ‘Zhangsan was the object of leg-breaking by Lisi’ or ‘An event of Lisi’s breaking a leg affected Zhangsan’. The fact that the leg belongs to Zhangsan is inferred from the assumption that Zhangsan is (directly) affected by the action of leg-breaking.

This notion of affectedness is not present in purely topicalised variants without *bei* and therefore must be attributed to the morpheme itself. Since the effect is so marked, it would appear that the notion of affectedness is encoded as a semantic effect of *bei* which we suggest it retains from its original verbal meaning as the ability to ‘assign’ a participant role to its preceding (originally subject) constituent. We do not, however, claim that *bei* is a verb in contemporary (Mandarin) Chinese as it exhibits none of the common grammatical properties expected of full verbs and has no independent semantic contribution to make to the clause beyond that of indicating the affectedness of a nominal that immediately precedes it (or from which it is separated only by a restricted set of adjuncts).

All that remains of *bei*’s origin as a full verb is, as we suggest, the association of its preceding constituent with an affectedness reading. We now go further and suggest that this role is in fact one of an event role of ‘locus of affect’. In an analysis of resultative verb constructions in Chinese, Chang (2003) develops ideas put forward in (Croft 1991, 1998) to do with the structure of events and the roles of the participants. Although Chang’s concern is with linking roles to argument realisation, something that we are not concerned with in this paper, nevertheless his analysis of event roles is pertinent to our analysis of *bei*. Chang (2003), following Croft (1998), suggests that participants are involved at the beginning and endpoints of subevents in some event structure, defining three event roles:

- (35) a. **Initiator**: an entity that is involved in the initiation or bringing about of an object [ or event];  
 b. **Target of activity**: an entity that undergoes an action;  
 c. **Locus of affect**: an entity that is involved in the endpoint or resulting state.  
 (Chang 2003:330, addition ours)

Like Chang, it is the last role that we associate with *bei* since, as we have seen above, the pre-*bei* noun phrase is not necessarily an under-goer argument of the main verb. This is particularly clear in examples involving retained objects where, for example, in (2a) it is Zhangsan’s leg that is broken (and so is the target of activity in Chang’s terms) not Zhangsan. Zhangsan is, however, obviously ‘involved in the endpoint’ of the leg-breaking event. In examples with locatives and other adjuncts

(10,13), the location or material used is ‘involved in the resulting state’ whereas the target of activity is the hole dug by the children or the trousers made.

Although in retained object constructions, the target of activity and locus of affect roles are realised by different expressions, in the canonical constructions, this is not the case: the pre-*bei* noun phrase performs both functions, both undergoer and affected argument. Since there is no incompatibility of these two roles, we get a straightforward passive interpretation. For example, in (36) the internal argument of *da* ‘hit’ is a patient necessarily affected by the action and the initial constituent *Zhangsan* is interpreted as locus of affect of the hitting event by reason of *bei*, the most relevant (in the technical sense of Relevance Theory, Sperber and Wilson 1995) and most natural reading is to identify the two, giving rise to an interpretation: ‘there is an event of hitting in which Lisi is the agent and Zhangsan the affected patient’ without any inferential effect. Since the patient argument is fronted and thereby made syntactically prominent, the analysis of the construction as a passive is straightforward.

- (36) Zhangsan bei Lisi da le.  
 Zhangsan BEI Lisi hit PFV  
 ‘Zhangsan was hit by Lisi’

The information provided about the locus of affect by *bei* also helps explain the interpretation of non-patient pre-*bei* noun phrases such as in (30b) repeated below as (37).

- (37) Zhangsan bei jingcha kanjian le.  
 Zhangsan BEI police see PFV  
 ‘Zhangsan was seen by the policeman.’

By marking Zhangsan as locus of affect, this construction gives rise to a focus on the endpoint of the seeing, its result state. Since there is no lexically encoded result state of a seeing event, there is an inference that nevertheless some result state does obtain that affects Zhangsan and, because the police are the agents of the seeing, this gives rise to an implication of adversity for Zhangsan.

Chang (2003) is principally concerned with the realisation of arguments in different resultative verb constructions. In typical, active constructions he associates the locus of affect with a postverbal position (in fact, the position immediately following the second verb, but the details are not relevant here) and provides a separate linking rule that stipulates that it also may be realised as the pre-*bei* noun phrase (‘subject’ in his terms). This necessarily excludes his initiators (typi-

cally agents) from this position, but by brute force: the account does not explain the constraint. In our account, argument linking has no place (at least in the syntactic process, it may be that such concepts are relevant in the lexicon), and object gaps are construed as anaphoric to the topic. For us, therefore, the problem reduces to excluding the term projected by the pre-*bei* constituent from being interpreted as an agent/initiator argument in the following string.

The concept of affectedness itself does not exclude agents from having an affected reading (Saksena 1980) and so we might expect unaccusatives or verbs of imbibing, etc., to be able to appear with *bei* and interpreted as actor as well as locus of affect, contrary to fact (38):<sup>13</sup>

- (38) \*Lisi bei diedao le.  
 Lisi BEI fall PFV  
 (Intended: ‘Lisi was affected by falling’)

Agents of transitive verbs are also excluded from being identified with the pre-*bei* constituent where there is a gap in object position. Putative examples like that in (39) are excluded by binding principle B (or its analogue), since the pronominal would then be bound by the subject.

- (39) \*Lisi<sub>i</sub> bei e<sub>i</sub> da le ta<sub>i</sub>/e<sub>i</sub>.  
 Lisi BEI hit PFV him  
 (Intended: ‘Lisi was hit by himself.’)

Furthermore, the ungrammaticality of examples like (40) with a fronted agent and an overt object follows, we suggest, from a constraint on the construal of a (null or overt) pronominal in the subject position of the clause following *bei* with the pre-*bei* noun phrase. We return to this issue in section 1.4.1.

- (40) \*Lisi<sub>i</sub> bei e<sub>i</sub> da le Zhangsan  
 Lisi BEI hit PFV Zhangsan

Our overall conclusion, then, is that *bei* identifies the constituent that precedes it as the locus of affect of the event expressed by the following clause. The *bei* construction in Chinese is thus interpreted

<sup>13</sup>An anonymous reviewer claims that intransitive verbs may appear with *bei*, citing the following example:

(i) Ni zenme bei ta pao le  
 you how BEI s/he run PFV  
 ‘How did you let him run away.’

Our informants reject this example with *bei*, but accept it with *gei*, *jiao* or *rang*. even if it were acceptable, however, notice that the putative locus of affect *ni* is not identified as the actor of the running *ta* and so does not constitute a counterexample to the current hypothesis.

as a passive construction by virtue of the fact that it encodes action notionally devolving from the standpoint of the locus of affect of a transitive verb. Thus, 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*. Furthermore, the effect of presenting an initial constituent as having such a role normally associated with syntactic objects gives rise to topiclike discourse properties being associated with that constituent, giving rise to a hybrid topic/subject interpretation of the pre-*bei* noun phrase.

### 1.3 Towards a Dynamic Syntax of Chinese

Given the above descriptive discussion, we now turn to a formal analysis of these hypotheses within the framework of Dynamic Syntax in which these properties can be made to follow straightforwardly. We will further show how it can provide the basis of a unified account of the various problematic instantiations of the construction.

As is evident from the papers in this volume, *Dynamic Syntax* (Kempson et al 2001, Cann et al. 2005) models the process of natural language understanding as the monotonic growth of trees representing the semantic content of some string of words uttered in context. The process is goal-driven, beginning with the initial, universal requirement to establish propositional content for some utterance. Such content is represented in terms of binary trees establishing the argument structure of a proposition as it is built up incrementally through the operation of general construction rules, information provided by words, and pragmatic processes of enrichment. The framework articulates a grammar formalism that characterises the structural properties of language by means of a dynamic parsing process that is strictly incremental. Syntax is thus construed not in terms of static articulated structures defined over strings of words, but in terms of how structures that represent the meaning of a string of words are built up. Intrinsic to this process are concepts of underspecification which are 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 *bei* construction.

#### 1.3.1 Requirements and tree growth

The logical form corresponding to the interpretation of a string (an expression in the language of thought) is represented as a binary tree which encodes the argument structure of a clause, and the parsing pro-

cess is the attempt to establish some appropriate tree on the basis of the words provided. Nodes in trees are decorated with values of labels specifying (amongst other things) the type of the node (label  $Ty$ <sup>14</sup>), its semantic content shown as a lambda expression (label  $Fo$ ) and an address specifying where in the tree the node is (label  $Tn$ ). The structures derived in the output language are thus proof trees of some labelled deductive logic (see Gabbay 1994 inter al.) with each step defined over the types and formulae by modus ponens and functional application. The result of parsing a sentence such as (41) is, therefore, the binary structure in Figure 1 with each node decorated by an argument or functor expression and associated type.<sup>15</sup>

- (41) Lisi ma guo Zhangsan  
 Lisi scold EXP Zhangsan  
 ‘Lisi scolded Zhangsan.’

