

On the Headedness of Mandarin Resultative Verb Compounds*

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This paper examines previous accounts of the headedness of Mandarin resultative verb compounds and argues for the view that such compounds are headless from the perspective of argument realization. This study is theoretically significant in that it challenges the idea that all compounds have a head as all phrases do.

Keywords: head, headedness, headlessness, Mandarin, resultative verb compounds

1. Introduction

There has been a lot of discussion in the literature as to whether Mandarin resultative verb compounds (RVCs) like *xi-ganjing* ‘wash-clean’ in (1) have a head.

- (1) Zhangsan **xi-ganjing-le** yifu.
Zhangsan wash-clean-PERF clothes
'Zhangsan washed his clothes clean.'

Concerning the headedness of RVCs, there are four logical possibilities and each of them has been proposed in the literature: (i) V1 being the head (e.g. Cheng and Huang 1994; Li 1990, 1993, 1995, 1999; Wang 2001); (ii) V2 being the head (e.g. Tai 2003, Yong 1997);¹ (iii) both V1 and V2 being heads (e.g. Gu 1992); (iv) neither V1 nor V2 being the head (e.g. Huang and Lin 1992).

The purpose of this paper is to argue for the fourth possibility mentioned above, namely the headlessness position, from the perspective of argument realization. In

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Abbreviations: ACC=accusative; ASP=aspectual marker; CL=classifier; DAT=dative; GEN=genitive; INTR=intransitive; MM=modifier marker; NOM=nominative marker; PERF=perfective aspect; TR=transitive.

¹ Note that the use of "V1" and "V2" in this paper covers not only cases where the element in question is a verb, but also situations in which the first or the second constituent of an RVC is an adjective. In other words, "V" in "V1" and "V2" should be understood as an element that bears the [+V] feature in the sense of Chomsky (1970).

what follows, I will first examine previous accounts of the headedness of Mandarin RVCs and then provide arguments for the fourth possibility. Section 4 presents an analysis of Mandarin RVCs, and the final section briefly discusses the theoretical implication of this study.

2. Previous accounts

2.1 V1 as head

The V1-as-head possibility is assumed by Li (1990, 1993, 1995, 1999), Ross (1990) and Uehara et al. (2001), argued for by Cheng and Huang (1994) and Lin (1998), and maintained by Wang (2001). Among them, Cheng and Huang (1994:194) (cf. also Lin 1998:36) argue that V1 is the head, on the grounds that V1 rather than V2 determines the event type of the whole compound. According to them, when V1 is “active”, the compound as a whole is either “unergative” or “transitive”, as shown in (2); when V1 is “stative”, the entire compound is either “ergative” or “causative”, as shown in (3). In this regard, Cheng and Huang implicitly assume that the unergative and transitive types of RVCs are active and the ergative and causative types are stative.

- (2) a. Zhangsan **qi**-lei-le. (Unergative)
 Zhangsan ride-tired-PERF
 ‘Zhangsan rode himself tired.’
- b. Zhangsan **qi**-lei-le ma. (Transitive)
 Zhangsan ride-tired-PERF horse
 ‘Zhangsan rode the horse and as a result the horse became tired.’
 Or: ‘Zhangsan rode horses and as a result he became tired.’
- (3) a. Zhangsan **lei**-bing-le. (Ergative)
 Zhangsan tired-sick-PERF
 ‘Zhangsan’s being in the state of tiredness caused him to become sick.’
- b. Fanzhong-de nonghuor **lei**-bing-le Zhangsan. (Causative)
 heavy-MM farm.work tired-sick-PERF Zhangsan
 ‘The heavy farm work caused Zhangsan to become sick, as a result of his being in the state of tiredness.’

There are two problems with Cheng and Huang's view. First, as noticed by Cheng and Huang (1994:190) themselves and shown in (4), it is common for an RVC with an active V1 to have both a transitive and a causative use.

- (4) a. Zhangsan **kan-hua-le** ta-de yanjing.
 Zhangsan read-dim-PERF he-GEN eye
 'Zhangsan read (something), and as a result his eyes became dim-sighted.'
 b. Na-ben houhou-de shu **kan-hua-le** Zhangsan-de yanjing.
 that-CL thick-MM book read-dim-PERF Zhangsan-GEN eye
 'The thick book caused Zhangsan's eyes to become dim-sighted as a result of Zhangsan's reading it.'

As they implicitly assume that the former use is active and the latter stative, this poses a serious problem for their view that the event type of V1 determines the event type of the entire RVC.² The second problem with Cheng and Huang's view is that their reliance on the notion of "event type" to decide the matter of headedness seems to go against their idea that "the notion of a head is a structural and not a conceptual notion" (1994:191). This is because event type is primarily a semantic rather than a structural notion, even though it has effects on sentence structure and could even be syntacticized within a certain framework.³

After discussing Cheng and Huang's view, I would like to devote some space to Li's (1990, 1995) account of Mandarin RVCs with his assumption that V1 is the head. Before I take up this task, it should be pointed out that Li adopts the V1-as-head assumption without much argumentation. In fact, Li (1990:182) simply says that the head of an RVC like *pao-lei* 'run-tired', which is composed of a verbal V1 and an adjectival V2, is the first constituent because, intuitively, "the whole compound is

² According to Jim Huang (p.c.), when the V1 of an RVC like *kan-hua* 'read-dim' in (4) is transitive, the "causative" reading of the RVC is derived by moving a transitive RVC to combine with a "zero CAUSE morpheme". Therefore, among the different types of RVCs, the causative type exemplified by (4b) is derived. Because of this, Jim Huang held that the fact that an RVC with an active V1 can have both a transitive and a causative use does not count as evidence against the view of Cheng and Huang (1994). However, even if the derivational analysis of a causative RVC with a transitive V1 is correct, the causative use of an RVC involving a transitive V1 still poses a problem for Cheng and Huang's view. This is because according to Cheng and Huang, the causative use of an RVC with a stative V1 is determined by the fact that the event type of V1 in this case is stative. Crucially, on the view of Cheng and Huang (1994) and Huang (1992), the causative use in this case is also derived, though in a different way; that is, it is derived by adding an external argument to a (deep) ergative RVC. Therefore, Cheng and Huang do intend the event type of the V1 of an RVC to determine both the non-derived and "derived" types to which this RVC can belong. In turn, the fact that Cheng and Huang assume causative RVCs to be stative and the fact that an RVC with an active V1 can have a causative use together pose a serious problem for Cheng and Huang's view that the event type of the V1 of an RVC determines the event type of the whole compound.

³ Cf. recent attempts to syntacticize event structure by Borer (1998) and Ritter and Rosen (1998), for example.

obviously ‘verb-like’, not ‘adjective-like’”. Although Li admits that it is difficult to independently prove the above intuition, yet he adopts the V1-as-head assumption on the grounds that doing so allows him to better account for the argument realization patterns and complex thematic relations of RVCs.

Li (1990) makes three important assumptions in accounting for Mandarin RVCs, namely theta-identification, a structured theta-grid, and head feature percolation. Theta-identification is a mechanism of linking two theta-roles together and assigning them to a single argument.⁴ Furthermore, Li assumes that the theta-roles assigned by a verb form a structured theta-grid on the basis of “theta-role prominence”. That is, the theta-roles assigned have different degrees of prominence, with the most prominent theta-role put in the first position in the theta-grid and assigned last and the least prominent role placed in the last position in the theta-grid and assigned first. For example, Li (1990:179) proposes the following theta-grid for *give*.

- (5) give <1, 2, 3>

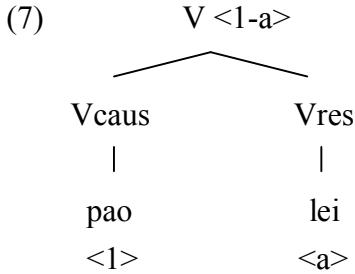
In addition, Li assumes a version of head feature percolation. According to him, V1 is the head of an RVC, and “the theta-role prominence of the head must be strictly maintained in the theta-grid of the compound” (Li 1990:181).

By making the above assumptions, Li (1990) intends to give a successful account of the complex thematic relations expressed by RVCs and of the fact that RVCs often provide more theta-roles than overt NP arguments. This attempt is largely successful as it accounts for the majority of the thematic relations expressed by RVCs. For example, for the RVC in (6), Li (1990:183) provides the analysis in (7).⁵

- (6) Baoyu pao-lei-le.
 Baoyu run-tired-ASP
 ‘Baoyu got tired because of running.’ (Li 1990:182)

⁴ This idea originates in Higginbotham 1985, where theta-identification is argued to be a mode of thematic discharge, in addition to theta-marking and theta-binding. This mechanism is originally proposed to work in syntax under government. Li seems to extend it to the lexicon, although he does not make any explicit remarks on this extension.

