A Force-Theoretic Approach to the Mandarin *ba*-Construction

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The Mandarin *ba*-construction follows the structure of [DP_1 + *ba* + DP_2 +(*gei*) + Predicate], with a semantic pattern as DP_1 causes DP_2 to change to a new state indicated by the predicate (Zhang 2000). This study seeks to encode this pattern structurally, by using a force-theoretic approach (Copley & Harley 2015). In this analysis, the pattern is reanalyzed as DP_1 exerts a force to DP_2, so that DP_2 experiences a situation change (S_0 to S_1). DP_1 and DP_2 are thus interpreted as force producer and force recipient respectively. This semantics-syntax approach can capture the affectedness associated with DP_1 and provide a unified analysis to pre-*ba* DPs (i.e. DP_1) when they serve as agents or causers.

0. Introduction

In Mandarin, there is a unique *ba*-construction, roughly taking the form of [DP_1 + *ba* + DP_2 + (*gei*) + VP], as exemplified in (1a). This construction seems to have a SVO counterpart in (1b).

(1) a. Lisi ba na-ge   huaidan   sha-le.
         Lisi BA that-CL scoundrel kill-LE[1]
         'Lisi killed that scoundrel.'

     b. Lisi sha-le na-ge   huaidan.
         Lisi kill-LE that-CL scoundrel
         'Lisi killed that scoundrel.'

                                        (Huang et al. 2009)

From the earliest analyses, the seeming interchangeability has suggested a movement analysis of the construction, i.e. *ba* functions to raise the object DP_2 to an immediate post-*ba* position (Li 1924). The post-*ba* DP_2 also gains an additional meaning of getting 'disposed' or 'affected' (Wang 1954). Henceforth, the *ba*-construction has been subject to extensive research, from various perspectives (Zhang 2000, Wang 2001, Ye 2004, Kuo 2010).

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[1] Abbreviations used in this paper are listed as follows: BEI= passive marker, CL = classifier, DE = post-verbal resultative marker, LE = perfective marker or sentence-final particle, Lv = light verb.

Not every SVO sentence can be rephrased using the *ba*-construction. Sentence (2b) with *ba* is unacceptable, because post-*ba* DPs have to be the affected entities (Huang et al. 2009, Zhang 2000). However, affectedness is a concept that is hard to pin down, especially when such a notion is implemented as a structural constraint.

(2) a. wo xihuan zhe-ge wenti.
       I like this-CL question
       'I liked this question.'

    b. *wo ba zhe-ge wenti xihuan-le.
       I BA this-CL question like-LE
       'I liked this question.'   (Huang et al. 2009)

According to Sybesma (1999), there is a different type of *ba*-construction using causative *ba* rather than the aforementioned canonical *ba* (i.e. disposal *ba*). It is termed causative because a causer role seems to be assigned to the subject preceding *ba*, e.g. *jiu* 'wine' in (3a). However, Huang and colleagues (2009) argue that *ba* does not introduce a thematic role of its own based on the fact that not all causers are valid subjects in *ba*-construction sentences. As the intended reading in (3b) suggests, *the depressed feeling* can serve as a causer for *Lisi*'s intoxication, but it is not an acceptable subject to appear preceding *ba*. Huang and colleagues suggest that the subject in a *ba*-construction sentence needs to be thematically related to the predicate, but there is no detail on how the thematic relations are built.

(3) a. na san-da-wan jiu ba Lisi he-zui-le.
       that three-big-bowl wine BA Lisi drink-drunk-LE
       'Those three big bowls of wine got Lisi drunk.'

    b. *yumen de xinqing ba Lisi he-zui-le.
       depressed DE mood BA Lisi drink-drunk-LE
       Intended reading: 'The depressed feeling made Lisi drunk from drinking.'

This study attempts to integrate the semantic notion of affectedness into syntactic structures and investigate the constraints governing subjects in *ba*-construction sentences, by applying the force-theoretic approach proposed by Copley and Harley (2015).