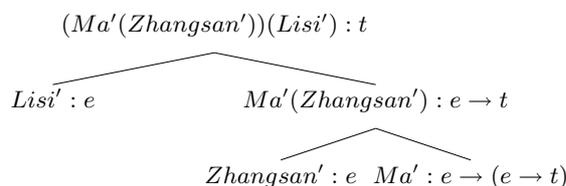


FIGURE 1 Output proof tree for *Lisi ma guo Zhangsan*

In addition to values of labels, nodes may be decorated by requirements of various sorts which provide the driving force of the parsing process. Requirements may be to specify values for any of the labels that may decorate a node, but the principal drivers of the syntactic process are requirements to establish formula values of certain types, starting from  $?t$ , an instruction to build a propositional tree decorated with a formula of type  $t$ . To satisfy a requirement, a parse relies on information from three sources. First of all, there are general computational rules which are optional, freely available and may be universally or specifically available to a language. Secondly, there are actions associated with a particular word. The framework is strongly lexicalist and much of the work of the construction of the output logical forms are induced by individual lexical items. However, unlike other lexical-

<sup>14</sup>DS uses only a restricted set of types:  $e$  the type of a term,  $t$  the type of a proposition,  $cn$  the type of a common noun,  $e \rightarrow t$ , the type of a (one-place) predicate and higher arities of predicates, and eventuality sorts of these (see below). The theory eschews the use of type-altering operations.

<sup>15</sup>Here and below, we omit the address of nodes except where relevant.

ist frameworks such as HPSG (Sag, Wasow and Bender 2003) or LFG (Bresnan 2001), the lexical entries for lexical words are not static feature matrices but procedural instructions giving information about how the semantic content of the word is to be construed in the current context. Thus, lexical entries consist of *IF...THEN...ELSE* statements where the *IF* clause states the conditions under which the actions in the *THEN* clause can be run, while the *ELSE* statement gives instructions about the action to be taken if the conditioning context is not met, typically an instruction to abort the parse. In this paper, however, we leave aside all technical details for ease of exposition and rely on the tree displays to show the results of applying syntactic operations.

Wu (this volume) provides a sketch of a DS grammar of Chinese within the framework of Cann et al. (2005). In this paper, we develop the account given there by introducing situation or event terms into the representations (Gregoromichelaki 2006) and pick the hypotheses in Cann (this volume) concerning syntactic subjects as locally unfixed and the behaviour of verbs in projecting full propositional information.

As is common, we take event arguments to be of type  $e$ , that of an entity, but sortally distinguished from individual entity-denoting expressions as being of type  $e_{sit}$  (where *sit* stands for ‘situation’<sup>t</sup>). The result of parsing the simple verb *ma* is shown in figure 2. The diamond,  $\diamond$ , is the ‘pointer’ which is used to identify the particular node that is to be developed next, here the event node.<sup>16</sup>

As noted above, the parse of a verb leaves the pointer on the node that requires to be decorated by some event term which, we suggest, is provided by parsing an aspect marker (whether overt or null). It is not possible here to discuss the behaviour and semantics of aspect markers in Chinese, but we assume that they provide information about how the eventuality expressed by the verb is to be interpreted. Specifically, we suggest that the parse of an aspect marker provides an event variable of different sorts, according to the specific marker used. This event variable is then evaluated when the propositional formula expressed by an utterance is computed to give some sort of indexical term that can be updated in various ways (such as relations with other event vari-

<sup>16</sup>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. The formal basis of the theory is a description language for partial trees based on the Logic of Finite Trees (LOFT) (Blackburn and Meyer-Viol 1994), a modal logic for describing finite trees. This logic allows reference to any node in a tree from any other node, using two modal operators

$\langle \uparrow \rangle$  the mother relation  
 $\langle \downarrow \rangle$  the daughter relation

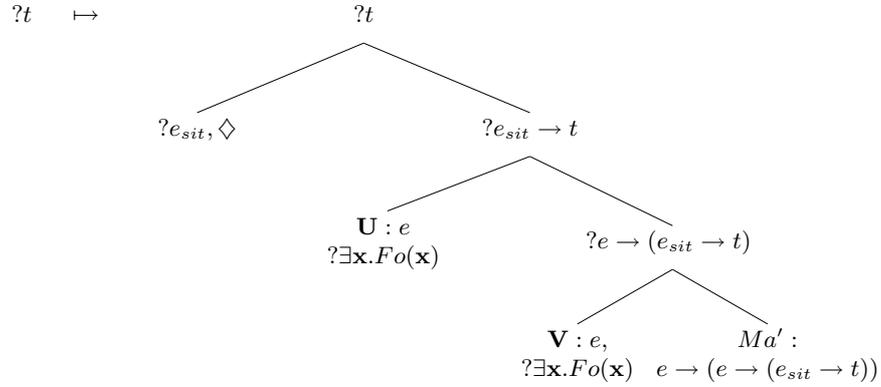


FIGURE 2 Parsing *ma*

ables already introduced in the discourse, see Kamp and Reyle 1993) depending on the properties of the aspect marker. We thus envisage the parse of the experiential aspect marker *guo* as providing a fresh event variable annotated to indicate its specific aspect which we represent by boldface  $\mathbf{s}$  superscripted by the gloss used in this paper for the marker and with a subscripted index to differentiate between variables associated with different predicates, e.g.  $\mathbf{s}_i^{\text{exp}}$ . Parsing *ma guo* thus updates the tree in figure 2 to that in figure 3.<sup>17</sup>

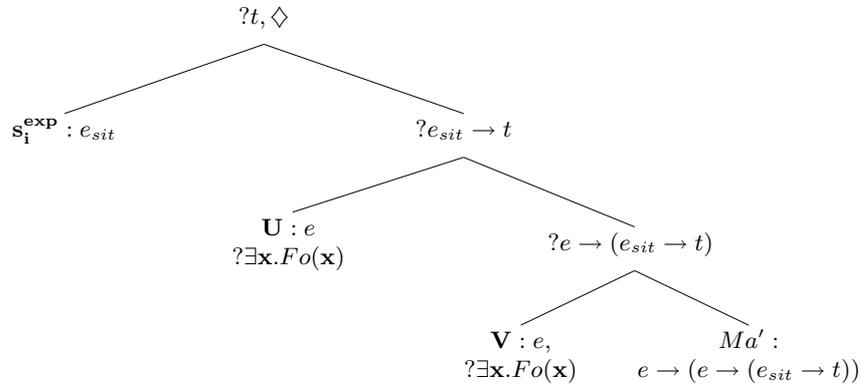


FIGURE 3 Parsing *ma guo*

<sup>17</sup>In a more elaborated grammar, one might take the aspect marker as constructing an epsilon situation term with an aspectual restrictor. We leave such a refinement to one side in this paper.

### 1.3.2 Formula Underspecification

In the tree displays in figures 2, 3, the individual argument nodes are annotated with expressions of type  $e$  shown as boldface  $\mathbf{U}, \mathbf{V}$ . These are *metavariables* which act as placeholders for actual formulae and are thus associated a requirement to find *formula values* ( $?\exists \mathbf{x}.Fo(\mathbf{x})$ ) which can only be satisfied if some contentful formula value replaces the metavariable during the course of a parse. Such replacement is associated with a substitution process that is both pragmatic and system-external, restricted by pragmatic principles (such as relevance), locality considerations (such as analogues of the Binding Principles, Chomsky 1981, Kempson et al. 2001:97) and, for pronouns, by lexical presuppositions, such as gender, number and person, only the latter being relevant for Chinese in the pronominal system. The effect of parsing verbs in Chinese is thus to have argument nodes decorated with such metavariables as if associated with null pronominals. The reason for adopting this approach is, of course, that Chinese is a radical pro-drop language and speakers freely omit arguments when it is clear what those arguments should be from the context. Thus, all the strings in (42) are grammatical in appropriate contexts:<sup>18</sup>

- (42) a. Lisi ma guo Zhangsan.  
       Lisi scold EXP Zhangsan  
       ‘Lisi scolded Zhangsan.’  
       b. (Who did Lisi scold?)  
       *ma guo Zhangsan.*  
       c. (Who scolded Zhangsan?)  
       *Lisi ma guo.*  
       d. (What did Lisi do to Zhangsan?)  
       *ma guo.*

With metavariables projected by verbs in Chinese, there are no presuppositional constraints (because of the lack of morphological agreement) allowing free substitution of some term from context (modulo binding restrictions) which prevent (for example) the substitution of one local argument formula for another. Thus, assuming that *ma guo* is being uttered by Lisi, then the hearer may choose the concept *Lisi'* as the appropriate substituend. By a process called *anticipation* in Cann et al. (2005), the pointer may be moved down a tree to some node that contains an open requirement such as the subject node in figure 3, allowing substitution to occur to derive the update in figure 4 where the substitution operation is shown by the double uparrow.