⁵ In Li 1990, the theta-roles assigned by V1 are indicated by numerals and those assigned by V2 are symbolized by numerals with a prime. In his 1995 paper, Li makes several technical changes. First, “Vcaus” and “Vres” are used to refer to V1 and V2 respectively. Second, the theta-roles assigned by Vcaus are indicated by numerals, but those assigned by Vres are symbolized by small letters. Finally, Li (1995) uses nested angled brackets to represent the structured theta-grid, with one pair of angled brackets for the most prominent theta role, two pairs of angled brackets for the next prominent theta role, etc. For ease of exposition, from now on I will adapt the examples from Li’s 1990 paper so as to make them conform to the format adopted in his later work.



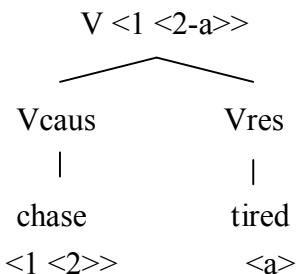
In (7), the theta-role assigned by V1 or V_{caus} is identified with the theta-role assigned by V2 or V_{res} (as indicated by “-”), and the coindexed theta-roles ($<1-a>$) are assigned to the same argument. As a result, we get the reading that the same entity ran and got tired.

For another example, with the assumptions adopted, Li successfully accounts for the first two readings in (8) and rules out the fourth reading.

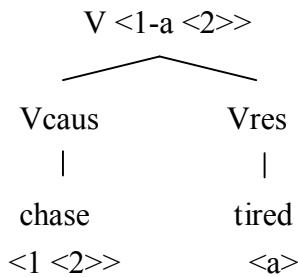
- (8) Zhangsan zhui-lei-le Lisi.
 Zhangsan chase-tired-PERF Lisi.
- (a) ‘Zhangsan chased Lisi and as a result Lisi got tired.’
 - (b) ‘Zhangsan chased Lisi and as a result Zhangsan got tired.’
 - (c) ‘Lisi chased Zhangsan and Zhangsan got Lisi tired.’
 - (d) *‘Lisi chased Zhangsan and Zhangsan got himself tired.’

In the (8a) reading, which is represented in (9) below, the internal argument of V1 or V_{caus} is identified with the single argument of V2 or V_{res} , so we get the object-oriented reading. In the (8b) reading, which is represented in (10), the external argument of V_{caus} is identified with the single argument of V_{res} , which yields the subject-oriented reading.

- (9) Representation for the (8a) reading (Li 1995:256)

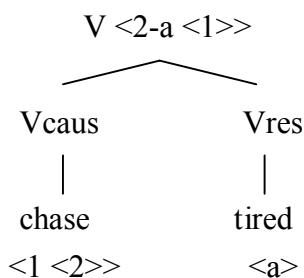


(10) Representation for the (8b) reading (Li 1995:256)



Furthermore, the fourth reading of (8), which is represented in (11) below, is ruled out because it violates the head feature percolation condition proposed by Li.

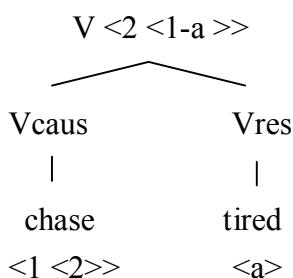
(11) Representation for the (8d) reading



In (11), “1” refers to the theta-role assigned to *Lisi*, and “2”, “a”, and “2-a” refer to the theta-role(s) assigned to *Zhangsan*. However, in this case, the theta-role prominence of the “head” *zhui* is not maintained, as the most prominent theta-role (i.e. “1”) assigned by *zhui* fails to be the most prominent role of the compound.

However, as far as (8) is concerned, there is one problem with Li’s (1990) account. That is, the assumption made by Li (1990) incorrectly rules out the third reading, which is represented in (12). In (12), “1”, “a”, and “1-a” refer to the theta-role(s) assigned to *Lisi*, and “2” refers to the theta-role assigned to *Zhangsan*. As in the case of (11), the representation in (12) violates the head feature percolation condition because the most prominent theta-role (i.e. “1”) assigned by *zhui* fails to be the most prominent role of the compound. As a result, (12) is incorrectly ruled out.

(12) Representation for the (8c) reading



Li (1995) himself recognizes this problem. In an attempt to solving it, he proposes the “causative hierarchy”, which resembles Grimshaw’s (1990) “aspectual hierarchy”. He assumes that “in addition to the theta-roles assigned by lexical words and regulated by the thematic hierarchy, there are two causative roles (c-roles), Cause and Affectee, that arguments acquire when they are associated in a particular way with two causally related predicates” (1995:265). According to Li, the two causative roles are assigned on the basis of the following conditions.

- (13) Conditions on the assignment of Cause and Affectee (Li 1995:267-268)⁶
- a. The argument in the subject position receives the c-role Cause from a resultative compound only if it does not receive a theta role from Vres.
 - b. The argument in the object position receives the c-role Affectee from a resultative compound if it receives a theta role at least from Vres.

Moreover, Li assumes that when the causative hierarchy applies, the thematic hierarchy can be overridden.

Returning to (8), let’s see how Li’s (1995) further assumption and the assumptions made in the 1990 paper can account for the different readings. First, on the (8a) reading (cf. the representation in (9)), the argument in the subject position does not receive a theta-role from Vres, and thus it can receive the Cause role. The argument in the object position does receive a theta-role from Vres, and therefore it can receive the Affectee role. As in this case the causative hierarchy is maintained and the other assumptions are not violated, the account correctly predicts that this reading is good. Second, on the (8b) reading (cf. the representation in (10)), the argument in the subject position does receive a theta-role from Vres, and the argument in the object position fails to receive a theta-role from Vres. As a result, neither Cause nor Affectee is assigned, and the causative hierarchy does not apply. However, since the head feature percolation condition is obeyed in this case, this reading is correctly predicted to be good, too. Third, on the (8c) reading (cf. the representation in (12)), the argument in the subject position does not receive a theta-role from Vres, and as a result it can receive the Cause role. The argument in the object position does receive a theta-role from Vres, and thus it can receive the Affectee role. As in this case the causative hierarchy is maintained, the third reading is predicted to be good, although the thematic hierarchy with respect to the head (i.e. V1) of the compound is violated. The fact that (8) is grammatical on the third reading shows that this prediction is borne out. Finally, on the (8d) reading (cf. the representation in (11)), the argument in the subject position receives a theta-role from Vres, and no Cause role can be assigned.

⁶ Cf. also Li 1998:293, 306-307; 1999:455.

The argument in the object position does not receive a theta-role from Vres, and no Affectee role can be assigned, either. Therefore, the causative hierarchy fails to apply here. However, as discussed earlier, this reading violates the thematic hierarchy related to the head of the compound, and it is correctly predicted to be bad.⁷

Although Li's (1990, 1995) proposal can account for a number of data related to Mandarin RVCs, it has the following problems. First, there are data that Li's account fails to explain. For one thing, as pointed out by Huang and Lin (1992:95) and Zou (1994:278), Li's proposal fails to account for examples like (14).

- (14) Zhangsan kan-dun-le dao.
 Zhangsan cut-blunt-PERF knife
 Literally: 'Zhangsan cut the knife blunt.'

In (14), the internal argument of V1 *kan* 'cut' is not realized at all. This is shown by the fact that the sentence, on its normal interpretation, does not mean "Zhangsan cut the knife and as a result the knife became blunt", but rather "Zhangsan cut (something) with a knife and as a result the knife became blunt". This is inconsistent with Li's tacit assumption that θ-roles have to be exhaustively assigned and identified. For another, Li's analysis fails to account for cases of three overt arguments as in (15), because on Li's assumption an RVC can assign theta-roles to no more than two arguments (1990:183). The fact that there are three arguments in (15) and the sentence is grammatical poses a problem for Li's account.

- (15) Zhangsan jiao-hui-le Lisi na-shou ge.
 Zhangsan teach-know-PERF Lisi that-CL song
 'Zhangsan taught Lisi that song, and as a result Lisi learned it.'

The second problem with Li's analysis concerns the conditions on the assignment of causative roles. For one thing, the conditions are stipulative. For another, based on the conditions proposed, subject-oriented sentences like (6) (repeated as (16)) and the (8b) reading (repeated as (17)) do not involve causative relations, because in these cases the subject argument receives a theta-role from Vres, and therefore cannot be assigned the Cause role. This, however, is counterintuitive, because in (16) it is *Baoyu*'s running that got him tired, and in (17) it is *Zhangsan*'s chasing *Lisi* that got *Zhangsan* tired. Based on this, *Baoyu* in (16) and *Zhangsan* in (17) arguably receive

⁷ Note that in order for Li's theory to work, he in fact has to make an auxiliary assumption that the thematic hierarchy has to be obeyed when the causative hierarchy does not apply, in addition to his assumption that the thematic hierarchy can be violated if the causative hierarchy applies and is maintained.

the “Cause” role, although it is true that in this case it is the running event and the chasing event that serve as the cause for Baoyu’s and Zhangsan’s becoming tired.

- (16) Baoyu pao-lei-le.

Baoyu run-tired-ASP

‘Baoyu got tired because of running.’ (Li 1990:182)

- (17) Zhangsan zhui-lei-le Lisi.