1. Why a syntax-semantics approach
In this section, I will first point out the deadlocks confronting a purely syntactic approach to the Mandarin *ba*-construction, and then summarize relevant semantic interpretations of the *ba*-construction, which necessitates a syntax-semantics approach.

1.1 Why not a purely syntactic approach

A purely syntactic approach cannot account for argument variations in (4), if we strictly follow the Uniformity of Theta Assignment Hypothesis (UTAH), and the Predicate-Internal Subject Hypothesis (PISH), and assume a derivational analysis of the complex predicate *chang-ku* 'sing-cry'. UTAH requires each theta-role have a constant structural position (Baker 1988), while PISH hypothesizes that the external arguments are generated in the specifier of the lexical head with which they enter into a theta-relation (Koopman & Sportiche 1991).

(4) a. zhe shou ge   ba guanzhong (gei) chang-ku-le.
         this CL   song BA audience   GEI   sing-cry-LE
         'This song's being sung got the audience into tears.'

     b. zhe ge geshou ba guanzhong (gei) chang-ku-le.
         this CL singer BA audience   GEI   sing-cry-LE
         'This singer got the audience into tears by singing.'

This study does not attempt to resolve the debate over headedness of a verb resultative complex. We temporarily follow Cheng and Huang (1994) and Li (1990, 1999), in which V_1 of a V_1-V_2 predicate is the head. As illustrated in (5), the post-*ba* argument *audience* is generated as the complement of *cry*, but when the V_1 *sing* is involved, only one of the two theta-roles can be assigned, *singer* or *song*.

(5)
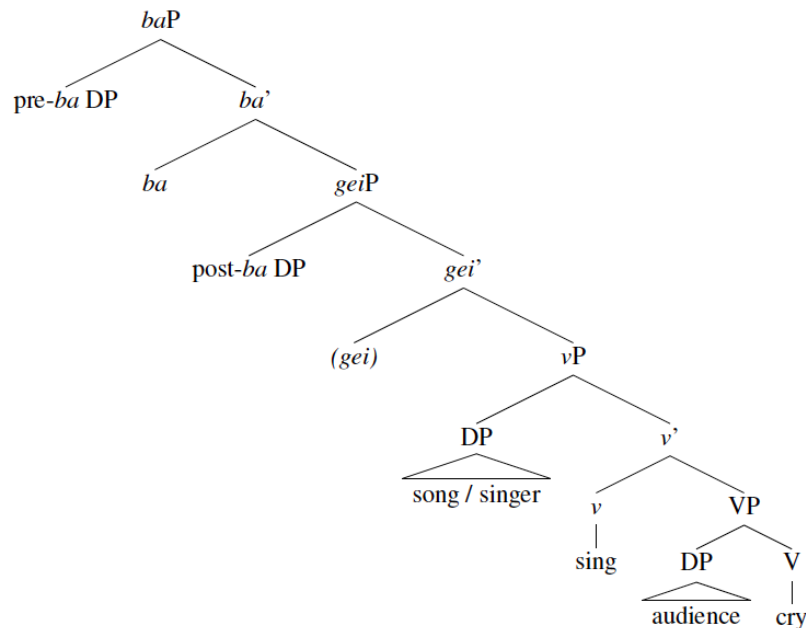
This violation of UTAH can be circumvented by assuming that *chang-ku* has two lexical entries in the lexicon, or that there is one more projection immediately above *v*P to accommodate *singer*, but neither assumption is desirable. The first assumption requires more evidence to demonstrate *sing-cry* in (4a) is a different lexical item from that in (4b), whereas the second assumption leaves it unanswered when and why a verb component can optionally assign theta-roles.

