Participant Sharing in Chinese Resultatives

Mingming Liu
Rutgers University, markliu@rci.rutgers.edu
Participant Sharing in Chinese Resultatives
Participant Sharing in Chinese Resultatives

Mingming Liu∗

1 Introduction

Chinese resultatives take the form of verbal compounds $V_1$-$V_2$, $V_1$ describing an activity $e_1$ and $V_2$ its resultant state $e_2$. In (1), $V_1$ is *kan* ‘hack’ and $V_2$ *diao* ‘fall-off’. The sentence means Zhangsan hacked the leaves and the leaves fell off as a result.

(1)  Zhangsan *kan-diao le shuye.

‘Zhangsan hacked the leaves and the leaves fell off.’

Following the literature, we call these compounds Resultative Verb Compounds (RVCs) and use $S$ubject + $V_1$-$V_2$ + $O$bject to talk about simple sentences containing RVCs. In (1), $S$ is *Zhangsan* while $O$ is *shuye* ‘the leaves’.

This paper mainly discusses semantic relations between $O$ and $V_1$, $V_2$ respectively. It claims that $O$ is *thematically* related to both $V_1$ and $V_2$. Specifically:

- $O$ receives a theta role from $V_2$ by being its argument;
- $O$ receives a theta role from $V_1$, not by being its argument, but to satisfy a requirement of RVC formation, which we call Participant Sharing.


Then, we implement the idea by adding into the semantic rule of resultative formation a conjunct $[O] \in \theta(e_1)$, which requires the argument of $V_2$ also receive a thematic role from $V_1$.

Finally, we show the argument facts discussed here are compatible with the modifier facts reported in Liu (2014). Both suggest that $V_1$ and $V_2$ head their own verbal projections in syntax, with the resulting RVC being $[\gamma P \ V_1 \ [\gamma P \ V_2 P]]$. This is similar to Sybesma (1999) but contra Li (1990) and Williams (2005, 2014, to appear), where $V_1$-$V_2$ is treated as a single complex head.

2 Problem with Argument Sharing

As is illustrated in (1), simple RVC sentences consist of $S$, $V_1$-$V_2$, and $O$. Since there are two verbs but only two argument positions $S$ and $O$, assuming both verbs have their own theta roles to assign/discharge, it is natural to ask: where does the additional theta role go if $V_1$ is transitive?

Li (1990) is the first to raise the question and he answers it with Argument Sharing, following Higginbotham’s (1985) Theta Identification.

(2)  Argument Sharing

Identify the argument of $V_2$ with an argument of $V_1$.

∗I am grateful to my QP chair Jane Grimshaw, and to other members of that QP committee Veneeta Dayal and Mark Baker, for their discussions and detailed advice. Thanks also go to Roger Schwarzschild, Maria Bittner, Alexander Williams and audiences at Macsim 3 and PLC 38 for comments and discussions. All errors and inadequacies are mine.

1The name argument mentioned in this paper can either be regarded as a slot in a verb’s Argument Structure (Grimshaw 1990) or a lambda-bound variable in the Fregean denotation of a verb (see Heim and Kratzer 1998 page 54). As far as I can see, these two interpretations of argument make no difference in the setting of this paper.

2This is a common assumption for theories that want to compositionally derive RVC from its two individual verbs. Such a theory is not only conceptually desirable, but also empirically motivated in view of (i), RVC formation is fully productive; (ii), the two verbs $V_1$ and $V_2$ are free, i.e., they can themselves serve as the sole verb in a simple clause.
In other words, for (1), *the leaves* is both an argument of *fall-off* and an argument of *hack*, and thus it receives both a theme role from *V₂* and a patient role from *V₁*. However, Argument Sharing cannot be right. Consider (3).

(3) **Zhangsan ku-shi le shoupa**

*Zhangsan cry-wet PRF handkerchief*

‘Zhangsan was crying and his handkerchief got wet as a result.’