Zhangsan chase-tired-PERF Lisi.

‘Zhangsan chased Lisi and as a result Zhangsan got tired.’

The third problem is that Li (1995:269-270, cf. also 1999:484) assumes random theta-role assignment. For one thing, this method of theta-role assignment cannot account for the varying degrees of difficulty in obtaining the first three readings of (8).⁸ For another, it entails the possibility that for an unambiguous sentence like (18), the human parser may pursue all the other three possible ways of theta-identification (i.e. <1-a <2>>; <2 <1-a>>; <2-a <1>>) before it gets the correct interpretation, on which the internal argument of V1 is “identified with” the single argument of V2 (<1 <2-a>>).

- (18) Zhangsan xi-ganjing-le yifu.

Zhangsan wash-clean-PERF clothes

‘Zhangsan washed his clothes clean.’

This manner of processing implies an inefficient parser. Moreover, as far as (18) is concerned, this way of processing is counterintuitive, as the sentence is quite easy to process.

Finally, the notion “theta-identification” seems misleading because what is really involved is not theta-identification, but argument sharing. For example, in (18), *yifu* ‘clothes’ seems to receive two **distinct** theta-roles (one from V1 and the other from V2). The two theta-roles are in no sense identified, or united into one theta-role. Rather, the internal argument of V1 and the single argument of V2 are realized by the same NP *yifu*. Therefore, “argument sharing” is a better term to describe the very important mechanism used by Li.

From the above discussion, it can be concluded that Li’s (1995) account of Mandarin RVCs has its own problems. Particularly relevant to our current purpose is

⁸ Among the three grammatical readings of (8), the first one is the easiest to get and the third one is the most difficult to obtain. See Li 2008 for an account of the varying degrees of difficulty in obtaining the different readings.

the fact that by allowing the causative hierarchy to override the thematic hierarchy, Li in fact makes a claim that his head feature percolation condition can be violated, a conceptually unattractive move. Moreover, making such a claim also means that his assumption of V1-as-head is irrelevant to the explanation of some RVC phenomena, particularly the third reading of (8).

Before leaving this subsection, I would like to point out one phenomenon that is devastating to the view that V1 is the head of an RVC. That is, as shown in (19), there are sentences in which no arguments of V1 are realized in the overt syntax at all.

- (19) a. Dao qie-dun-le.
knife cut-blunt-PERF
'As a result of being used to cut (something), the knife became blunt.'
- b. Shoujuan ku-shi-le.
handkerchief cry-wet-PERF
'The handkerchief got wet from someone's crying.'

Specifically, *dao* 'knife' is not an argument of *qie* 'cut' of (19a), and nor is *shoujuan* 'handkerchief' an argument of *ku* 'cry' of (19b). From the perspective of argument realization, this shows that the V1-as-head position cannot hold.

2.2 V2 as head

After discussing two representatives of the V1-as-head view, we now turn to the second logical possibility regarding the headedness of Mandarin RVCs, namely that V2 is the head. In the literature, a number of researchers (e.g. Tai 2003:308, Wang 1995:145, and Yong 1997:9) claim that V2 is the semantic focus of an RVC, and thus is the head. Or in Tai's words, V2 functions as the "center of predication" and V1 is like a manner adverb.⁹ However, the evidence for this claim is conceptual rather than empirical. In fact, as pointed out by Cheng and Huang (1994:192), the claim seems not to hold even on the conceptual level. This is because in addition to *ti-kai* 'kick-open', *tui-kai* 'push-open', and *la-kai* 'pull-open', which may suggest that V2 is the center of predication of an RVC, there are examples like *ti-kai* 'kick-open', *ti-dao* 'kick-fall', and *ti-bian* 'kick-flat', which may indicate that V1 is the semantic focus.

The only empirical evidence for the V2-as-head claim is given by Li (1984). Li's evidence comes from the distributional facts of the two components of an RVC. He observes that V1, but not V2, can be omitted. For example, the V2 of the RVC

⁹ Related to this, Talmy (1985:127-129, 2000:153) maintains that the resulting subevent of a resultative is the main event and the causing subevent is a subordinate event.

ku-hong ‘cry-red’ in (20a) cannot be omitted, but the V1 can, as shown by the contrast between (20b) and (20c). Based on this, Li concludes that the second component of *ku-hong* is the head of the compound.

- (20) a. Zhangsan-de yanjing **ku-hong**-le.
Zhangsan-GEN eye cry-red-PERF
'Zhangsan cried and as a result his eyes became red.'
- b. *Zhangsan-de yanjing **ku**-le.
Zhangsan-GEN eye cry-PERF
Literally: 'Zhangsan's eyes cried.'
- c. Zhangsan-de yanjing **hong**-le.
Zhangsan-GEN eye red-PERF
'Zhangsan's eyes became red.'

However, Li's criterion is problematic. Given this criterion, we have to conclude that the V1 rather than V2 of *xi-ganjing* ‘wash-clean’ in (21a) is the head of the compound, because, as shown in (21b-c), in this case it is the V2 that can be omitted.

- (21) a. Zhangsan **xi-ganjing**-le yifu.
Zhangsan wash-clean-PERF clothes
'Zhangsan washed his clothes clean.'
- b. Zhangsan **xi**-le yifu.
Zhangsan wash-PERF clothes
'Zhangsan washed his clothes.'
- c. *Zhangsan **ganjing**-le yifu.
Zhangsan clean-PERF clothes
Intended: 'Zhangsan cleaned the clothes.'

But the same criterion leads to the conclusion that the same compound in (22) is headless because (22b) and (22c) respectively show that not only the V2 but also the V1 of the compound can be omitted.¹⁰

¹⁰ One might argue that (21a-b) and (22a-b) have different structures in the sense that while the former involve an initial subject but not a topic, the latter involve an initial topic but not a subject. However, it should be noted that subject and topic are notions of different levels, with the former being a grammatical notion and the latter a notion of information structure. The two correlate and largely overlap with each other. As a result, within a specific context, the initial subject NPs in (21a-b) can also be topics. In addition, although there is no morphological evidence that the single NPs in (22a-b) are subjects, there is other evidence that they are. First, in terms of linear order, these NPs appear in the canonical subject position. Second, unlike the topicalized NP in (i), which is accompanied with a pause, no pause is necessary after the single NPs in (22a-b).

- (22) a. Yifu **xi-ganjing-le.**
 clothes wash-clean-PERF
 Literally: ‘The clothes washed clean.’ → ‘The clothes were washed clean.’
- b. Yifu **xi-le.**
 clothes wash-PERF
 Literally: ‘The clothes washed.’ → ‘The clothes were washed.’
- c. Yifu **ganjing-le.**
 clothes clean-PERF
 ‘The clothes became clean.’

In addition, by the same criterion, *kan-dun* ‘cut-blunt’ in (23a) should be double-headed because (23b) and (23c) show that in this case neither V1 nor V2 can be omitted.

- (23) a. Zhangsan **kan-dun-le** dao.
 Zhangsan cut-blunt-PERF knife
 ‘Zhangsan cut (something with the knife) and as a result the knife became blunt.’
- b. *Zhangsan **kan-le** dao.
 Zhangsan cut-PERF knife
 Intended: ‘Zhangsan cut (something) with the knife.’
- c. *Zhangsan **dun-le** dao.
 Zhangsan blunt-PERF knife
 Intended: ‘Zhangsan made the knife blunt.’

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- (i) Yifu, Zhangsan xi-ganjing-le.
 clothes Zhangsan wash-clean-PERF
 ‘Speaking of the clothes, Zhangsan washed them clean.’

This suggests that it is at least not necessary to analyze (22a-b) as involving a topicalized Causee/Patient and a dropped Causer/Agent that occupies the subject position. Third, (22a), for example, is similar to the inchoative use of English change of state predicates such as *break* and *open* in (ii) in both form and meaning, except that the sentences in (ii), unlike (22a), do not entail a Causer.

- (ii) a. The vase broke.
 b. The door opened.

Given this similarity, the fact that the NPs of the sentences in (ii) are subjects strongly suggests that the single NP in (22a) is also a subject. Finally, unlike (iii), which is strongly felt to be an incomplete sentence without a proper context, (22a-b) sound natural without any further context.

- (iii) Zhangsan ji-le.
 Zhangsan send-PERF
 ‘Zhangsan sent (it).’

Based on these, I conclude that the NPs in (22a-b) are subjects.

However, this very criterion leads to the conclusion that the same RVC in (24a) is right-headed because, as shown in (24b-c), it is V1 rather than V2 that can be omitted.

- (24) a. Dao **kan-dun-le**.
 knife cut-blunt-PERF
 Literally: ‘The knife cut blunt.’ → ‘The knife got blunt from cutting.’
- b. *Dao **kan-le**.
 knife cut-PERF
 Intended: ‘(Somebody) cut (something) with the knife.’
- c. Dao **dun-le**.
 knife blunt-PERF
 ‘The knife became blunt.’