The aforementioned problems are trivial compared to the violation of Minimality (Rizzi 2001). To derive a *ba*-construction sentence, the two base-generated DPs need to undergo movements to be situated in pre-*ba* or post-*ba* positions. For the lowest DP *audience* to be raised to a higher position, it necessarily crosses the intervening DP *song/singer* or its trace. The same problems remain even if V_2 is the head of V_1-V_2 (e.g. Tai 2003). The minimality can be avoided only when the subject DP in a *ba*-construction sentence is base-generated as specifier of *ba*P as assumed in Huang et al. 2009 and Kuo 2011, although Huang and others also comment that *ba* does not license a theta role. It seems that the successful derivation of a *ba*-construction sentence may require muting of more than one syntactic assumptions, PISH, UTAH, etc. That is why this study moves away from a purely syntactic analysis of the *ba*-construction.

1.2 Causativity and the *ba*-construction

As mentioned in the introduction, two types of *ba*-construction sentences (disposal *ba* and causative *ba*) are differentiated based on semantic meanings. Ye (2004) tries a unified interpretation of *ba*-construction and claims that the primary meaning of *ba*-construction is causitivity. It represents a semantic relationship between two events, with one event as the cause and the other as the effect. A sentence using disposal *ba* can be analyzed similarly. In (1a), the object *huaidan* 'scoundrel' is definitely the one that gets disposed of or affected, yet it is also apparent that the disposal of the *scoundrel* is initiated/caused by the subject *Lisi*'s volitional action. The causitivity is witnessed more clearly in the meaning contrast of the two sentences in (5). Sentence (5a) adopts *ba*-construction, whereas (5b) is its SVO counterpart. According to Shen (2002), only the former encodes subjectivity and represents the standpoint of the speaker towards the event. When the subject DP *ta* 'he' is focused in (5a), it implies that *ta* should be held responsible for losing the key. The additional meaning of attribution further demonstrates the causativity in a *ba*-construction sentence.

(5) a. ta ba da-men-de yaoshi diu-le.
         he BA big-door-DE key   lose-LE
         'He got lost the key to the big door.'

     b. ta   diu-le   da-men-de   yaoshi.
         he   lose-LE big-door-DE key
         'He has lost the key to the big door.'

1.3 Affectedness in the *ba*-construction

It has been widely assumed that disposal *ba* sentences encode affectedness (Li & Thompson 1981, Liu 1997). Affectedness in a *ba*-construction sentence is further evidenced in its contrast with a verb-copying construction sentence like (6b).

(6) a. Lisi **ba** haizi da-de shou dou zhong-le.
         Lisi BA child hit-DE hand even swell-LE
         'Lisi hit the child so that (the child's) hands got swollen.'

     b. Lisi **da** haizi da-de shou dou zhong-le.
         Lisi hit child hit-DE hand even swell-LE
         'Lisi hit the child so that (Lisi's / the child's) hands got swollen.'

The two sentences in (6) have similar surface structures except that (6a) uses *ba* while (6b) has the lexical verb *da* 'hit', which is replicated to a subsequent V-*de* structure. *De* here is a marker for resultative, and the post- *de* clause represents the effect or result from the action *hitting*. *Lisi* here is the causer in both sentences, but only *haizi* in (6a) (e.g. the post-*ba* nominal) is the affected individual. In (6b), however, either the agent *Lisi* or the patient *haizi* can be the one affected. It is worth mentioning that Huang and colleagues (2009) believe sentence (6a) also allows ambiguous readings identical with (6b), but this paper insists that affected readings are only for post-*ba* nominals, which actually has corpus evidence. Wang (2001) conducts a corpus study on the possible affectees in *ba*-construction and verb-copying construction. He examines several Chinese novels amounting to 5 million words, and extracts all sentences with the two constructions. It is found that only 4 tokens violate post-*ba* nominals' interpretations as affectees. The four sentences all come from novels written by Laoshe. The tokens with violation are idiosyncratic at best, because they are not only sparse in number, but cease to be accepted by contemporary native speakers of Mandarin. In addition to disposal *ba*, typical causative *ba* sentences also imply affectedness, if not disposal. Take sentence (3a) for instance, the post-*ba* DP *Lisi* is the one who gets intoxicated/affected by alcohol.

