On the Headedness of Mandarin Resultative Verb Compounds[1]

Chao Li
City University of New York

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

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 & C.-T. James
Huang 1994; Yafei Li 1990, 1993, 1995, 1999; Lingling Wang 2001); (ii) V2 being the
head (e.g., Tai 2003, Yong 1997); (iii) both V1 and V2 being heads (e.g., Gu 1992); (iv)
neither V1 nor V2 being the head (e.g., Chu-Ren Huang & 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 what
follows, I will first examine previous accounts of the headedness of Mandarin RVCs and
then provide arguments for the fourth possibility. The final section briefly discusses the
theoretical implication of this study.

2. Previous Accounts
2.1 V1 as Head

This possibility is assumed by Yafei Li (1990, 1993, 1995, 1999), Ross (1990) and Uehara et al. (2001), argued for by Cheng & C.-T. James Huang (1994) and Lin (1998), and maintained by Lingling Wang (2001). Among them, Cheng & 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 V2 is "stative," the entire compound is either "ergative" or "causative," as shown in (3). In this regard, Cheng & 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 & Huang's view. First, as noticed by Cheng & 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.[2] As they implicitly assume that

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[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 has both a transitive and a causative use does not count as evidence against the view of Cheng & 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 & Huang's view. This is because according to Cheng & Huang, the causative use of an RVC with a stative

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.

(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-benhouhou-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.'

The second problem with Cheng & 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 frame-work.[3]

2.2 V2 as Head
The second logical possibility regarding the headedness of Mandarin RVCs is that V2 is the head. In the literature, a number of researchers (e.g., Tai 2003: 308, Hongqi 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 like a manner adverb.[4] 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.

V1 is determined by the fact that the event type of V1 in this case is stative. Crucially, on the view of Cheng & Huang (1994) and C.-T James 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 & 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 & 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 & 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 & Rosen (1998), for example.

[4] 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.

The only empirical evidence for the V2-as-head claim is given by Linding 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, given the use of an RVC *ku-hong* 'cry-red' in (5a), the V2 of the RVC cannot be omitted, but the V1 can, as shown in (5b) and (5c). Based on this, Li concludes that the second component of *ku-hong* is the head of the compound.

(5) a. Zhangsan-de   yanjing   **ku-hong**-le.
         Zhangsan-GEN   eye   cry-red-PERF
         'Zhangsan's eyes were cried 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 (6a) is the head of the compound, because, as shown in (6b-c), in this case it is the V2 that can be omitted.

(6) 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 (7) is headless because (7b) and (7c) respectively show that the V2 and the V1 of the compound can be omitted.

(7) 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 (8a) should be double-headed because (8b) and (8c) show that in this case neither V1 nor V2 can be omitted.

(8) 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.'

However, this very criterion leads to the conclusion that the same RVC in (9a) is right-headed because, as shown in (9b-c), it is the V1 rather than the V2 that can be omitted.

(9) 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).[5] 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 (10a) below, V1 contributes the Causer argument *Zhangsan*; in (10b), V2 contributes the Causee argument *Zhangsan-de yanjing* 'Zhangsan's eyes.'

(10) 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.'

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 (11), although V1 may contribute to the argument structure of the entire compound in certain uses of an RVC. For example, in (11b) what is overtly realized is a semantic argument of V2, not an argument of V1. Furthermore, the fact that in (11b) the argument of V1 is not syntactically realized casts doubt on Gu's view that all RVCs are double-headed.

(11) 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.'

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[5] In this respect, note that Baker & 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 & 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.

    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.'

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 Chu-Ren Huang & Fu-Wen Lin (1992). The main evidence for Huang & Lin's position comes from the fact that, as shown by (12), the transitivity of an RVC is not determined by V1 or V2.

(12) 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.'

For example, in (12a), the RVC allows an object even though both V1 and V2 involve a single argument. Furthermore, Huang & 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 & C.-T. James Huang (1994: 217-218), Chu-Ren Huang & Lin are not entirely consistent in their view that RVCs are headless. In fact, Huang & Lin argue that to allow for the subject-oriented reading with respect to transitive sentences like (13), 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.

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

      I agree with Cheng & Huang (1994) that Huang & Lin's (1992) idea is unattractive because they have to treat the compound in (14) 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.

(14) 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.'

Furthermore, I do not think that Huang & Lin (1992) present any good reason for treating RVCs like the one in (13) as headed by V2. In fact, arguably the RVC in (13) 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.

3. Argument Realization and the 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 (15-19) below, there are different ways of realizing the Causer and Causee arguments licensed by Mandarin RVCs.