Therefore, Li’s criterion leads to the undesirable conclusion that RVCs can be head-final, head-initial, headless, or double-headed, and that the same RVC can be head-initial or head-final in one instance, and headless or double-headed in another.

2.3 Both V1 and V2 being heads

The third possibility concerning the headedness of an RVC is that both V1 and V2 are heads, a position argued for by Gu (1992).¹¹ Gu argues against the view that V1 is the head of an RVC, and points out that both V1 and V2 contribute to the argument structure of the compound, and therefore both are heads. For example, in (25a) below, V1 contributes the Causer argument *Zhangsan*; in (25b), V2 contributes the Causee argument *Zhangsan-de yanjing* ‘Zhangsan’s eyes’.

- (25) a. Zhangsan ca-liang-le jingzi.
 Zhangsan wipe-shiny-PERF mirror
 ‘Zhangsan wiped the mirror shiny.’
- b. Na-ben houhou-de shu kan-hua-le Zhangsan-de yanjing.
 that-CL thick-MM book read-dim-PERF Zhangsan-GEN eye
 ‘The thick book caused Zhangsan’s eyes to become dim-sighted as a result of Zhangsan’s reading it.’

¹¹ In this respect, note that Baker and Stewart (1999) propose a bi-headed analysis of the serial verb construction, an analysis also implied by the syntactic structure given to this construction by Baker (1989). However, Déchaine (1993) argues that different types of serial verb constructions differ as to which verb is the head (for information about different types of serial verb constructions, see also Stewart 2001). Moreover, Zubizarreta and Oh (2007), in discussing Korean serial verb constructions, make a distinction between morpho-syntactic head and semantic head, with the latter varying according to the type of the serial verb construction.

Although Gu is right in pointing out that both V1 and V2 can contribute to the argument structure of an RVC, it is more proper to state that the argument of V2 has to be realized in the overt syntax as shown in (26), although V1 may contribute to the argument structure of the entire compound in certain uses of an RVC.

- (26) a. Zhuozi ca-ganjing-le.
 table wipe-clean-PERF
 Literally: ‘The table wiped clean.’ → ‘The table was wiped clean.’
- b. Shoujuan ku-shi-le.
 handkerchief cry-wet-PERF
 Literally: ‘The handkerchief cried wet.’ → ‘The handkerchief got wet from someone’s crying.’
- c. Zhangsan zou-lei-le.
 Zhangsan walk-tired-PERF
 ‘Zhangsan walked himself tired.’
- d. Zhangsan chi-bao-le.
 Zhangsan eat-full-PERF
 ‘Zhangsan ate himself full.’

Specifically, the single NP in (26a) is a semantic argument of V2, although it is also a Patient argument of V1. In (26b), what is overtly realized is a semantic argument of V2, not an argument of V1. In (26c), the single NP has to be interpreted as the semantic argument of V2, although it is also construed as the Agent argument of V1. The same can be said of (26d), although in this case, V1 is transitive. In addition to the fact that the argument of V2 has to be overtly realized, the fact that in (26b) the argument of V1 is not syntactically realized at all casts doubt on Gu’s view that all RVCs are double-headed.

2.4 Neither V1 nor V2 as head

The final possibility as to the headedness of Mandarin RVCs is that they have no head. This is the position held by Huang and Lin (1992). The main evidence for Huang and Lin’s position comes from the fact that, as shown by (27), the transitivity of an RVC is not determined by V1 or V2.

- (27) a. Zhangsan ku-shi-le shoujuan.
 Zhangsan cry-wet-PERF handkerchief
 ‘Zhangsan cried the handkerchief wet.’
- b. Na-ge youmo gushi xiao-wan-le Zhangsan-de yao.
 that-CL humor story laugh-bend-PERF Zhangsan-GEN waist
 ‘That humorous story caused Zhangsan’s waist to bend as a result of Zhangsan’s laughing.’

In (27a), the RVC allows an object even though both V1 and V2 involve a single argument. Similarly, although both V1 and V2 of the RVC in (27b) are intransitive, the RVC as a whole is transitive. Furthermore, Huang and Lin argue that the event structure of the entire RVC is a composite of the event structures of V1 and V2. Based on these, they conclude that RVCs in Mandarin “involve composite instead of headed structures” (1992:91).

However, as pointed out by Cheng and Huang (1994:217-218), Chu-Ren Huang and Lin are not entirely consistent in their view that RVCs are headless. In fact, Huang and Lin hold that to allow for the subject-oriented reading with respect to transitive sentences like (28), the compound involved has to be headed by V2—presumably because the authors assume that the sole argument of V2 cannot be fused with the Causer.

- (28) Zhangsan kan-lei-le shu.
 Zhangsan read-tired-PERF book
 ‘Zhangsan read books and as a result he became tired.’

I agree with Cheng and Huang (1994) that Huang and Lin’s (1992) idea is unattractive because they have to treat the compound in (29) below as headless when the sentence has an object-oriented reading, the (a) reading, and to treat the same compound as headed by V2 when the sentence has a subject-oriented reading, the (b) reading.

- (29) Zhangsan zhui-lei-le Lisi.
 Zhangsan chase-tired-PERF Lisi
 (a) ‘Zhangsan chased Lisi and Lisi got tired.’
 (b) ‘Zhangsan chased Lisi and Zhangsan got tired.’

However, I do not think that Huang and Lin (1992) present any good reason for treating RVCs like the one in (28) as headed by V2. In fact, arguably the RVC in (28) is headless, just like other RVCs.

2.5 Summary

What can be seen from the above discussion of the four possibilities concerning the headedness of RVCs is that different researchers use different criteria in deciding on this issue. However, no matter whether the criterion adopted is semantic or structural, I do not see any convincing empirical evidence for regarding either V1 or V2 as the head of an RVC, and the same holds of the double-head claim. In the next section, I would argue that from the perspective of argument realization, Mandarin RVCs are headless.

3. Argument realization and headlessness of Mandarin RVCs

In this section, I argue for the headlessness position from the point of view of argument realization. The main evidence for this view comes from the fact that as seen from (30-32) below, there are different ways of realizing the Causer and Causee arguments licensed by Mandarin RVCs.

- (30) Zhangsan xi-ganjing-le yifu.
Zhangsan wash-clean-PERF clothes
'Zhangsan washed his clothes clean.'
- (31) Zhangsan qie-dun-le dao.
Zhangsan cut-blunt-PERF knife
'Zhangsan cut (something) with the knife, and as a result the knife became blunt.'
- (32) Na-bao yifu xi-lei-le Zhangsan.
that-CL clothes wash-tired-PERF Zhangsan
'(Zhangsan washed that bundle of clothes) and the clothes got Zhangsan tired.'

For example, in (30) the Causer argument is realized by *Zhangsan*, which is semantically also an argument of V1 *xi* 'wash'; the Causee argument is realized by *yifu* 'clothes', which is semantically also the single argument of V2 *ganjing* 'clean' and an argument of V1. For another example, in (32) the Causer argument is realized

by *na-bao yifu* ‘that bundle of clothes’, which is also the Patient argument of V1; the Causee argument is realized by *Zhangsan*, which is semantically the Agent argument of V1 and the single argument of V2.

On the assumption of the head feature percolation condition in (33), the fact that the Causer and Causee arguments can be realized in different ways argues against any claim that Mandarin RVCs have a head.

(33) Head Feature Percolation Condition (cf. Li 1990, 1995)¹²

The way that the arguments of the head of a compound are realized in the syntax should be maintained on the compound level.

Take (32) as an example. The fact that the Patient argument of the V1 of the RVC in this sentence is realized in the overt subject position of the compound poses a problem for the claim that V1 is the head. This is because when *xi* ‘wash’ is used alone, its Patient argument is realized in the object position of an active sentence, not in the subject position, as shown in (34).

- (34) Zhangsan xi-le na-bao yifu.
 Zhangsan wash-PERF that-bundle clothes
 ‘Zhangsan washed that bundle of clothes.’

In addition, the fact that the Agent argument of the V1 of the RVC in (32) is realized in the overt object position of the compound also causes a problem to the claim that the first component of the compound is the head. This is because as (34) shows, when *xi* ‘wash’ is used alone, its Agent argument is realized in the subject position of an active sentence. Therefore, there is evidence that the first component of *xi-lei* ‘wash-tired’ in (32) cannot be the head of the compound. Moreover, the fact that the single argument of V2 is realized in the overt object position of the compound poses a problem for the claim that V2 is the head of the compound, because when V2 is used alone, its single argument must be realized in the overt subject position, as shown in (35).

¹² Recall that in accounting for Mandarin RVCs, Li (1990) assumes that the theta-roles assigned have different degrees of prominence and that the theta-role prominence of the head must be preserved in the theta-grid of the compound. While the head feature percolation condition in (33) is similar to Li’s version, unlike Li (1995), I intend it to be a hard-and-fast condition that cannot be violated. As will become clearer later, a theory without auxiliary assumptions like the overriding of the thematic hierarchy and of the head feature percolation condition by the causative hierarchy and without stipulations on the assignment of the Causer (or Yafei Li’s Cause) and the Causee (or Yafei Li’s Affectee) is more desirable than a theory with such assumptions and stipulations.