Given the above discussion, a causitivity-affectedness approach can characterize all instances of *ba*-construction. Such an integrated approach also echoes Zhang (2001), which accounts for *ba*-construction in terms of image schema (Lakoff 1987). The basic structure [DP_1 + *ba* + DP_2 + (*gei*) + V + XP] encodes an event, in which DP_1 causes DP_2 to undergo some change indicated in XP, in the manner represented in V. The causer DP_1 provides the driving force for the change to happen. It seems that the Mandarin *ba*-construction is better characterized and defined by its semantic meanings, which cannot be captured by a purely syntactic approach. In the next section, I will introduce the theoretical basis of this study.
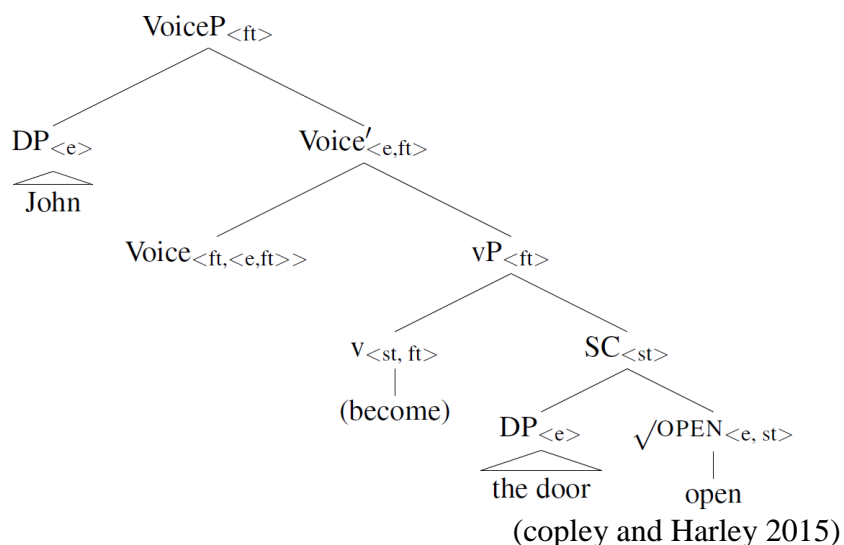
2. The force-theoretic framework

The force-theoretic framework (Copley and Harley 2015) originates as an alternative account for Accomplishment verbs like *open* in *John opened the door*. Traditional approaches take accomplishment verbs as composed of two sub-events chained together in a causal relationship, e.g. the causing sub-event e_1 *John's opening* and the result sub-event e_2 *the door's being open*. This chain is represented as $\exists e_1 \exists e_2 : e_1$ CAUSE e_2. When it comes to a sentence like (7), the two-subevent analysis runs into problems, because no result subevent e_2 occurred.

(7) Mary was painting the dresser black, but she did not finish.

In order to account for the non-culmination in (7), Copley and Harley (2015) develop a syntax-semantics interface theory of Accomplishments which draws on the notion of *force*. According to them, the verb *open* is understood as a force representing the energy input from a force producer; the force is inherently defeasible and thus entails no necessary effect. Semantically, forces are realized as a new type f(orce): <s,s>, denoting the function form an initial situation S_0 to a final situation S_1 that occurs if nothing external intervenes. For the sentence *John opened the door*, S_1 is encoded as s small clause [$_{SC}$ the door open], and S_0 is the situation immediately before S_1 with the door's readiness to be open. This sentence has a basic structure as in (8), with a light verb (become) representing the force leading to situation changes. The external argument *John* is ''introduced by a Voice head, which takes a predicate of forces as its complement and returns a function from individuals to forces'' (Copley and Harley 2015: 125).