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

(16) Zhangsan   qie-dun-le   dao.
      Zhangsan   cut-blunt-PERF   knife
      'Zhangsan cut (something) with the knife, and as a result the knife became blunt.'

(17) 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.'

(18) Na-kuai   paigu   kan-dun-le   san-ba   dao.
      that-CL   sparerib   cut-blunt-PERF   three-CL knife
      'That sparerib got three knives blunt as a result of the cutting (by some specific
                                    person).'
(19) Na-ge   youmo gushi xiao-wan-le   Zhangsan-de   yao.
      that-CL   humor   story   laugh-bend-PERF   Zhangsan-GEN   waist
      'That humorous story got Zhangsan's waist bent as a result of his laughing.'

For example, in (15) 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 (17) the Causer argument is realized by *na-bao yifu* 'that bundle of clothes,' which is 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 (20), the fact that the Causer and Causee arguments can be realized in different ways argues against any claim that Mandarin RVCs have a head.

(20) Head Feature Percolation Condition (cf. Yafei Li 1990, 1995)
The way that the arguments of the head of a compound are realized in the syntax should be maintained on the compound level.

Take (21), which is the same as (17), as an example.

(21) Na-bao yifu   **xi-lei**-le   Zhangsan.   [=(17)]
that-CL   clothes   wash-tired-PERF   Zhangsan
'(Zhangsan washed that bundle of clothes) and the clothes got Zhangsan tired.'

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 (22).

(22) Zhangsan   **xi**-le   na-bao   yifu.
Zhangsan   wash-PERF   that-bundle   clothes
'Zhangsan washed that bundle of clothes.'

Likewise, the fact that the Agent argument of the V1 of the RVC (21) is realized in the overt object position of the compound causes a problem to the claim that the first component of the compound is the head. This is because as (22) shows, when *xi* 'wash' is used alone, its Agent argument is realized in the subject position of an active sentence. 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 (23).

(23) Zhangsan **lei**-le.
     Zhangsan tired-PERF
     'Zhangsan got tired.'

Finally, the existence of sentences like (21) 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 (21) 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 supported by crosslinguistic evidence. To start, there is evidence that Japanese RVCs are head-final. In this regard, Yafei 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 (24a) and (24b), *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 (24c).

(24) a. John-ga   Mary-**o**   **ot**-ta.
         John-NOM   Maru-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 (25), Japanese does not allow sentences analogous to Mandarin examples like (17).

(25) *Sorerano fuku-ga **John-o** aria-**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 (26) only allows the first reading, the subject-oriented reading.

(26) **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 (27) and (28) 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.

(27) **John-ga** **tsukare**-ta.
John-NOM get.tired-PAST
'John got tired.'

(28) **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, (25) 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 (26) is ruled out. As for the first reading of (26), 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 (29) 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.

(29) 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 (30), when V1 is used alone, its single argument should be expressed in the subject position.

(30) 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 (29) 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 (31), 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.

(31) 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.[6] I argue that such an ordering is motivated by the fact that adjectives in Swedish cannot bear tense inflection, as shown in (32a). Rather, a copula has to be used to reflect tense, as shown in (32b).

(32) a. *John trött.
          John   tired
          Intended: 'John was tired.'

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[6] According to Yafei 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 in 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.

   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 (33).

(33) *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 (33) 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 (33) should be realized in the subject position, not in the object position of the sentence. This is because as shown in (34), when *tvätta* 'wash' is used separately, the Agent argument needs to be expressed in the subject position as far as active sentences are concerned.

(34) John **tvättade** de   där   kläderna.
      John washed   those there   clothes
      'John washed those clothes.'

Likewise, on the basis of (34) 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 (33). Therefore, the ungrammaticality of (33) is due to its violation of the head feature percolation condition.

     Given that the head feature percolation condition is independently motivated, I take the grammaticality of sentences like (17-19) to be crucial evidence for the headlessness of Mandarin RVCs.

     It is worth pointing out that the conclusion that Mandarin RVCs are headless is consistent with Shuanfan 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 one remaining issue, which is about why the argument of V2 has to be overtly realized, as seen from (11). 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 (35), 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 (35c) can only be understood as "John became broken" and thus is ungrammatical on the intended interpretation that John broke something.

(35) a. John broke the window.
      b. The window broke.
      c. *John broke. (Intended: 'John broke something.')

4. Theoretical Implication

The fact that Mandarin RVCs are headless has an interesting theoretical implication. That is, in terms of headedness, there are not only headed verb compounds 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 & 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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