- (35) Zhangsan **lei-le.**

Zhangsan tired-PERF

‘Zhangsan got tired.’

Finally, the existence of sentences like (32) also challenges the claim that Mandarin RVCs are double-headed because after all, neither the realization of the Agent and Patient arguments of V1 nor the realization of the single argument of V2 is maintained on the compound level. Therefore, the fact that sentences like (32) are grammatical provides a strong argument for the headlessness of Mandarin RVCs.

Note that crucially, the head feature percolation condition adopted here is independently motivated and is supported by Japanese and Swedish data. To start, there is evidence that Japanese RVCs are head-final. In this regard, Li (1993) reasons that since most types of compounds are head-final in Japanese and since the right-hand component of an RVC is of the same category as the whole compound, namely a verb, ‘the minimal assumption is that they pattern with all these other types of compounds in being head-final’ (p. 487). More importantly, there is indirect evidence from other V-V compounds that Japanese RVCs are head-final. Specifically, there is evidence from case marking that other V-V compounds in Japanese are right-headed. For example, although as shown in (36a) and (36b), *ou* ‘chase’ and *tsuku* ‘attach’, when used separately, require an accusative object and a dative object respectively, the compound *oi-tsuku* ‘chase-attach’ can only be followed by a dative object, as shown in (36c).

- (36) a. John-ga Mary-**o** **ot-ta.**
 John-NOM Mary-ACC chase-PAST
 ‘John chased Mary.’ (Nishiyama 1998:177)
- b. John-ga Bill-**ni** **tui-ta.**
 John-NOM Bill-DAT attach-PAST
 ‘John attached to Bill.’ (Nishiyama 1998:177)
- c. John-ga Mary-**ni/*o** **oi-tui-ta.**
 John-NOM Mary-DAT/ACC chase-attach-PAST
 ‘John chased Mary and attached to (i.e., caught up with) Mary.’ (Nishiyama 1998:184)

Therefore, there is evidence that other V-V compounds in Japanese are head-final. This, in turn, provides the strongest indirect evidence that Japanese RVCs, which are V-V compounds, are also head-final.

With the head-final nature of Japanese RVCs kept in mind, we now turn to several observations that can be made about these compounds. First, as shown in (37), Japanese does not allow sentences analogous to Mandarin examples like (32).

- (37) *Sorerano fuku-ga **John-o** arai-**tsukare-ta**.
 those clothes-NOM John-ACC wash-get.tired-PAST
 Intended: ‘John washed those clothes and the clothes got John tired.’

Moreover, the sentence in (38) only allows the first reading, the subject-oriented reading.

- (38) **John-ga** Bill-o oi-**aki-ta**.
 John-NOM Bill-ACC chase-get.bored-PAST
 (a) ‘John chased Bill and as a result John became bored.’
 (b) *‘John chased Bill and as a result Bill became bored.’

Finally, as shown in (39) and (40) respectively, the single argument of *tsukareru* ‘get tired’ and *akiru* ‘get bored’ is realized in subject position when such verbs are used alone and are not part of a compound.

- (39) **John-ga** **tsukare-ta**.
 John-NOM get.tired-PAST
 ‘John got tired.’
- (40) **John-ga** **aki-ta**.
 John-NOM get.bored-PAST
 ‘John got bored.’

Given the right-headedness of Japanese RVCs, the above facts provide strong support for the head feature percolation condition. That is, (37) is ungrammatical in Japanese because in this case the single argument of V2, the head of the compound, is realized in the object position of the whole sentence, thus violating the head feature percolation condition. For the same reason, the second reading of (38) is ruled out. As for the first reading of (38), it is allowed because in this case the single argument of V2 is realized in the subject position of the whole sentence, thus obeying the head feature percolation condition. Therefore, there is strong evidence from Japanese RVCs that the head feature percolation condition is needed.

In addition to the evidence from Japanese RVCs, there is also evidence for the head feature percolation condition from Japanese V-V compounds which are not RVCs. For example, the fact that (41) is grammatical is because the V2 (i.e. the head) of the compound involved is transitive and the way its arguments are realized in the overt syntax is maintained on the compound level.

- (41) John-ga soup-o [suupu-o] **huki-kobosi-ta.**
 John-NOM soup-ACC boil.over (INTR)-spill (TR)-PAST
 ‘The soup boiled over and John spilled it.’ (Nishiyama 1998:193)

Crucially, note that in this example V1 is intransitive and its single argument is realized as the object of the sentence. As shown in (42), when V1 is used alone, its single argument should be expressed in the subject position.

- (42) Suupu-ga **huki-ta.**
 soup-NOM boil.over (INTR)-PAST
 ‘The soup boiled over.’

This shows that the way the argument(s) of the non-head component of a compound are realized in the syntax need not be maintained on the compound level. In turn, it suggests that the grammaticality of (41) is due to the fact that the argument realization related to V2 (the head) rather than V1 (the non-head) is preserved on the compound level.

Further crosslinguistic evidence for the head feature percolation condition comes from Swedish RVCs. To begin with, there is evidence that Swedish RVCs, like Japanese ones, are head-final. First, as shown in (43), the category of each Swedish compound involved is identical with the category of the right component, which is a verb, not with the category of the left component, which is an adjective.

- (43) De röd-målade huset.
 they red-painted house.the
 ‘They painted the house red.’

Second, unlike Japanese and Mandarin RVCs, in which the causing predicate precedes the result predicate, Swedish RVCs have the reverse order.¹³ I argue that such an

¹³ According to Li (1993:499), the ordering of the two components of Japanese and Mandarin RVCs is motivated by iconicity considerations, namely the requirement that the temporal relation of the two components must be reflected in their surface linear order. Obviously, Swedish RVCs pose a problem to Li’s “Temporal Iconicity Condition”. To account for similar counterexamples from

ordering is motivated by the fact that adjectives in Swedish cannot bear tense inflection, as shown in (44a). Rather, a copula has to be used to reflect tense, as shown in (44b).

- (44) a. *John trött.
 John tired
 Intended: ‘John was tired.’
- b. John var trött.
 John be.PAST tired
 ‘John was tired.’

Because Swedish RVCs function as main predicates and thus are verbs, and because regular tense inflection in the language is in the form of suffixes, it is necessary for the component which can bear tense to be in the right position of the compounds. If so, the ordering of the two components of Swedish RVCs provides additional support for the view that the right component is the head.

Bearing in mind the head-final nature of Swedish RVCs, let’s consider one observation about these compounds. That is, Swedish RVCs, like Japanese ones, do not allow sentences like (45).

- (45) *De där kläderna trött-tvättade John.
 those there clothes tired-washed John
 Intended: ‘John washed those clothes and the clothes got John tired.’

By adopting the head feature percolation condition, the ungrammaticality of (45) can be readily accounted for. Given the head feature percolation condition and the right-headedness of Swedish RVCs, the Agent argument of the head of the RVC in (45) should be realized in the subject position, not in the object position of the sentence. This is because as shown in (46), when *tvätta* ‘wash’ is used separately, the Agent argument needs to be expressed in the subject position as far as active sentences are concerned.

German, Li proposes that the condition applies only when the two components of the compound are both verbal. While this proposal predicts that RVCs like those in Swedish do not need to meet the condition proposed by Li because such compounds are composed of an adjective and a verb, Li fails to account for why the two components of such compounds must be in the “adjective-verb” order.

- (46) John **tvättade** de där kläderna.

John washed those there clothes
 ‘John washed those clothes.’

Likewise, on the basis of (46) and the head feature percolation condition, the Patient argument of *tvätta* ‘wash’ is expected to be realized in the object position, not the subject position of (45). Therefore, the ungrammaticality of (45) is due to its violation of the head feature percolation condition.

Given that the head feature percolation condition is independently required, I take the grammaticality of sentences like (32) to be crucial evidence for the headlessness of Mandarin RVCs.¹⁴

It is worth pointing out that the conclusion that Mandarin RVCs are headless is consistent with Huang’s (1998:261) view that “Chinese is essentially a headless language”. Although Huang’s argument is made on the basis of the fact that neither the first nor the second element of a compound in Mandarin “prevails in the determination of the category type of a compound” (Huang 1998:270) (and thus it is possible that a specific type of compound is left-headed or right-headed), our conclusion that RVCs are headless is consistent with Huang’s overall assessment as to the headedness of Mandarin compounds.

Before we take leave of this section, I would like to address three remaining issues, all of which are crucial to my proposal that Mandarin RVCs are headless. The first issue concerns the scope of data and the headedness of Mandarin RVCs. Note that sentences like (47) may suggest that V1 is the head of the RVC involved, as this conforms to the head feature percolation condition. However, sentences like (48) may indicate that V2 is the head of the same RVC, as this obeys the Condition.