(8)

VoiceP$_{<ft>}$

DP$_{<e>}$ — John

Voice'$_{<e,ft>}$

Voice$_{<ft,<e,ft>>}$

vP$_{<ft>}$

v$_{<st, ft>}$ — (become)

SC$_{<st>}$

DP$_{<e>}$ — the door

√OPEN$_{<e, st>}$ — open

(copley and Harley 2015)

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The force-theoretic framework is also applied to compositions of other Vendlerian eventuality types, based on the underlying conception that dynamaic predicates are forces while stative ones are situations. Such a treatment successfully captures non-culminated cases of accomplishment verbs.

3. A force-theoretic approach to the Mandarin *ba*-construction

This section first applies the approach to *ba*-construction with 'V$_1$-V$_2$' resultative complexes, and then extends it to *ba*-construction with V-*de* resultatives. It will be demonstrated that the Mandarin resultative constructions are compatible with the *ba*-construction in many ways. The approach can be applied to simplex predicates like *bing* 'sick' as well, following similar derivation processes. At the end of the section is a discussion on affectedness and its formal representation.

3.1 A force-theoretic framework to the *ba*-construction with 'V$_1$-V$_2$' resultatives

Most *ba*-construction sentences in Mandarin involve resulative construcitons, and sentence (9a) is one example using the resultative complex *da-shang* 'hit-injured'. Han (2017) demonstrates that such 'V$_1$-V$_2$' resultative constructions can be accounted for by the force-theoretic approach, although it only concerns itself with such sentences as (9b), the SVO countearprt of (9a). Resultative constructions are characterized by causing actions and result states/actions. A resultative complex 'V$_1$-V$_2$' necessarily invovles two distinct situations, an initial situation S$_0$ and a final situation S$_1$. The two situations are associated by the cause-and-effect relationship, with V$_2$ representing the new situation and V$_1$ encoding the force manner.

(9) a. John ba Bill (gei) da-shang le.
         John BA Bill GEI hit-injured LE
         'Bill was injured from john's hitting him.'

     b. John da-shang-le Bill.
         John hit-injured-LE Bill
         'Bill was injured from john's hitting him.'

For sentence (9b), V$_2$ *shang* 'injured' is the new situation concerning *Bill* whereas V$_1$ *da* 'hit' describes the way *Bill* got injured. The two arguments are interpreted in relation to the complex predicate rather than each individual verb component. In other words, the external argument *John* is the producer of the force making *Bill* injured, whereas the internal argument *Bill* is the force recipient. In the force-theoretic framework, sentence (9a) with the *ba*-construction is interpreted the same as its counterpart without *ba* (i.e. (9b)). Before the complex predicate is derived, the two sentences also share the same formal representation as in (10).

(10)
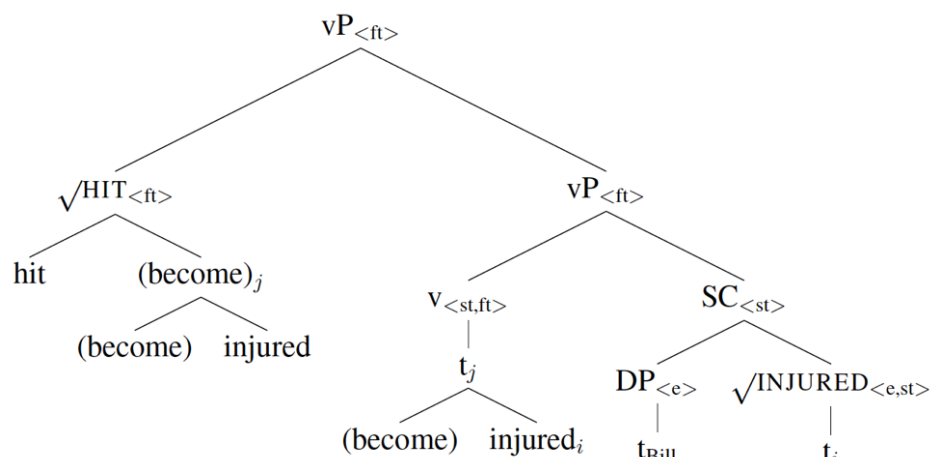
A smal clause contains the new situation *Bill injured*; light verb (become) is a force evoking the situation change. The resultative complex 'hit-injured' is interpreted within a lexical-decomposition syntax, with both component verbs understood as verb roots. Here √HIT is a force manner adjoining to vP (become); semantically, the two are combined by Predicate Modification (Heim & Kratzer 1998). Assuming Distributed Morphology (Halle & Marantz 1993), √INJURED firstly undergoes head-movement to Lv (become); the intermediate outcome then combines with √HIT via m-merger (Matushansky 2006), driving the complex predicate *da-shang* 'hit-injured'.