Sentence (3) is an example of an unergative verb *cry* being *V₁*. Crucially, in this case the O simply cannot be an argument of the *V₁* (as *the handkerchief* cannot be an argument of *cry*), so Argument Sharing cannot be satisfied.

Weakening (2) into (4) would presumably solve the problem.

(4) **Argument Sharing (the weakened version)**

Identify the argument of *V₂* with an argument of *V₁*, if it is possible.  

But (4) will not work either, because there are transitive *V₁* but without Argument Sharing; following Lin (2004), I call these cases unselective transitive *V₁* (in the sense that *V₁* does not select O as its argument). See (5).

(5) **Zhangsan kan-dun le fuzi**

*Zhangsan hack-blunt PRF axe*

‘Zhangsan hacked something and the axe got blunt.’

Although (1) and (5) share the same *V₁* *hack*, (1) invokes Argument Sharing while (5) does not. A comparison between (1) and (5) shows that we would never know when Argument Sharing is to be applied. Thus, a theory based on Argument Sharing alone does not seem right.

### 3 Problem with Pragmatic Association

Based on examples like (3) and (5), Sybesma (1999) and Williams (2005, 2014, to appear) propose **Pragmatic Association**.

In this theory, a thematic relation between *V₂* and O is always present, but there is no thematic relation between *V₁* and O (and correspondingly no syntactic relation between the two). Any understood relation of O to *V₁* is pragmatically inferred.

Take (5) as an example. In Williams’ analysis, it means ‘Zhangsan hacked something, and the axe got blunt as a result’ and pragmatics tells us that *the axe* is the instrument of *hacking*.

Similarly, (1) means ‘Zhangsan hacked something, and the leaves fell off as a result’ and we infer from world knowledge that *the leaves* is the patient of *hacking*.

As a result, Pragmatic Association avoids the problem faced by Argument Sharing by denying O to ever be an argument of *V₁* and thus provides a unified analysis for (1), (3) and (5).

However, this analysis over-generates. Consider (1) again: Lin (2004) notices a mere Pragmatic Association predicts it can either have (6a) or (6b) as its interpretation.

(6) **Zhangsan kan-diao le shuye**

*Zhangsan hack-fall PRF leaves*

a. ‘Zhangsan hacked the leaves, and the leaves fell off.’

b. **Impossible**: ‘Zhangsan hacked the tree and the leaves fell off.’

---

3What is ‘possible’ can be further specified. For example, in view of (3), we can state (the weakened) Argument Sharing as the following: Identify the argument of *V₂* with an argument of *V₁*, if *V₁* is unergative.

4Sybesma (1999) and Williams (2005, 2014 and to appear) differ in how they derive this thematic relation. For Sybesma, O receives a thematic role from *V₂* because it is an argument of *V₂*; while for Williams, O is never an argument of *V₂* and its thematic relation with *V₂* comes from a stipulation (Williams attributes it to Parsons 1990) which roughly says: if O is the patient of the entire RVC (which describes a change-of-state event), it is also a theme of the *V₂* (which describes its resultant state) in the RVC.
But (6b) is impossible, as is further illustrated by the contradiction in (7).

(7) # Zhangsan _kan-diao_ le shuye, dan ta _mei kan_ shuye  
Zhangsan hack-fall PRF leaves, but he not hack leaves  
  a. #‘Z hacked the leaves and the leaves fell off, but Z did not hack the leaves’.  
  b. Impossible: ‘Z hacked something and the leaves fell off, but Z did not hack the leaves.’  

In other words, the O in (1)/(6) has to be interpreted as the patient of hacking, which Pragmatic Association cannot guarantee.

**Direct Causation?**


First, Direct Causation has the effect that the causal relation between \( V_1 \) and \( V_2 \) within a RVC has to be direct. This further could be used to block the ‘indirect’ reading of (1)/(6) — Zhangsan hacked the tree and the leaves fell off. This is a welcome result.