- (47) Zhangsan **xi-ganjing-le** yifu.
 Zhangsan wash-clean-PERF clothes
 ‘Zhangsan washed his clothes clean.’

¹⁴ One reviewer wondered about the relevance of the discussion of the Japanese and Swedish data. However, note that the head feature percolation condition, which is proposed for verb compounds, is intended to be a condition that holds crosslinguistically. That is, if a verb compound has a head, then its argument realization must obey the head feature percolation condition. In this regard, the discussion of crosslinguistic evidence for the Condition from Japanese and Swedish is crucial, as it shows that the Condition is crosslinguistically well-motivated and well-supported by languages whose resultatives have a head. In other words, my point is that, given the fact that the Condition is crosslinguistically well-motivated and given the assumption that it holds crosslinguistically for any verb compound that has a head, only the headlessness approach is compatible with the fact that sentences like (32) are grammatical in Mandarin. Moreover, the headlessness view has the advantage of allowing us not only to maintain the well-motivated head feature percolation condition (see below), but also to give a principled account of why sentences like (32) are grammatical in Mandarin and why their counterparts in Japanese and Swedish are ungrammatical.

- (48) Yifu **xi-ganjing-le.**

clothes wash-clean-PERF

Literally: ‘The clothes washed clean.’ → ‘The clothes got clean from (someone’s) washing.’

To make the issue more complicated, the RVC in (49) may be considered to be double-headed, as both the argument realization of V1 and that of V2 conform to the head feature percolation condition. However, by consistently adopting the Condition, the same RVC in (50) has to be viewed as headless because in this case neither the argument realization of V1 nor that of V2 conforms to the Condition.

- (49) Zhangsan **lei-bing-le.**

Zhangsan tired-sick-PERF

‘Zhangsan’s being in the state of tiredness caused him to become sick.’

- (50) Fanzhong-de nonghuor **lei-bing-le** Zhangsan.

heavy-MM farm.work tired-sick-PERF Zhangsan

‘The heavy farm work caused Zhangsan to become sick, as a result of his being in the state of tiredness.’

The above data may point to the conclusion that Mandarin RVCs do not form a homogenous class. Furthermore, as (47) and (48) involve one and the same RVC, one may conclude that the same RVC can be headed by V1 in one instance, and by V2 in another. Likewise, as (49) and (50) also involve one and the same RVC, one may suggest that the same RVC can be double-headed in one case and headless in another.

The above conclusions are obviously unattractive if we can analyze the headedness of all Mandarin RVCs in a uniform manner. I would like to point out that there is indeed a way to treat all Mandarin RVCs uniformly, and the way is to adopt the headlessness position. As mentioned earlier, neither the right-headed, left-headed, nor the double-headed approach can account for examples like (50), as long as the head feature percolation condition is applied consistently and is not overridden by anything *ad hoc*. In other words, examples like (50) are only compatible with a headlessness approach. If so, the question is whether this approach can be applied to all Mandarin RVCs or whether all the data in (47-50) are compatible with the headlessness view. I argue that the answer to the above question is positive. This is because the head feature percolation condition requires that the way the arguments of the head of a compound are realized in the syntax should be maintained on the compound level. However, if Mandarin RVCs do not have a head, that does not lead

to the conclusion that neither the argument realization with respect to V1 nor that of V2 should be maintained on the compound level, but rather to the conclusion that the head feature percolation condition fails to exert any effect on constraining the argument realization patterns of Mandarin RVCs. In other words, the headlessness approach predicts that Mandarin RVCs should show a kaleidoscope of argument realization patterns as headlessness gives them the maximum freedom in the respect of argument realization.¹⁵ Therefore, the various argument realization patterns shown in (30-32) and (47-50) are something predicted by the headlessness proposal, but not by any other approach about the headedness of Mandarin RVCs.

The second issue to be addressed is about why the argument of V2 has to be overtly realized, as seen from (47-50). I argue that this results from the constructional requirement of the resultative construction in general and Mandarin RVCs in particular. That is, as resultative constructions, Mandarin RVCs require the argument that undergoes the change denoted by the result component to be overtly expressed. This proposal is independently confirmed by English change-of-state verbs like *break* and *open*. As shown in (51), the argument that undergoes the change of state expressed by *break* has to be overtly expressed, regardless of whether the entity that causes the change to take place is overtly realized or not. This is clearly demonstrated by the fact that (51c) can only be understood as ‘John became broken’ and thus is ungrammatical on the intended interpretation that John broke something.

- (51) a. John broke the window.
- b. The window broke.
- c. *John broke. (Intended: ‘John broke something.’)

Finally, a few more words on the head feature percolation condition are necessary. Recall that Li (1995) allows the Condition to be able to be violated so as to account for the argument realization pattern shown in (52), repeated from (32).

- (52) Na-bao yifu xi-lei-le Zhangsan.
that-CL clothes wash-tired-PERF Zhangsan
‘(Zhangsan washed that bundle of clothes) and the clothes got Zhangsan tired.’

¹⁵ One reviewer stated that the different argument realization possibilities consistent with the headlessness approach would give rise to the same processing problem implicated by Li’s (1995, 1998) assumption of random theta-role assignment. However, I do not think that a large number of argument realization possibilities entail processing problems. This is because although Mandarin resultatives allow different ways of argument realization, their processing is guided by semantic and pragmatic factors, which can function as heuristics for sentence processing so that we have an efficient parser. Li (2008), for example, proposes that the animacy of the referents of the different NPs plays an important role in processing Mandarin resultatives.

Further recall that Li's theory involves not only the *ad hoc* overriding mechanism as to the relation between the causative hierarchy and the thematic hierarchy, but also stipulations about the assignment of the Cause (or our Causer) and the Affectee (or our Causee). However, by assuming that the head feature percolation condition applies consistently to all Mandarin RVCs, our account is more economical and conceptually more desirable. In addition, by assuming the Condition to apply to RVCs across the board, our account offers insight into the contrast between Mandarin RVCs on the one hand and Japanese and Swedish RVCs on the other.

Taking into consideration all that has been discussed so far, I conclude that only the headlessness approach is compatible with the variety of argument realization patterns associated with Mandarin RVCs and that this approach is more desirable than any other approach, including Yafei Li's V1-as-head one.^{16,17}

4. A formal analysis of Mandarin RVCs

The paper would be incomplete without showing that a more desirable formal analysis of Mandarin RVCs is possible without positing that V1 is the head, as Li (1990, 1995) does. The purpose of this section is to offer an analysis of the relevant data covered by Li, particularly the four potential readings of (8), repeated as (53) below, by placing emphasis on the interaction between the individual thematic relation expressed by each component of an RVC and the composite thematic relation expressed by the compound as a whole.

¹⁶ It needs to be pointed out that different argument realizations do not mean different mechanisms of forming RVCs. In fact, the former concerns syntax or syntax-semantics interface, and the latter morphology. As argued in Li 2008 (cf. Thompson 1973), the formation of RVCs can be accounted for by a single lexical rule, namely that RVCs are formed by two components which bear the [+V] feature in the sense of Chomsky (1970) and which give rise to the interpretation that as a result of the eventuality denoted by the first component, a change denoted by the second component takes place.

¹⁷ One reviewer touched upon the similarity between morphology and syntax in Chinese. While I leave the extent of such similarity for future research, I would like to make two points. First, as correctly pointed out by the same reviewer, one should not give too much power to morphology or syntax even when there are similarities between the two in a certain language. Similar points have also been made by Anderson (1982, 1992). Second, as far as RVCs are concerned, the way that they are formed cannot be replicated in syntax. For example, to get the same meaning as expressed by the RVC *xi-ganjing* 'wash-clean' in (i) by resorting to syntax, a structure like (ii) is needed. Crucially, however, the two components of the RVC in (i) are adjacent to each other and are used in a single clause, *xi* 'wash' and *ganjing* 'clean' cannot be adjacent to each other and are used in two separate clauses in (ii).

- (i) Zhangsan xi-ganjing-le yifu.
Zhangsan wash-clean-PERF clothes
'Zhangsan washed the clothes clean.'
- (ii) Zhangsan xi-de yifu hen ganjing.
Zhangsan wash-DE (indicating degree or result) clothes very clean
'Zhangsan washed the clothes very clean.'

- (53) Zhangsan zhui-lei-le Lisi.
 Zhangsan chase-tired-PERF Lisi.
- (a) ‘Zhangsan chased Lisi and as a result Lisi got tired.’
 (b) ‘Zhangsan chased Lisi and as a result Zhangsan got tired.’
 (c) ‘Lisi chased Zhangsan and Zhangsan got Lisi tired.’
 (d) *‘Lisi chased Zhangsan and Zhangsan got himself tired.’

It has been noted that the meaning of the resultative is compositionally derived (e.g. Alsina, 1996:4, Cheng and Huang 1994:187, Levin and Rappaport Hovav 1995:54). Likewise, the semantic arguments of the resultative are also compositionally determined. As far as RVCs are concerned, they express complex causative events composed of a causing component and a result component. Although the causing component contributes a Causer argument and the result component contributes a Causee argument, the Causer and Causee arguments of an RVC are not determined by V1 or V2 alone. Rather, they are contributed by the combinatory force of V1 and V2.