What is merged with the higher vP is the optional *gei*, whose categorical status Is still under debate. As a lexical verb or a preposition, *gei* means 'give' or 'to'. The functional word *gei* often co-exists with *ba*-construction and appears in a pre-verbal position. The use of *gei* in a ba-construction sentence is optional; it does not cause changes to theta-role assignments and sentential meanings (He 2011, Ye & Pan 2014). Since *gei* shares some functions with the passive marker *bei* in Mandarin, it is sometimes taken as a passive marker, e.g. Xiong 2011. As pointed out in Shen & Sybesma 2010, *gei* is different from *bei* in that it can co-occur with intransitive verbs, as demonstrated in (12a). The use of *gei* introduces an external force to the situation/action represented by the subsequent predicate. Tang (2002) also agrees with the presence of external forces, but describes *gei* as an affectedness marker and structurally represented it as a light verb (become). *Gei*'s semantic function of introducing external forces is validated by its incompatibility with adverbials meaning 'by itself', as in (12b).

(11) Bill gei/bei da-shang   le.
      Bill GEI/BEI hit-injured   LE
      'Bill was hit injured.'

(12) a. xiao-niao gei/*bei fei le.
          little-bird GEI/* BEI fly LE
          'The little bird flew away with an external reason.'

    b. *xiao-niao gei ziji fei le.
          little-bird GEI self fly LE
          'The little bird flew away by itself.'

This study assigns an affected meaning to post-*ba* (also pre-*gei*) nominals; it is thus compatible with the treatment that *gei* is an affectedness marker. In contrast to Tang (2002), however, *gei* is not a light verb (become); otherwise, there will be two light verbs (become) in the structure for (9a), one for the complex predicate and the other for *gei*. As demonstrated in (13), *gei* is a head with its projection. It only selects for vP (become) as complement; in order to meet the EPP feature of *gei*P, the affected DP base-generated in the small clause is raised to the specifier position. *Gei*'s meaning of introducing external forces thus derives from *gei*'s selection requirement of complement and specifier.

(13)
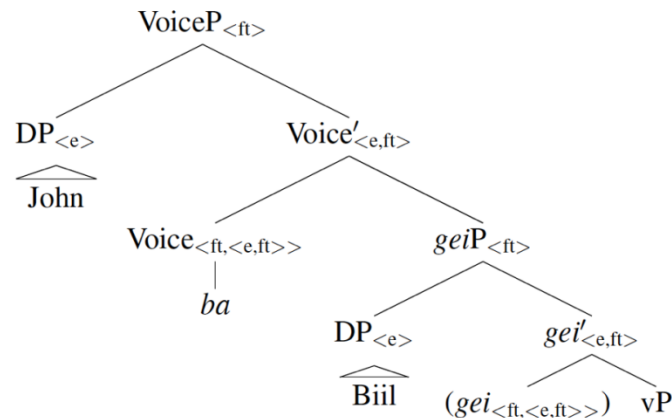
In order to derive sentence (9a), the post-*ba* nominal *Bill* is first raised to the specifier of *gei*P. Then another functional head *ba* merges with *gei*P. The phrase *ba*P has force producer (e.g. *John* in (9a)) in its specifier position, which explains why pre-*ba* nominals are causers. Following Copley and Harley 2015 that force producers serve as specifiers of VoiceP, the head *ba* may be an overt representation of Voice head. A *gei*P can directly merge with functional heads like T(ense) as well. In that case, no force producer is introduced, forming sentence (11) with *gei*. Note that the *gei* head requires its specifier to be an affected entity. In a *ba*-construction sentence, the affected individual is usually base-generated in a small clause; it then gets raised to the specifier of *gei*. This accounts for the affected meaning associated with post-*ba* nominals.