<sup>18</sup>See Wu 2005 and W. Li fcmg for an alternative approach that allows free metavariable insertion.

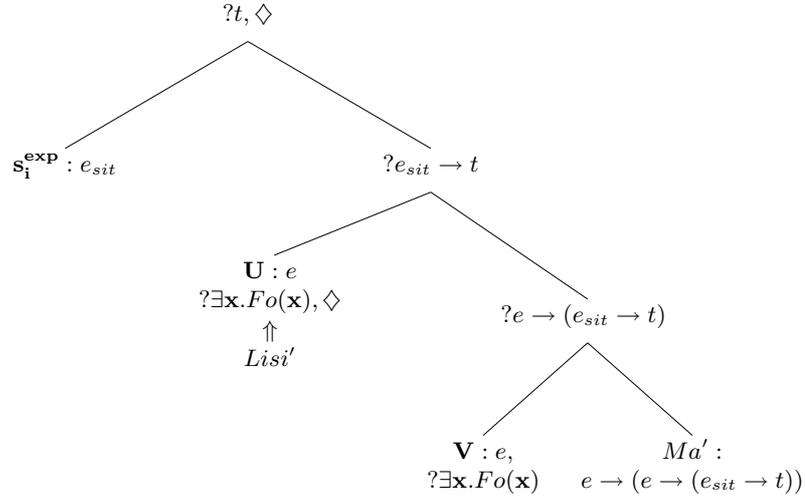


FIGURE 4 Identifying the subject argument from context

Metavariables may be updated not just through substitution but through the parse of some term-projecting expression. All noun phrases (including quantified ones) are projected as terms of type  $e$  in DS, contrary to the higher type associated with the theory of generalised quantifiers (Barwise and Cooper 1981 inter al.), so that a proper name like *Zhangsan* projects a simple individual constant.<sup>19</sup> The parse of a noun in Chinese may thus be triggered either by a type requirement for a term,  $?e$ , or by a formula requirement,  $?\exists \mathbf{x}. Fo(\mathbf{x})$ , on a term node hosting a metavariable. So, after parsing *ma guo* parsing the proper name *Zhangsan* gives the tree in figure 5 from that in figure 4.

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. Figure 6 shows the completed tree with no outstanding requirements, the root node of which is decorated with a type  $t$  formula value, as required.

### 1.3.3 Left Dislocation and Syntactic Subjects

As already noted, the driving force behind the parsing process in DS is the need to satisfy requirements. Often these requirements need to be

<sup>19</sup>Technically, terms in DS are modelled as epsilon terms (Hilbert and Bernays 1939) so that a proper name *Zhangsan* yields an iota term,  $\iota, x, Zhangsan'(x)$ . We leave this complexity aside, returning to the issue of epsilon terms as they relate to event terms below.

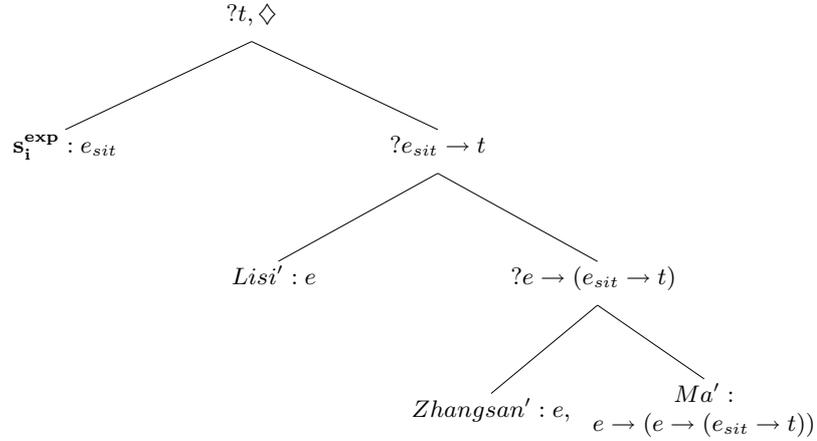


FIGURE 5 Parsing *ma guo Zhangsan*

satisfied immediately, but some requirements can only be satisfied at some later stage of the parsing process. One of these is used to account for left dislocation. Just as anaphora is analysed in terms of underspecification of formula, so dislocated dependencies are analysed in terms of underspecification of final position within an unfolding propositional structure. This is achieved using a tree modality that specifies only some undetermined domination relation:  $\langle \downarrow_* \rangle \alpha$  from some node  $\beta$  merely indicates that  $\alpha$  holds at some node that  $\beta$  dominates (inversely  $\langle \uparrow_* \rangle \beta$  from  $\alpha$  indicates that  $\beta$  holds at some dominating node).<sup>20</sup> Initial expressions may, by virtue of these operators, be parsed without initially having a fixed position within the tree but being asserted to be only dominated by some node with treenode address  $n$ , 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. Unfixed nodes also carry a requirement  $?\exists \mathbf{x}. Tn(\mathbf{x})$  to identify a fixed address within the current tree.

Certain types of left dislocation are thus 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, analysing the string *Zhangsan, (ta) ma guo* ‘Zhangsan, he/she scolded’ in these terms is illustrated in Figure 7 with an initially projected unfixed node,

<sup>20</sup>Both relations are defined as the reflexive and transitive closure of the appropriate relation so that  $\langle \uparrow_* \rangle \alpha$  states that  $\alpha$  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.  $\langle \uparrow_* \rangle \alpha =_{def} \alpha \vee \langle \uparrow \rangle \langle \uparrow_* \rangle \alpha$ ). See also footnote 16.

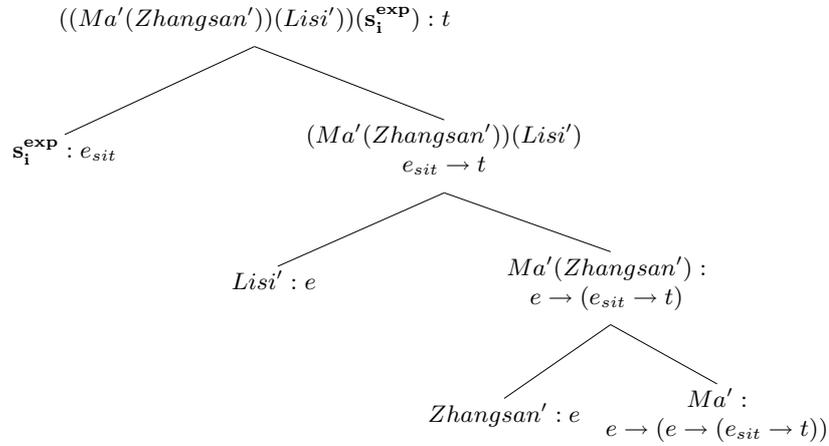


FIGURE 6 Completing *ma guo Zhangsan*

licensed by a general computational rule called \*Adjunction (read ‘star adjunction’) allowing the parse of the word *Zhangsan* which bears only a weak dominance relation to the rootnode (with treenode address 0).

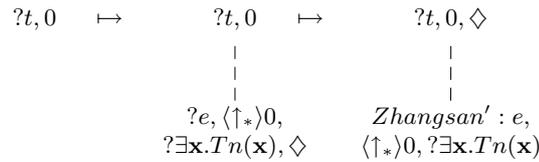


FIGURE 7 Parsing a left dislocated string

From this point, the parse of the string proceeds exactly as in figures 2–4 to yield the tree in Figure 7 where two outstanding requirements remain: a requirement to find a fixed position for the unfixed node and a requirement to find the formula value for the internal argument. In this environment, a process called MERGE<sup>21</sup> can take place which unifies the unfixed treenode with the current node, giving rise to a composite set of decorations which is well-formed just in case there are no contradictory values for labels (shown as the dashed arrow in Figure 7). Ultimately, completion of the tree derives exactly the same tree as in figure 6.