More importantly, with respect to RVCs, the semantic arguments that are immediately relevant to linking are the Causer and Causee arguments rather than the arguments licensed by V1 or V2 alone. I propose that the realization of the Causer and Causee arguments in the syntax follows the rules in (54) below.¹⁸

- (54) Linking rules for complex causative events in active sentences
- a. The Causer argument is realized in subject position and the Causee argument in object position, when both arguments are overtly expressed by different linguistic expressions.
 - b. When the Causer argument and the Causee argument are realized by one and the same linguistic expression, it appears in subject position.
 - c. When only the Causee argument is expressed, it is realized in subject position.¹⁹

As a causing event involves a causal chain in which the causing component precedes the result component, I assume that the Causer event role ranks over the Causee event role, and that the causative hierarchy cannot be violated in the syntax. As there is independent evidence from relative clause formation that subject ranks higher than direct object (Keenan and Comrie 1977:66), (54a) is proposed to maintain the causative hierarchy in the syntax when the Causer and the Causee arguments are

¹⁸ Note that analogous linking rules have to be assumed by Li (1995), although there they are not made explicit.

¹⁹ Rule (54c) is of the same nature as Fillmore’s (1968:33) “Subject Selection Principle”.

overtly realized by different linguistic expressions. In the case of (54b), the causative hierarchy is trivially obeyed as the Causer argument and the Causee argument are realized by the same expression in subject position. Finally, when rule (54c) applies, the Causer argument is left unexpressed and as a result the causative hierarchy only applies vacuously. In this case, the Causee argument is realized in subject position, as this position has the highest priority among all grammatical relations.

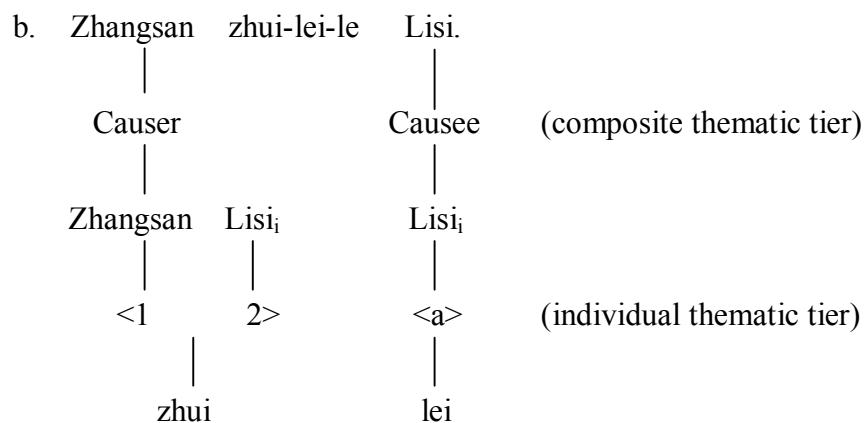
Assuming a monostratal syntax, I argue that the three readings allowed in (53) are just reflections of the different ways of realizing the Causer and Causee arguments and result from different interactions between the thematic relations expressed by V1 and V2 and the composite thematic relation expressed by the RVC as a whole, namely the Causer-Causee relation. In addition, I argue that the fourth reading is bad for both structural and semantic reasons.

For the sake of explicitness, I present the thematic relations expressed by V1 and V2, and the causative relation expressed by the compound in two separate tiers, namely an individual thematic tier and a composite thematic tier.²⁰ I will use Causer and Causee in the composite thematic tier. However, for the individual thematic tier, I use numerals to indicate the theta-roles assigned by V1, and employ small letters to represent the ones assigned by V2. When more than one theta-role is assigned, “1” or “a” stands for the theta-role associated with an external argument, and “2” or “b” for the theta-role associated with a direct internal argument.

With the above machinery, let's take a closer look at the first three readings of (53). As shown in (55b), the argument realization associated with the first reading of (53) is as follows: the Causer is identified with the external argument of the V1 of *zhui-lei* ‘chase-tired,’ and the Causee is realized by the single argument of the V2, which is identified with the internal argument of the V1. As in this case the Causer and the Causee are not identified, they are expressed in the subject and object position respectively according to the linking rule in (54a).

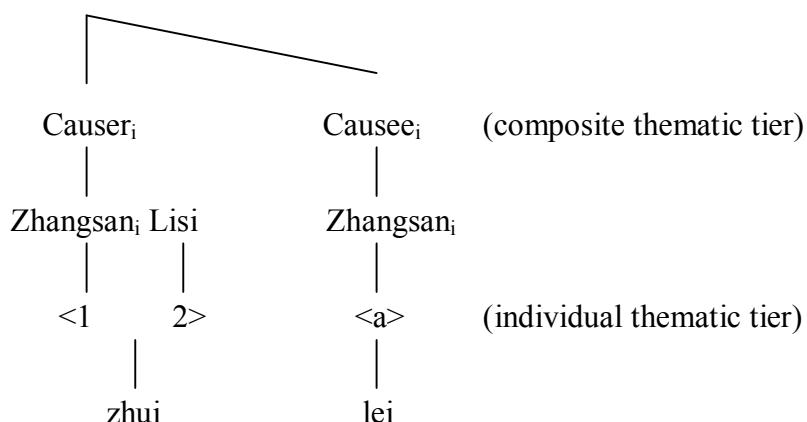
²⁰ Jackendoff (1987) is probably the first to use tiers to represent thematic relations. As far as previous accounts of Mandarin RVCs are concerned, most lexical-semantic accounts (e.g. Huang and Lin 1992, Li 1995) also adopt this method of representation.

- (55) a. Zhangsan zhui-lei-le Lisi.
 Zhangsan chase-tired-PERF Lisi
 ‘Zhangsan chased Lisi and as a result Lisi got tired.’



In the second reading of (53), just as in the first one, the external argument of V1 is realized as the Causer and the single argument of V2 is realized as the Causee. However, in this case, the single argument of V2 is identified with the external argument of V1. As a result, the Causer and Causee arguments are identified. As shown in (56b), the two are realized by the same linguistic expression, which is linked to the subject position according to the rule in (54b). Therefore, the second reading of (53) is subject-oriented.

- (56) a. Zhangsan zhui-lei-le Lisi.
 Zhangsan chase-tired-PERF Lisi
 ‘Zhangsan chased Lisi and as a result Zhangsan got tired.’
- b. Zhangsan zhui-lei-le Lisi.



However, the question is how to account for the realization of *Lisi* in (56). With respect to this, I propose that an argument of V1 or V2 that is neither realized as the Causer nor as the Causee can be overtly expressed on the conditions that it forms a

grammatical sentence with the other NP(s) and the V1 or V2, and that the meaning of this sentence is part of the meaning of the resultative construction.²¹ On this proposal, *Lisi* in (56), a semantic argument of V1 *zhui* ‘chase’, can be overtly expressed because it forms a grammatical sentence with the other NP *Zhangsan* and the V1, as shown in (57), and because the sentence thus formed is part of the meaning of the resultative in (56a).

- (57) Zhangsan zhui-le Lisi.

Zhangsan chase-PERF Lisi

‘Zhangsan chased Lisi.’

Note that there is both intralinguistic and crosslinguistic evidence for the above proposal. Intralinguistically, although *Lisi* in (56) can be overtly expressed, *gutou* ‘bone’ in (58) cannot be overtly expressed because the sentence formed by *gutou* (a semantic argument of V1), the other NPs, and the V1 is ungrammatical, as shown in (59).

- (58) *Zhangsan kan-dun-le dao gutou.

Zhangsan cut-blunt-PERF knife bone

Intended: ‘Zhangsan cut the bones with the knife and as a result the knife became blunt.’

- (59) *Zhangsan kan-le dao gutou.

Zhangsan cut-PERF knife bone

In addition, (60b) (cf. (60a)) is grammatical because *na-ge wenti* ‘that question’, an argument of V1 that is not realized as the Causer or the Causee, forms a well-formed sentence with the other NPs and the V1, as shown in (60c). Moreover, what is expressed by (60c) is part of the meaning of the resultative in (60b).

²¹ I believe that the first condition is tied to processing considerations. Resultatives are essentially about the realization of the Causer and the Causee. To facilitate the incorporation of the argument of V1 (or V2) that is not realized as the Causer or the Causee to the argument structure of the RVC on the compound level, it becomes necessary for this argument to form a well-formed sentence with the V1 (or V2) and the other NP(s) involved. As for the second condition, it is reasonable to require that the sentence thus formed be part of the intended interpretation of the resultative under consideration.