3.2 Explaining other types of *ba*-construction

Predicates in the Mandarin *ba*-construction also adopt another type of resultative construction in the form of 'V- *de* + clause'. *De* as a lexical verb means 'gain'. When *de* occurs post-verbally, it is usually characterized as a suffix to the verb, and functions to introduce a resultative clause (Huang et al. 2009). In the example sentence (14), *wo* 'I' is the individual with a new situation of not wanting to write letters; this new state is driven by a force exerted by *ta* 'he', in the manner of irritation. The two arguments still represent force producer and force recipient respectively.

(14) ta ba wo (gei) qi-de   bu xiang xie-xin   le.
     he BA me GEI   annoy-DE not want   write-letter LE
     'He annoyed me so much that I didn't want to write the letter.'

In Huang et al. 2009, V-*de* is a single compounding verb, which selects for a clause as complement and an affected DP as specifier. The embedded clause has *pro* as its subject; it is co-indexed with the affected DP with a new situation. The force-theoretic approach, however, pursues a lexical-decomposition syntax. As demonstrated in (15), the embedded clause is actually as a lambda abstraction, requiring later saturation by 'me'.[2]

(15)
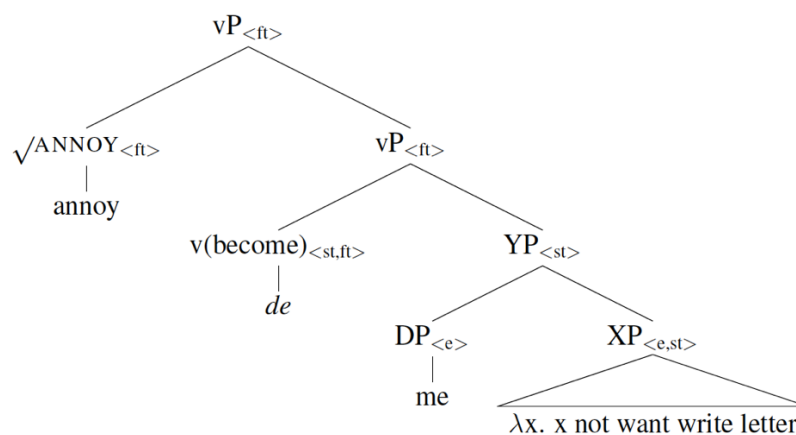
The functional head *de* takes in a situation <s,t> and returns a function of force; it seems that *de* is an overt representation of Lv (become). It is not surprising that the lexical *de* 'gain' is grammaticalized to a functional element indicating a change of states.

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[2] In (15), I use XP and YP and leave it an open question what the phrases are and whether it involves movements. It is possible that YP is a CP of topic, and X is IP; if so, we also need to assume that a topic can be raised beyond CP.

De is also subject to manner modification, e.g. by 'annoy'. Derivations above vP follow the example in (13), where *gei* only attracts affected DPs to its specifier position.

As demonstrated above, both types of Mandarin resultative constructions (RC) can be used as predicates in *ba*-construction. In a RC sentence, there are causing actions and result situations. Such a cause-and-effect relationship necessarily encodes one as force producer, and the other as force recipient undergoing the situation change. Since *ba*-construction sentences require post-*ba* DPs to be affected entities, i.e. with situation changes, Mandarin RCs are inherently compatible with *ba*-construction.