Note again that there is no encoding in the output that the string

<sup>21</sup>Not to be confused with the tree-building process of the same name used in Minimalism (Chomsky 1995). A better name for this process would be UNIFICATION which more accurately describes its operation.

involved left dislocation and thus no encoding of discourse information such as topic or focus in the semantic representations themselves. The effect of focus (or topic) derives from the fact that some expression is presented string initially that might be expected to appear later which initiates in context some inferential effect. This illustrates a significant aspect of the framework: discourse effects are not specifically encoded but are taken to result from (relevance-theoretic) pragmatic reasoning (see Kempson et al. 2006 for some discussion). Notice how this modelling of natural language structure replaces the static configurational approach: concepts such as c-command defined over a fixed structure are 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. Since such relations are not represented in the proof trees, the notions of topic and focus in DS are treated as pragmatic, discourse constructs whose particular interpretation on any particular occasion of utterance is context dependent. There is no concept that topic and focus are associated with specific truth conditional meaning or particular structural properties (contra Rooth 1992 inter al. but in line with, for example, Wedgwood 2005). Instead, it is assumed that topicalised and focused constituents are introduced by the same syntactic processes, leaving it to the richness of context to determine exactly how such constituents are interpreted on particular occasions of utterance. This seems to be of particular relevance to the analysis of the phenomena in Chinese (and other languages like Korean, see Kiaer 2007). Wu (2005) notes briefly that it is often difficult to distinguish topic from focus in Chinese, particularly with respect to clause initial expressions. Compare (43) and (44):

(43) Tomatoes, I like; potatoes, I don't.

(44) xihongshi, wo xihuan; malingshu, wo bu xihuan.  
 tomato 1SG like potato 1SG not like  
 'As for tomatoes, I like (them); As for potatoes, I don't (like them).'  
 OR 'Tomatoes I like; potatoes I don't.'

While the clause-initial expression *tomatoes* has a focus interpretation in English (Cf. *As for tomatoes I like them*), *xihongshi* could be either interpreted as a focus or topic in Chinese because a pause, which is supposed to use to distinguish them, is not always clearly indicated in discourse. The interpretation of topic or focus within spoken utterances therefore may be determined by context (although syntactic

disambiguation can be achieved if a topic particle like *a* is used) after the initial constituent.<sup>22</sup>

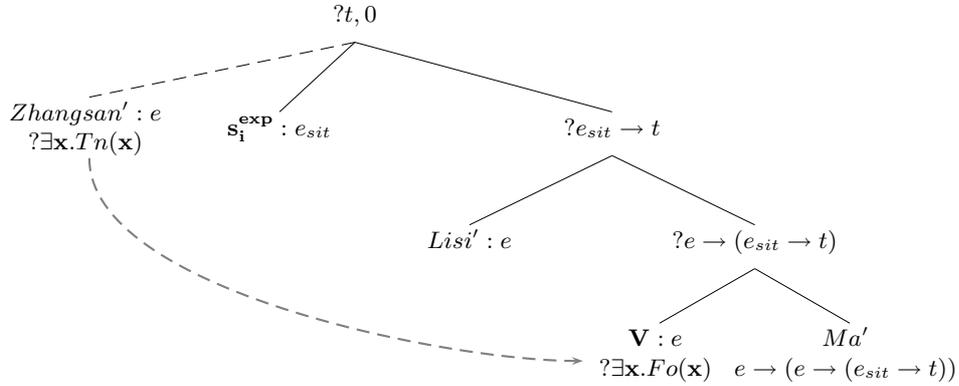


FIGURE 8 Parsing *Zhangsan, ma guo*

Although an unfixed node can be used to analyse true left dislocation, including unbounded dependencies, it does not have to be, as the definition of the modality,  $\langle \uparrow_* \rangle n$ , merely requires the relevant node to be dominated by node  $n$ . Hence, the node can be fixed locally or non-locally and in subject as well as object argument positions. It is thus this device that allows for the appearance of overt subjects in pro-drop languages like Chinese. An initial expression may be parsed as decorating an unfixed node and then once the verb (and any associated aspect marker) is parsed, the unfixed node may be fixed in subject position as schematically indicated in figure 9 which shows the resulting partial tree after a parse of the first three words of *Lisi ma guo Zhangsan*.<sup>23</sup>

### 1.4 The ‘bei’ construction

We now have in place all that is necessary to provide a theoretical analysis of the *bei* construction based on the descriptive characterisation given in earlier sections. Recall that the particle *bei*, we have argued, marks the pre-*bei* constituent as the locus of affect of the event

<sup>22</sup>Notice at this point that this analysis is functionalist in spirit, as in many analyses within DS which provides a formal and explicit framework for exploring such approaches.

<sup>23</sup>In fact, syntactic subjects are typically associated in current versions of DS with a local variant of \*Adjunction which requires a node to be fixed within the current predicate-argument array. For the purposes of the current paper, this refinement is not necessary. See Kempson and Cann (2008) for discussion of this process with respect to Medieval Spanish.

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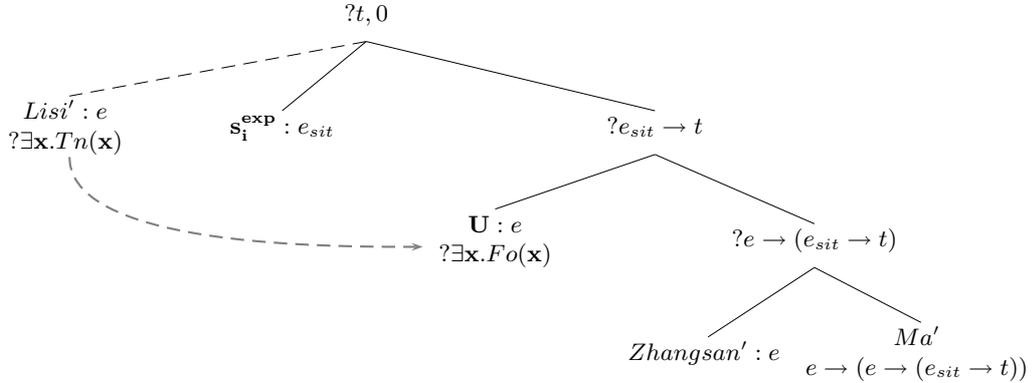


FIGURE 9 Parsing *Lisi ma guo Zhangsan*

expressed by the following clause, thus often being interpreted as the internal argument of that verb and giving rise to a passive interpretation. Additionally, we argued that this constituent has significant topic-like properties as well as some, but by no means all, the properties associated with subjects in Chinese.

As noted above, a topic effect is achieved within the theory by using \*Adjunction to provide an unfixed node to allow the parse of the initial string.<sup>24</sup> The analysis of a canonical *bei* construction like that in (1a), repeated below as (45), begins as usual with a requirement to construct a propositional structure and the projection of an unfixed node that is decorated by parsing *Zhangsan*, exactly as in figure 8 above.

- (45) Zhangsan bei Lisi ma guo.
- Zhangsan BEI Lisi scold EXP
- ‘Zhangsan has been scolded by Lisi.’

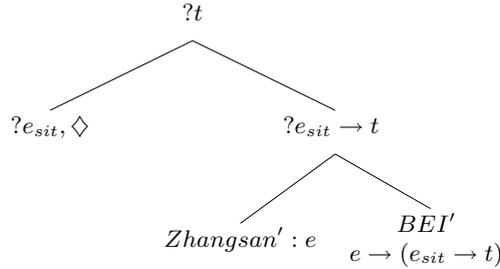
At this point, *bei* is parsed and a quite complex set of actions is initiated. As argued above, we take the pre-*bei* noun phrase to be the locus of affect of the event expressed by the following clause. To encode this, bearing in mind that semantic representations are the *only* level of representation in DS, we take *bei* to project a predicate with argument structure, but one that is quite underspecified with respect to content, encoding only that it identifies its individual argument term as the locus of affect of its event argument:  $\lambda x[\lambda y[\theta_{LoA}(y, x)]]$  (which

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<sup>24</sup>Note that the use of the same mechanism for subjects helps to explain why, in pro-drop languages, overt subjects often show topic or focus effects in the absence of other expressions *already* identified as playing such roles.

we abbreviate to  $BEI'$  in the displays). The unfixed node decorated by  $Zhangsan'$  is further ‘fixed’ as the individual argument of the predicate and then a requirement of an event node is constructed above that as illustrated in (46)

(46) The initial stage of parsing *Zhangsan bei*:



However, instead of leaving the event node to be annotated by an aspect marker, as with verbs like *ma* above, the construction of a *specific* event term is initiated.