- (60) a. Zhangsan wen-fan-le.
 Zhangsan ask-vexed-PERF
 ‘Zhangsan asked (somebody something) and as a result he felt vexed.’
- b. Zhangsan wen-fan-le Lisi na-ge wenti.
 Zhangsan ask-vexed-PERF Lisi that-CL question
 Intended: ‘Zhangsan asked Lisi that question, and as a result Zhangsan felt vexed.’
- c. Zhangsan wen-le Lisi na-ge wenti.
 Zhangsan ask-PERF Lisi that-CL question
 ‘Zhangsan asked Lisi that question.’

So far, I have shown that an argument of V1 that is neither realized as the Causer nor as the Causee can be overtly expressed as long as it forms a grammatical sentence with the V1 and the other NP(s) involved and as long as the sentence thus formed is part of the meaning of the resultative in question. (61) shows that the same can be said of an argument of V2. In this example, *Zhangsan* is both the Causer and the Causee. The second NP *yao shuo-de hua* ‘the words he wanted to say’ is an argument of V2, but not an argument of V1, as shown by (61b) and (61c). As this NP forms a grammatical sentence with the V2 of *qi-wang* ‘anger-forget’ and the other NP of (61a) (as shown in (61c)) and as the sentence thus formed is part of the meaning of the resultative in (61a), our proposal predicts that (61a) should be allowed. The fact that (61a) is grammatical shows that this prediction is borne out.

- (61) a. Zhangsan qi-wang-le yao shuo-de hua.
 Zhangsan anger-forget-PERF want say-MM words
 ‘Zhangsan was so angry that he forgot what he wanted to say.’
- b. *Zhangsan qi-le yao shuo-de hua.
 Zhangsan anger-PERF want say-MM words
 *‘Zhangsan angered what he wanted to say.’
- c. Zhangsan wang-le yao shuo-de hua.
 Zhangsan forget-PERF want say-MM words
 ‘Zhangsan forgot what he wanted to say.’

In addition, my formulation of the condition on the overt expression of an argument of V1 or V2 that is neither realized as the Causer nor as the Causee successfully rules out sentences like (62a).²² On my proposal, the ungrammaticality

²² I am grateful to one of the reviewers for pointing out the relevance of the ungrammaticality of sentences like (62a) to the formulation of the conditions on the overt expression of an argument of V1 or V2 that is neither realized as the Causer nor as the Causee.

of (62a) on the intended reading is due to the fact that *gutou* ‘bone’, an argument of V1 that is not realized as the Causer or the Causee, does not form a well-formed sentence with the other NP and the V1, as shown in (62b).

- (62) a. **Dao* kan-dun-le *gutou*.
 knife cut-blunt-PERF bone

Intended: ‘As a result of being used to cut the bones, the knife became blunt.’

- b. **Dao* kan-le *gutou*.
 knife cut-PERF bone

Intended: ‘The knife was used to cut the bones.’

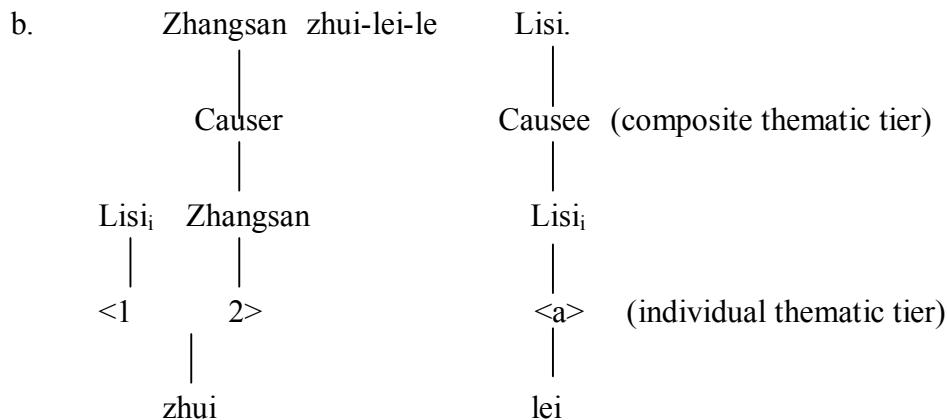
Crosslinguistically, there is also evidence from Japanese for my proposal that an argument of V1 or V2 that is neither realized as the Causer nor as the Causee can be overtly expressed on the conditions that it forms a grammatical sentence with the other NP(s) and the V1 or V2, and that the sentence thus formed is part of the meaning of the resultative in question. Take the argument realization of V1 as an example. As shown in (63), which is analogous to the Mandarin example in (56), *Bill* (a semantic argument of V1) can be overtly expressed because it forms a well-formed sentence with the other NP *John* and the V1, as shown in (64), and because what is expressed by (64) is part of the meaning of the resultative in (63).

- (63) *John-ga* *Bill-o* *oi-aki-ta*.
 John-NOM Bill-ACC chase-get.bored-PAST
 ‘John chased Bill and as a result John got bored.’

- (64) *John-ga* *Bill-o* *ot-ta*.
 John-NOM Bill-ACC chase-PAST
 ‘John chased Bill.’

Now let’s turn to the third reading of (53). On this reading, the Causer is identified with the internal argument of the V1 of the RVC *zhui-lei* ‘chase-tired’, and the Causee is realized by the single argument of V2, which is identified with the external argument of V1. Following (54a), the Causer and the Causee are expressed in subject and object positions, respectively. The argument realization associated with the third reading is shown in (65).

- (65) a. Zhangsan zhui-lei-le Lisi.
 Zhangsan chase-tired-PERF Lisi
 ‘Lisi chased Zhangsan and Zhangsan got Lisi tired.’



As for the fourth reading of (53), which is ungrammatical, I argue that it is bad for both structural and semantic reasons. Note that in this reading, *Zhangsan*, the internal argument of V1, is realized as the Causer, and the single argument of V2 is realized as the Causee. Furthermore, the Causer argument is identified with the Causee argument. After identification, the Causer and Causee arguments are realized by the same expression *Zhangsan* in the subject position. This gives rise to the subject-oriented reading of the sentence. Note that in this case the external argument of V1, namely *Lisi*, is neither realized as the Causer nor as the Causee. However, *Lisi* cannot be overtly expressed in the direct object position of (53). Recall that for an argument of V1 or V2 that is not realized as the Causer or Causee to be overtly expressed, this argument needs to form a grammatical sentence with the other NP(s) and the V1 or V2. Meanwhile, the sentence thus formed needs to be part of the meaning of the resultative under consideration. In the case of the fourth reading of (53), although *Lisi* forms a well-formed sentence with *Zhangsan* and the V1 *zhuī* ‘chase’ (as shown in (66)), what is expressed by this sentence is not part of the fourth reading of the resultative in (53). Therefore, *Lisi* cannot occupy the object position of (53) on the fourth reading, which gives rise to the ungrammaticality of the sentence.

- (66) Zhangsan zhuī-le Lisi.
 Zhangsan chase-PERF Lisi
 ‘Zhangsan chased Lisi.’

Moreover, note that on the fourth reading, (53) has to be interpreted as ‘Lisi chased Zhangsan and Zhangsan got himself tired’. This, however, is semantically bad. Relating this to the behavior of lexical causatives like *scare*, it can be said that the

ill-formedness of the fourth reading of (53) is analogous to the ungrammaticality of (67) on the intended reading.

- (67) *The tiger scared the child. (Intended: ‘The child did something to the tiger, and the tiger got itself scared.’)

Compared with Li’s (1995) account, my proposal is more desirable in the sense that unlike him, I do not make any stipulations as to the assignment of the causative roles. This allows us not only to give a more plausible account of the second reading of (53), which does not involve any causative relation on Li’s proposal, but also to offer a better and more plausible explanation of the ungrammaticality of the fourth reading, which is again not causative on Li’s proposal.²³

5. Conclusions

This paper showed that from the perspective of argument realization, Mandarin RVCs are headless. Among all the logically possible accounts, only the headlessness approach is compatible with the wide range of argument realization patterns found with Mandarin RVCs.

The proposal that Mandarin RVCs are headless has an interesting theoretical implication. That is, in terms of headedness, there are not only headed but also headless verb compounds. If this is correct, then it challenges the view that all compounds have a head as all phrases do (e.g. Di Sciullo and Williams 1987, Lieber 1992, and Selkirk 1982). Meanwhile, it poses a problem for the “syntax-all-the-way-down” approach to morphology (cf. Spencer 2005).

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²³ One reviewer raised the question of how the linking rules in (54) and the head feature percolation condition interact with each other in languages such as Japanese and Swedish. I think that as far as complex causative events are concerned, both the linking rules and the head feature percolation condition need to be obeyed. Moreover, the obeying of one does not override the obeying of the other. That is, the grammatical Japanese and Swedish resultatives discussed in section 3 violate neither the linking rules nor the head feature percolation condition.

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漢語動結式的核心

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本論文考察了關於漢語動結式（即結果式複合動詞）是否有核心的四種可能性。文章的主要觀點是，從論元實現的角度來看，漢語動結式是一種無核心結構。該研究在理論上的貢獻是，漢語動結式證明並不是所有的複合詞都像短語一樣有一個核心。

關鍵詞：核心、無核心、漢語、動結式