Not all *ba*-construction sentences use complex predicates as RCs, and simplex verbs are also used, like (16). Similarly, the affected entity 'dog' and its being sick is represented as a small clause <s,t>; the final verb form *bing-le* incorporates √SICK, Lv (become) and the aspectual feature [+perfective]. *Xiao-gou* 'little-dog', as an affectee, is raised to the specifier of *gei*P, while *ba* introduces the force producer *John* in a position of external argument.

(16) John bu xiaoxin ba   xiao-gou gei   bing-le.
      John not careful BA little-dog GEI   sick-LE
      'The dog got sick due to John's carelessness.'

(17)
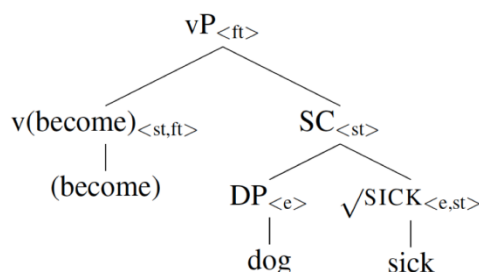
3.3 Encoding affectedness and causitivity

One of the problems in the introduction section is how affectedness in *ba*-construction is encoded. It is explicitly pointed out that *ba*-construction entails external forces (Tang 2002, Shen & Sybesma 2010). The advent of the force-theoretic framework provides a semantics-syntax framework to encode forces and affectedness. Stative predicates are situations and dynamic predicates are forces propelling situation changes. Affectedness is thus understood as a situation change, brought about by a force (mostly in a specific manner) exerted from force producer to force recipient. The roles of force producer and force recipient are only interpreted in relation to the complex event leading to the result situation. For instance, sentence (3a) may be interpreted as a causing action (i.e. *Lisi drinks wine*) and a result situation (i.e. *Lisi is drunk*). *Drink* in the causing action is a dynamic predicate and represents a force from *Lisi* to *wine*, but it is not the same

force leading to *Lisi*'s intoxication, which is exerted as a reaction force from *wine* to *Lisi*. Thus in (3a), *wine* is the force producer and *Lisi* is the force recipient.

In addition to (3a), the subject in (4a) is also inanimate, confirming that a force producer is not always voluntary/volitional, though it needs to be teleologically capable of generating the energy needed to produce a result situation (Copley & Harley 2015). The contrast of different external arguments in (4a) and (4b) further demonstrates that agents and causers are both included as force producers in *ba*-construction, and both are introduced by Voice heads represented by *ba*. Back to the question why 'depressed feeling' is not a valid subject in (3b), it can be explained from two aspects. On one hand, 'depressed feeling' is not teleologically capable of getting one drunk; on the other hand, 'depressed feeling' is not involved in (hence incompatible with) the causing action represented in the component verb *he* 'drink'.

4. Conclusion

This paper presents a re-analysis of the Mandarin *ba*-construction, following the force-theoretic framework in Copley & Harley 2015. Based on previous research, we first demonstrate that *ba*-construction embodies both causitivity and affectedness. Causativity refers to the role played by pre-*ba* DPs in producing changes of states, and affectedness is associated to post-*ba* DPs that undergo the changes of states. The force-theoretic approach can successfully account for *ba*-construction sentences with resultative either in the form of 'V$_1$-V$_2$' or 'V-*de* + clause', and those sentences with simplex predicates. It is found that such a semantics-syntax approach can structurally encode the affectedness as change of situations, and provide a unified analysis for agents and causers in pre-*ba* positions. Post-*ba* DPs are the affected entities experiencing situation changes, which arise from force exertion. Pre-*ba* DPs are force producers that generate the energy to cause the situation changes. Both agents and causers can be interpreted as force producers and are uniformly introduced by Voice heads represented by *ba*. This analysis confirms the prediction in Copley & Harley 2015 that ''argument structure is insensitive to any distinction between agents and causers, in particular, the ability to represent goals intensionally''.

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