Noun phrases in DS invariably project structures rooted in type  $e$ , the type of a term (whether an event or an individual); and there is no type-lifting mechanism, unlike in generalised quantifier theory. More specifically, quantifying expressions are analysed in terms grounded in a proof-theoretic labelled-deduction methodology and are taken to contribute arbitrary names of a sort familiar from natural-deduction predicate logic proofs. These names are defined as denoting the arbitrary witness of their containing assertion. The logic within which these names are defined is the *epsilon calculus*, with the defined names (*epsilon terms*, see also footnote 19) carry a record of the propositional formula within which they occur, based on the following equivalence:

$$\exists x.F(x) \equiv F(\epsilon x.F(x))$$

The schematic formula on the right hand side of the equivalence sign, an epsilon calculus formula, is an ordinary predicate-argument expression, like e.g.  $F(a)$ . However, within the argument of this expression, there is a required second token of the predicate  $F$  as the *restrictor* for that argument term ( $\epsilon$  is the variable-binding term operator that is the analogue of the existential quantifier, here binding the variable  $x$ ). The effect is that the term itself ( $\epsilon x.F(x)$ ) replicates inside it the content of the overall formula that is predicated of it. Further details are not important here (see Hilbert and Bernays 1939, von Heusinger 2002, Kempson et al. 2001, etc.). What is significant is that, although quantified terms are assigned only a low type, they nevertheless have structure, specifically a structure containing a quantifier, a bound vari-

able and a predicate over that variable. So, parsing *bei* induces such a quantificational structure, but with an event *metavariable* in place of the bound variable which provides the event term for the embedded propositional structure, whose value will be provided by any aspect marker appearing with the main verb. Although apparently complex, the structure that results from parsing *Zhangsan bei* which appears in Figure 10 provides the right sort of semantic basis for interpreting the *bei* construction.

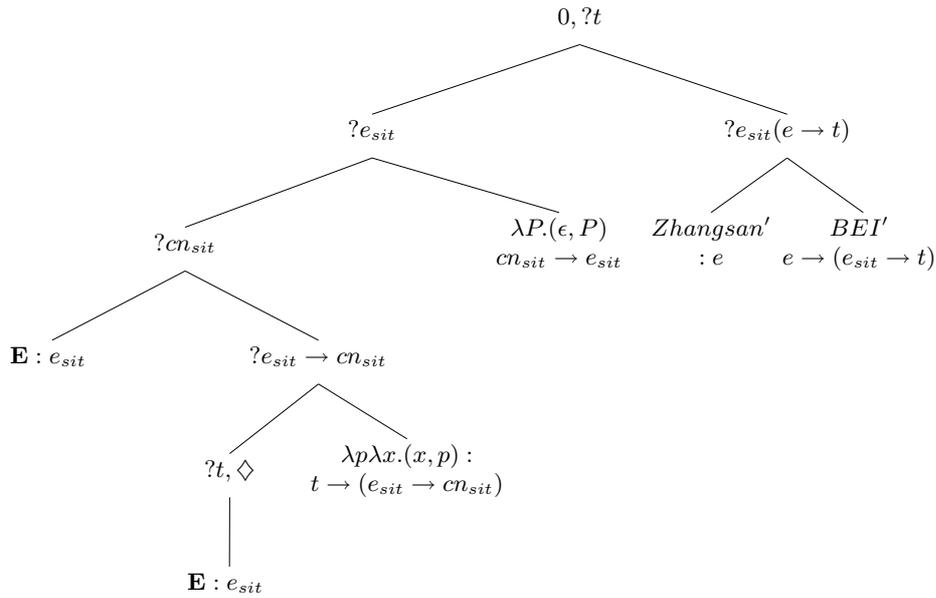


FIGURE 10 Parsing *Zhangsan bei*

With the pointer at an open propositional node, the parse of the rest of the sentence now proceeds as previously in Figures 7-9. When the last word is parsed, there remains a requirement to identify the content of the internal argument of the main verb (see figure 9, above). To resolve the formula requirement, given that there is no further input, it is necessary to substitute the metavariable with some contentive formula from context. Given that *Zhangsan* is interpreted as topic by the processes discussed above, this must provide the content of that pronominal as involving least effort and largest inferential effect. (Such an effect is seen also in topic sentences without *bei* which also have a gap in the comment clause, cf. (5).) In DS terms, therefore, the formula projected by *Zhangsan* is taken to substitute for the metavariable

decorating the undergoer argument node.

The propositional tree may now be completed and compiled to satisfy outstanding requirements, yielding the still incomplete tree in Figure 11, with *Zhangsan'* substituted for **V** and the variable projected by the aspect marker  $\mathbf{s}_i^{\text{exp}}$  substituting for the event metavariable **E**. (Note that complex types are omitted from the display for ease of reading.) To get the final propositional formula, we continue to go up the

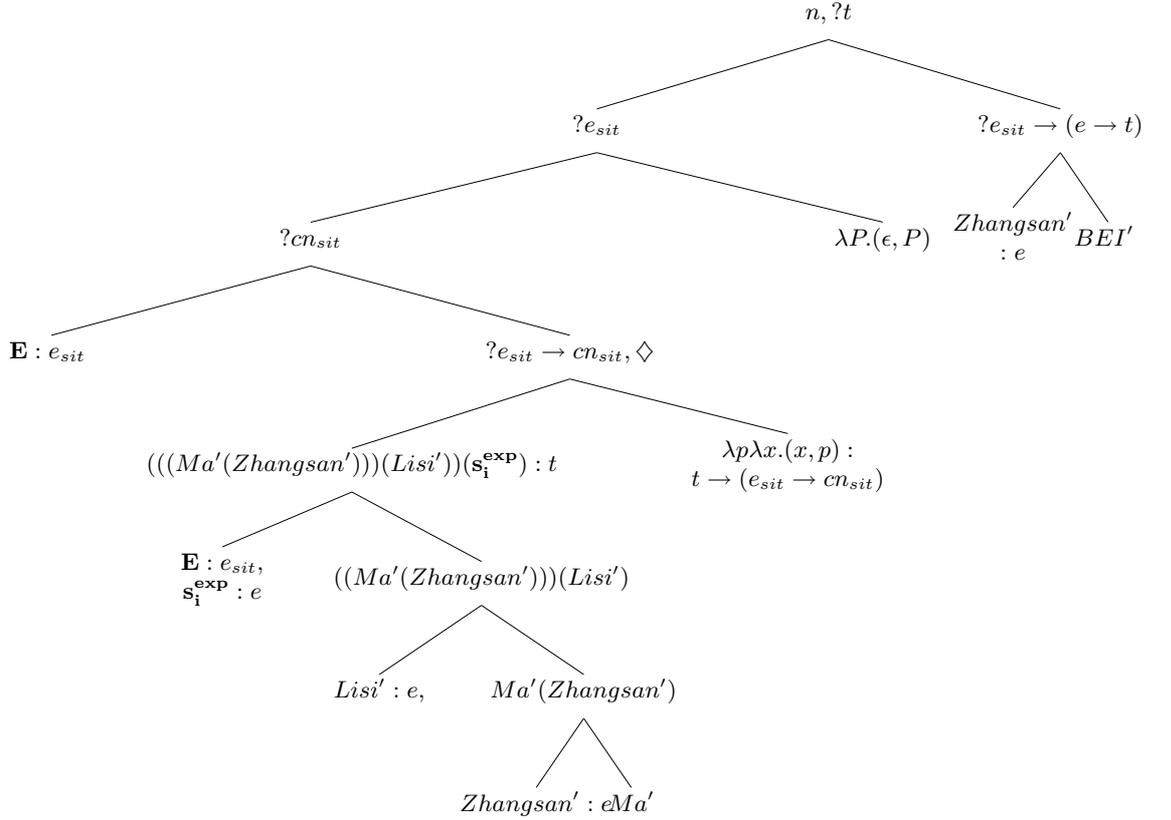


FIGURE 11 Completing *(Zhangsan bei) Lisi ma guo*

tree applying functional application over the nodes. So we apply the node decorated with  $t \rightarrow (e_{sit} \rightarrow cn_{sit})$  to yield the following (after lambda reduction):

$$\lambda x.(x, (Ma'(Zhangsan')(Lisi')(s_i^{\text{exp}}))) : e_{sit} \rightarrow cn_{sit}$$

The pointer goes to the event node and substitutes the event variable

$\mathbf{S}_i^{\text{exp}}$  (necessarily because  $\mathbf{E}$  has already been so instantiated) allowing the two nodes to combine to give:

$$(\mathbf{s}_i^{\text{exp}}, (Ma'(Zhangsan')(Lisi')(\mathbf{s}_i^{\text{exp}}))) : cn_{sit}$$

This then combines with the epsilon operator to yield:

$$(\epsilon, \mathbf{s}_i^{\text{exp}}, (Ma'(Zhangsan')(Lisi')(\mathbf{s}_i^{\text{exp}}))) : e_{sit}$$

The pointer moves down into the matrix proposition to combine the content of  $BEI'$  ( $\lambda x[\lambda y[\theta_{LoA}(y, x)]]$ ) with  $Zhangsan'$  and the result then combines with the event term to yield:

$$\theta_{LoA}((\epsilon, \mathbf{s}_i^{\text{exp}}, (Ma'(Zhangsan')(Lisi')(\mathbf{s}_i^{\text{exp}}))), Zhangsan') : t$$

By the process of term evaluation given in Kempson et al. (2001) (whose details are not relevant here), the epsilon equivalence given above, and unpacking the lexical roles associated with the verb *ma*, we get an equivalent first order logic expression which provides exactly the right set of truth conditions of there being an event of scolding initiated by Lisi and targeting and affecting Zhangsan, as desired:

$$\begin{aligned} & \exists \mathbf{s}_i^{\text{exp}} [Ma'(\mathbf{s}_i^{\text{exp}}) \wedge \theta_{Init}(\mathbf{s}_i^{\text{exp}}, Lisi') \\ & \wedge \theta_{ToA}(\mathbf{s}_i^{\text{exp}}, Zhangsan') \wedge \theta_{LoA}(\mathbf{s}_i^{\text{exp}}, Zhangsan')] \end{aligned}$$

#### 1.4.1 Some Consequences

We have now provided an analysis of the canonical *bei* construction that directly encodes the semantics of the construction we argued for in section 3 without having to assign the expression to any particular syntactic category. In this section, we explore some consequences of the analysis before moving on to our accounts of the agentless and retained object versions of the construction.

As discussed in section 3, the passive reading is derived without assuming that anything specifically encodes passive voice itself. The interpretation of the pre-*bei* noun phrase as the locus of affect role with respect to the event denoted by the main verb, combined with its interpretation as the topic of the sentence means that where there is a gap in the clause it will also be interpreted as the target of affect of the event. the passive reading is thus derived from more general processes of interpretation not from a specific, encoded, passive meaning.

Furthermore, this is achieved without having to assign the morpheme *bei* to any specific syntactic category. The syntax of DS does not use the concept of word class, except as a possible means of structuring the lexicon (as, for example, in the typed lexica associated with HPSG, Sag 1997). So, although our treatment of *bei* retains some of the lexical actions associated with parsing verbs, such as the construction of argument nodes and the introduction of a predicate, albeit a very weak one,

we do not thereby assign it to this particular category. It only makes sense to call *bei* a verb (or adjective, preposition or noun which are other expressions that project argument structure) if some generalisations can be made over the lexical actions it induces that are consistent with other members of such classes. In the absence of such generalisations, such as being able to appear with aspect or negation markers, the expression can be left as an idiosyncratic grammatical morpheme without further categorisation. In fact, the specific inability of *bei* to appear with an aspect marker is directly captured by our analysis. Recall that the trigger for parsing aspect markers is a node with a requirement to construct an expression of event type ( $?e_{sit}$ ), a constraint which ensures that a verb has already been parsed. The parse of *bei*, however, leaves the pointer at a proposition-requiring node. This automatically ensures that no aspect marker can appear as the next word in the string and that the next word must either be a subject (introduced by \*Adjunction triggered by  $?t$ ) or a verb, again with the same trigger. Thus, we directly account for why *bei* always appears closely associated with a following subject or, in short passives, with a verb.

As noted above, native speakers of Chinese do not, in general, accept long distance dependencies for the pre-*bei* noun phrase, as illustrated in (47).

- (47) a. \*Yuehan bei Mali renwei Dawei da guo.  
 John BEI Mary think David hit EXP
- b. Yuehan Mali renwei Dawei da guo.  
 John Mary think David hit EXP  
 ‘John, Mary thinks that David has hit.’

This follows directly from the semantic structure induced by parsing *bei*. The event of which the pre-*bei* noun phrase is construed as the locus of affect is the event expressed by the main predicate of the embedded proposition and not an event associated within any further embedded proposition. The putative output logical structure of (47a) would be something like:

$$\theta_{LoA}((\epsilon, s_j, Renwei'(((Da'(\mathbf{V}))(Dawei')(s_k^{EXP}))(Mali'))(s_j)), Yuehan')$$

In other words, John is the locus of affect of a state of Mary’s *thinking* that David beat someone, but this is semantically incoherent. Therefore, the example is excluded and the effect of locality derives from the association between the pre-*bei* noun phrase and the event described by the main verb of the following clause. For those speakers for whom Huang (1999)’s example (24), given in (48), is acceptable we would have

to say that the combination *pai jingcha zhua-zou* semantically projects a single, complex, event as indicated in Huang's translation for this example.

- (48) ?Zhangsan bei Lisi pai jingcha zhua-zou le.  
 Zhangsan BEI Lisi send police arrest PFV  
 'Zhangsan was "sent police to arrest" by Lisi.' (Huang's translation)

This would bring such examples on a par with pivotal constructions such as (49) in which the conjoined verb *kai-qiang-da-si* 'shoot dead' can be treated as projecting a complex predicate, i.e. defining a single event, where the objects *qiang* 'gun' and *huo* 'fire' are incorporated nouns which cannot be topicalised or passivised.

- (49) Zhangsan bei Lisi kai qiang da si le.  
 Zhangsan BEI Lisi open gun shoot dead PFV  
 'Zhangsan was shot dead by Lisi.'

One point needs to be made concerning the possibility of resumption. As noted above resumptive pronouns are generally considered to be unacceptable with the *bei* construction.

- (50) \*Zhangsan bei Lisi da guo ta.  
 Zhangsan BEI Lisi hit EXP him

The theory presented here, however, cannot exclude such examples as the link between the topic and the missing argument in the comment clause is anaphoric and so may allow a pronoun to appear in the 'gap' in the string. There have, however, been suggestions that resumption is occasionally acceptable, as in the example in (51).

- (51) Zhangsan bei wo piping le ta yidun.  
 Zhangsan BEI I criticise PFV he once  
 'Zhangsan was criticised once by me.' (Ting 1998: 322)

Although there is considerable disagreement that this example is really acceptable, the fact that there is controversy is interesting. In a paper on resumptive pronouns in English, Cann, Kaplan and Kempson (2005) show, from a database of spoken examples such as those in (52), that resumption in English relative clauses is not only possible but fairly common in dialogue.

- (52) a. She got a couch at Sears that it was on sale.  
 b. He's a professor that nobody liked him.  
 c. ... who I was going to have lunch with him....  
 d. I've had children that they've come on stage.

That paper argues that the apparent unacceptability of these examples when written down or presented without context results from pragmatic infelicity, not ungrammaticality. Since a gap is expected in a relative clause, the use of a pronoun gives rise, by assumptions of Relevance Theory, to additional inferential effects (such as highlighting an agent role associated with what would otherwise be an unemphasizable gap) that cannot be resolved out of context.

Although we do not have evidence for the use of resumptive pronouns with the *bei* construction in spoken Mandarin Chinese, the fact that there is some controversy about whether they are, or are not, acceptable, leads us to conclude that a similar story might be put forward in this case: resumptive pronouns are excluded because, having parsed *bei*, a hearer knows that the pre-*bei* noun phrase is to be construed as locally dependent on the main verb and that it performs the role of locus of affect. Any use of a resumptive pronoun will pragmatically reinforce the association of the topic with some specific, affected, argument role associated with the verb. Since this information is already given by the use of *bei*, there needs to be some strong inferential effect to satisfy the needs of relevance. Without such effects being manifest, speakers (and readers) will judge the examples to be unacceptable.

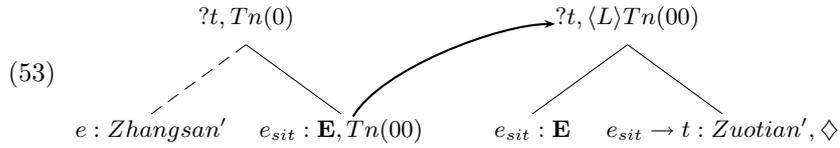
There is, however, a case of non-resumption which we believe is determined by the grammar. This involves the inability of the pre-*bei* noun phrase to be associated with the subject position of the following clause, as illustrated in examples (38, 39,40) above. We suggest that the identification is excluded because both positions are subjects (highest individual arguments of a predicate) in the same *event domain* where this is the set of all formulae that predicate over the event variable of a proposition. If this is correct, then while a pre-*bei* noun phrase may be construed as an object of the main predicate it will never be construed as its subject, thus excluding the relevant examples.

We do not have space here to explain in detail how the pre-*bei* noun phrase might get the subjectlike properties discussed in section 1.2.2 with respect to the placement of adverbials and reflexive binding. But, with respect to the latter, note that the word *Zhangsan* in (21) provides the content of *bei*'s sole individual argument, its semantic subject, just as with respect to the predicate projected by *guan*, *Lisi* provides the content of *its* semantic subject. So they share some properties and whatever licenses *ziji* to be bound by *Lisi* in this example may also license binding by *Zhangsan*. Indeed, we can account for all the data displayed in (20-24) above by adopting two hypotheses. Firstly, as suggested for the Japanese and English reflexive forms in Cann et al. (2005), reflexives, unlike pronouns, do not project metavariables whose content could

be identified later in a parse but require formula values to be found in the appropriate domain *immediately* as they are parsed. Secondly, unlike English, we take *ziji* to take a formula value of a (structural) subject in its immediate predicate-argument domain, or, if no such value is available, within its event domain, giving a slightly extended domain of potential antecedents (but not full long distance binding). Given these hypotheses consider the binding of (21): *Zhangsan bei Lisi guan zai ziji de jiali* ‘Zhangsan was locked by Lisi in his home’. At the point that *ziji* is parsed there are two subjects (highest individual arguments) within the event domain, because the matrix proposition (constructed by parsing *bei*) and the proposition embedded within the event term share the same event variable. Given that the PP is an adjunct and not an argument of the main verb, it is the event domain that is relevant for binding purposes so that the formula the reflexive provides may either be *Zhangsan*’ or *Lisi*’. In (22) (*\*Zhangsan bei Lisi da le ziji xiaohai*), on the other hand, the reflexive occurs within an argument position (even though it is not itself an argument) and so, by the above hypothesis, must take its value from the predicate-argument domain of *da* ‘hit’. Hence, it can only take *Lisi*’ as its value, rendering the example incoherent. But now consider (24), *Zhangsan bei ziji pian le* ‘Zhangsan cheated himself’. At the point where the reflexive is parsed in this example, the pointer is at an unfixed node, exactly as for the parse of a non-reflexive subject, and no local predicate-argument structure has been constructed because no verb has been parsed. The value must therefore be taken from a subject in the current event domain, *Zhangsan*’, yielding a well-formed interpretation that Zhangsan cheated himself. Of course, much more needs to be said about reflexive binding (especially about long distance binding and the behaviour of *taziji*, Pan 1998), but the sketch given here provides an explanation of why a pre-*bei* noun phrase may behave as a subject in some cases but not in others.

For the placement of adverbials such as *zuotian* and PPs between the initial noun phrase and *bei*, as in (25), paralleling the positioning of such expressions between subject and verb in *bei*-less clauses, we do not have space to provide a full account. However the current analysis of *bei* provides a means of accounting for this subjectlike property which we now sketch. It is commonplace nowadays to treat certain prepositional phrases and adverbials as predicates over events (Kamp and Reyle 1993 inter al.) rather than as predicates of predicates (Thomason and Stalnaker 1973), so we may treat such expressions when parsed before a verb as constructing an event/situation node, decorating that node with a situation metavariable and providing a predicate over that

variable. Technically this can be achieved by the use of a LINK structure. Such structures are independent trees that share some term value with the tree to which they are LINKed, here an event metavariable (see Kempson et al. 2001, Cann et al. 2005 and various papers in this volume for details of the LINK mechanism). Parsing an adverbial like *zuotian* ‘yesterday’ will be taken to be triggered by an open *?t* node where no event node has yet been constructed and to involve the actions noted above. Parsing *Zhangsan zuotian* will thus yield a tree like that in (53). (Some details are omitted from the tree display.)



The LINKed tree is then compiled to yield a formula value  $t : Zuotian'(\mathbf{E})$  and the pointer returns to the open propositional node, at which point either a verb or *bei* may be parsed (or any other word meeting the right contextual conditions). Assuming that *bei* is parsed, the parse will proceed as we have seen above. LINK structures are subject to evaluation rules (see Kempson et al. 2001) and the completed tree will yield a final formula value with *Zuotian'* providing a predicate over the complex event term to yield an expression that identifies Zhangsan as the locus of effect of an event of Lisi’s scolding him that happened yesterday:

$$\theta_{LoA}((\epsilon, \mathbf{s}_i^{\text{exp}}, (Ma'(Zhangsan')(Lisi')(\mathbf{s}_i^{\text{exp}}))), Zhangsan') \wedge Zuotian'(\epsilon, \mathbf{s}_i^{\text{exp}}, (Ma'(Zhangsan')(Lisi')(\mathbf{s}_i^{\text{exp}})))$$

To ensure that such adjuncts do not appear after *bei* merely requires an open event node *not* to have been constructed at the point of parsing the adjunct (thus ensuring that it occurs pre-verbally), then it can only appear before *bei* has been parsed. Clearly, much more needs to be said about both these constructions and their analysis, but it appears to us that our analysis of the *bei* construction in principle provides a solid foundation for such accounts.

#### 1.4.2 Agentless ‘passives’

The analysis of the canonical *bei* construction provides a template for analysing the other patterns found, thus providing a unitary characterisation of the function of the morpheme *bei*. We begin with the agentless pattern, where we analyse the lack of a subject expression as a simple instance of pro-drop. Thus in *Zhangsan bei ma guo*, after the first two words have been parsed, the pointer is at the propositional

node within the constructed event term. This allows either for the parse of a subject (via \*Adjunction) or of a verb: both are possible. If the latter option is chosen then the value of the metavariable decorating the higher individual argument node must be derived from context. In parsing a string like *chuanghu bei za le* ‘The window was smashed’, the post-*bei* ‘gap’ may be interpreted either as some salient referent or generically. In favour of this analysis is the fact that after an utterance like (54a), an agent-oriented question like (54b) is felicitous.

- (54) 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 also 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 (55).<sup>25</sup>

- (55) a. *Zhangsan bei (ren) da le.*  
 Zhangsan BEI people hit PFV  
 ‘Zhangsan was hit by someone.’  
 b. *chuanghu bei (ren) za le.* The  
 window BEI people smash PFV  
 ‘  
 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.<sup>26</sup>

Huang (1999) argues forcefully against such an approach, preferring to adopt a slightly different analysis for agentless passives from those with expressed agents. His reasons have to do both with historical and synchronic data.<sup>27</sup> Historically, Huang points out that the short passive

<sup>25</sup>We have queried a group of Chinese-speaking children of ages 6-9 with regard to the interpretation of the agentless *bei* sentences. Interestingly, most of them insist that such sentences are bad because the agent is missing.

<sup>26</sup>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.

<sup>27</sup>Huang’s argument concerning the inability of agents to delete, we leave to one side as not being relevant for our analysis: no deletion occurs.

is older than the long counterpart. Leaving aside notions of derivation of one construction from the other as irrelevant to our analysis, we point out that cross-linguistically short passives are more common than long ones, within linguistic communities short passives are more frequently used and in first language acquisition appear earlier in children's speech (Svartvik 1966, Xiao, McEnery and Qian 2006). Functionally, this is unsurprising, as the passive provides a means of foregrounding, or otherwise highlighting, an undergoer of some sort. This in turn implies a reduction in the discourse prominence of an actor. So, unless the actor needs to be mentioned (for example, the referent is less familiar in the discourse than the passive subject) then it is unlikely to appear. The chronologically earlier appearance of the short *bei* construction thus does not seem to us sufficient to assume it is fundamentally different from the long form.

Secondly, Huang points out that the short form strictly does not allow resumption and that the appearance of gaps in the long form is a recent phenomenon. Again, we believe that this is pragmatically motivated and point to our short discussion of resumption in the previous section. It is notable that the shorter an utterance is, the less likely a resumptive pronoun is likely to be acceptable so that short forms with resumption are likely to be dispreferred than long forms. Additionally, there may be an added factor ruling out such examples. A putative example like *\*Zhangsan bei ma guo ta* (intended *Zhangsan has been scolded*) might invite an inference that the pronoun is *not* coreferential with the pre-*bei* noun phrase (on standard relevance-theoretic grounds that something extra is more costly to process and so should lead to extra inferential effect to be sufficiently relevant). If this is so, then the addressee is forced to assume that Zhangsan is the scolder, but this is excluded on independent grounds (see discussion in section 1.2.3).

Overall, therefore, we do not think that the evidence provided in Huang (1999) is sufficient to abandon the idea that the long and short forms of the *bei* construction are essentially different and that the latter are simply (subject) pro-drop variants of the former.

### 1.4.3 Retained objects

Finally, we come to the two problematic patterns with the *bei* construction noted in section 1. In the first place, there are instances of objects appearing in the immediate post-verbal position (the so-called retained object construction) as in (56). In the second, there is an object marked by *ba* in pre-verbal position (possibly with a further noun phrase in the post-verbal position) as in (57), repeated below.

- (56) ]] Zhangsan bei Lisi daduan le tui.  
 Zhangsan BEI Lisi break PFV leg  
 ‘Zhangsan’s leg was broken by Lisi.’
- (57) 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.’

It should be clear at this point that these constructions pose no problem for our analysis and do not require us to postulate significant differences in analysis with the canonical constructions.

As argued in section 3, the function of the pre-*bei* noun phrase is not determined at the outset to be that of a direct object of the main verb: there is no direct relation between it and any object gap. Instead, its role is identified by *bei* to be the locus of affect of the event described in the post-*bei* clause. Inferentially, where there is a gap, the pre-*bei* noun phrase may also be interpreted as the target of affect, by virtue of its discourse function as topic. Nothing, however, requires this and it is perfectly possible for the post-verbal position to host an overt noun phrase, which itself is interpreted as the target of affect. Consider the analysis of (2a). This proceeds exactly as with our example sentence (*Zhangsan bei Lisi ma guo*) above (although with different concepts decorating the nodes and a differently sorted event variable) up to the point at which the aspect marker has been parsed. With the pointer currently at the internal argument node of the predicate projected by *daduan*, we are in a position to parse a noun (phrase) like *tui* ‘leg’. The resulting logical form once compiled yields an expression that identifies Zhangsan as the locus of affect of Lisi’s leg-breaking:

$$\theta_{LoA}((\epsilon, \mathbf{s}_j^{\text{pfv}}, ((Daduan'(Tui'))(Lisi'))(\mathbf{s}_j^{\text{pfv}})), Zhangsan')$$

Cashing this expression out with the lexical semantics of the verb and evaluation yields the truth-conditionally equivalent expression:

$$\begin{aligned} & \exists \mathbf{s}_j^{\text{pfv}} [Daduan'(\mathbf{s}_j^{\text{pfv}}) \wedge \theta_{Init}(\mathbf{s}_j^{\text{pfv}}, Lisi')] \\ & \wedge \theta_{ToA}(\mathbf{s}_j^{\text{pfv}}, Tui') \wedge \theta_{LoA}(\mathbf{s}_j^{\text{pfv}}, Zhangsan')] \end{aligned}$$

It is generally agreed that the relation between the topic and retained object is not random, but confined to possessor-possessee (2), kinship (34) and part-whole (58) relations. On the basis of this observation, A. Li (1990) proposes that the relationship between the two NPs can be schematised as NP<sub>2</sub>+de+NP<sub>1</sub>, where NP<sub>1</sub> is the retained object and NP<sub>2</sub> the topic. This generalisation, however, as Shi (1997) points out, is too restrictive to be accurate. Consider the examples in (59,60) which cannot be paraphrased in the manner suggested by A.Li.

- (58) 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.’
- (59) a. na-kuai bu bei ta zuo le yi-tiao kuzi.  
 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 yi-tiao kuzi bei ta zuo le.  
 that-CL cloth DE one-CL trousers BEI 3SG make PFV
- (60) a. yifu bei huo shao le yi-ge kulong.  
 clothes BEI fire burn PFV one-CL hole  
 ‘A hole was burnt into the clothes by fire.’ (L.Li 1980: 402)  
 b. \*yifu de yi-ge kulong bei huo shao le.  
 clothes DE one-CL hole BEI fire burn PFV

What is happening here is analogous to the construal of the relation between topic and comment in gapless topic constructions such as (8) where some ‘aboutness’ of the comment to the topic is to be inferred. In the retained object construction the relevant relation between topic and retained object is derived from the concept denoted by the complex predicate applied to the term expressed by the fronted locus of affect, 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 (60)). 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, that there is a leg-breaking event by Lisi that affected Zhangsan, from which one can infer that an actual leg was broken (by Lisi):<sup>28</sup>

$$\exists s_j^{\text{pfv}} \exists x [Daduan'(s_j^{\text{pfv}}) \wedge Tui'(x) \wedge \theta_{TA}(s_j^{\text{pfv}}, x)]$$

<sup>28</sup>We ignore here the proper construal of non-proper noun phrases in Chinese, although we assume that Chierchia (1989)’s suggestion that they are kind-denoting terms is on the right lines.

Since this event must form part of the event  $s_j^{\text{pfv}}$  which affects Zhangsan, it is straightforward to infer that the leg that was broken was Zhangsan's:

$$\exists s_j^{\text{pfv}} \exists x [Daduan'(s_j^{\text{pfv}}) \wedge Tui'(x) \wedge \theta_{ToA}(s_j^{\text{pfv}}, x) \wedge POSS(Zhangsan', x)]$$

We mentioned in section 1 the other problematic pattern with the *bei* construction: the co-occurrence of both *bei* and *ba* in the same clause, as in (3a). If both are analysed as object markers, then any explanation for such examples faces the same problems as those faced by the retained object construction. However, under the current assumption that the pre-*bei* noun phrase is only indirectly associated with the object of the content verb in the post-*bei* constituent comment clause, the existence of such examples is expected and unproblematic. The apparent co-occurrence of two objects is merely an artefact of the fact that the topic is necessarily construed as locus of affect of the main verb. Hence, whatever analysis one gives for the *ba* construction (and we leave this to one side), there should be no conflict with the analysis of *bei* presented in this paper.

### 1.5 Summary and Conclusion

In this paper, we have argued from a detailed examination of the data exhibited in the various forms of the *bei* construction in Mandarin Chinese that the function of the particle *bei* is not to encode passive meaning directly, as typically assumed, but indirectly through identifying the constituent that immediately *precedes* it to be the locus of affect of the event denoted by the clause that *follows* it. The morpheme is thus not construed as a specific marker of the passive nor as an agentive preposition governing its immediately following noun phrase. Because the pre-*bei* noun phrase occurs early in the string and is not directly interpreted as an argument of the main verb (although identified indirectly though the event role of locus of affect), it takes on the discourse function of a topic of the remainder of the sentence. By virtue of this function, where there is a (non-agent) gap in the following clause, it appears to bind that gap. From this a passive reading is derived whereby the pre-*bei* noun phrase is interpreted as both locus of affect (because of its association with *bei*) and as target of affect (undergoer), by virtue of its association with an object gap.

We have further provided an analysis of the construction using Dynamic Syntax which eschews structuralist notions of the classification of words and purely syntactic structures defined over these. Instead, output representations are representations of *semantic* content, with syntax itself being construed as the process by which such representations are derived. It is thus not necessary within the framework for *bei*

to be assigned to any specific word class, merely that it projects the correct semantic structure to analyse the pre-*bei* noun phrase as the locus of affect of some event given by the interpretation of the rest of the string of words. Thus, we take *bei* to project a semantic relation of affect between whatever it is that is expressed by its immediately preceding constituent and an event constructed as an epsilon term from the semantics of the rest of the sentence. From this, various properties of the *bei* construction are shown to follow directly, such as the apparent locality of the dependency shown by the pre-*bei* noun phrase and any following gap, the requirement that *bei* be immediately followed by a subject or a verb and the exclusion of aspect markers.

Moreover, we have argued that the agentless and retained object patterns within the construction follow without further stipulation. The former we treat as a case of pro-drop with pragmatic explanations provided to explain for apparent differences between ‘long’ and ‘short’ passives, cited in Huang (1999). With respect to the latter, since there is, in the analysis of the canonical constructions, no concept of displacement of the initial expression from some object position, overt objects are not excluded from appearing in the string. The retained object constructions (with or without *ba*) are thus no longer problematic and their interpretation follows straightforwardly from the semantic role provided by *bei* and pragmatic inference over the situation being described and the context in general. The fact that the exact role of the pre-*bei* noun phrase may depend on inference over contextually provided information means that our account identifies the *bei* construction typologically as a form of pragmatic voice (Klaiman 1991).

Of course, there remain significant questions that need to be explored such as the exact differences and interactions of the morphemes *bei* and *ba*, the extension of the analysis to less common patterns of the construction and the formal explanation of the distribution of temporal and other adjuncts in this construction, all obviously major topics in their own right. Nevertheless, our analysis provides a fruitful and new way of viewing this controversial grammatical construction that demonstrates 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.

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