However, the combination of Pragmatic Association and Direct Causation still fails to account for the Chinese data in its full range, because Chinese has RVCs that do not involve causation, e.g., _xie-cuo_ ‘write-wrong’, _shui-xing_ ‘sleep-awake’. Direct Causation fails to apply to them.

Further, it has been noticed (Lin 2004) that there are aspeclural restrictions on \( V_1 \) and \( V_2 \): \( V_1 \)s are always activity verbs, while \( V_2 \)s are stative/achievement verbs. Under a causal analysis of the two eventualities, the aspeclural restriction is not easy to explain: why is *_shuo-tiao_ ‘tell-jump’ not attested? Instead, it seems that the relation between the two eventualities is better to be analyzed as temporal (Rothstein 2004). Thus, for our purposes, Pragmatic Association + Direct Causation cannot be used to solve the over-generation problem.

### 4 Participant Sharing

The above discussion shows that neither Argument Sharing nor Pragmatic Association can be used to model the relation between \( V_1 \) and O in a simple RVC sentence. In view of their problems, we propose **Participant Sharing** as in (8).

(8) **Participant Sharing**  
To combine two verbs \( V_1, V_2 \) into an RVC \( V_1-V_2 \), the event introduced by \( V_1 \) and the state introduced by \( V_2 \) have to share at least one participant.  
Where, an individual is a participant of an event if the NP denoting the individual receives a theta role from the verb that describes the event.\(^5\)

Participant Sharing treads a middle ground between the two earlier proposals: it enforces a grammatical relation between \( V_1 \) and O (unlike the Pragmatic Association approach); but it denies an Verb-Argument relation between \( V_1 \) and O (contra Argument Sharing) and by doing this it leaves open what the precise relation will be.

Constraint (8), together with the antipassive assumption (9) usually assumed in the resultative literature (Kratzer 2005, Williams 2005, 2014, to appear), captures (1), (3) and (5).

(9) **Antipassive Assumption**  
O is never an argument of \( V_1 \).

\(^5\)In other words, NPs receiving an Agent role, a Theme role, an Instrument role, a Locative role, an Experiencer role, a Goal Role, etc. from a verb are all regarded as denoting participants of the event described by the verb. However, the paper cannot decide how many theta roles (and thus participants) a certain verb (and its corresponding event) could have, which is an empirical question for theta theory and lexical semantics.
Notice (9) is at least motivated by (3) and (5), where the O the handkerchief/the axe is obviously not an argument of V

However, we show how Participant Sharing + Antipassive explains the pattern shown by (1), (3) and (5), repeated here as (10), (11) and (12).

(10) Zhangsan kan-diao le shuye
Zhangsan hack-fall PRF leaves
a. ‘Zhangsan hacked the leaves, and the leaves fell.’
b. **Impossible**: ‘Zhangsan hacked the tree and the leaves fell.’

(11) Zhangsan ku-shi le shoupa
Zhangsan cry-wet PRF handkerchief
‘Zhangsan was crying and his handkerchief got wet as a result.’

(12) Zhangsan kan-dun le fuzi
Zhangsan hack-blunt PRF axe
‘Zhangsan hacked something and the axe got blunt.’

First, the Antipassive Assumption solves the problem faced by Argument Sharing by directly denying the principle (in other words, there is never any Argument Sharing). But crucially, the effect of Argument Sharing is preserved by Participant Sharing.

Specifically, in (10), although the O the leaves is interpreted as the patient of hack, it is not an argument of it; the patient relation between the leaves and hack is instead enforced by Participant Sharing.

Likewise, in (11), Participant Sharing is satisfied by letting the handkerchief receive a locative role from cry; in (12) it is met by allowing the axe to receive an instrument role from hack.

Second, Participant Sharing solves the over-generation problem faced by Pragmatic Association, by excluding any sentence/interpretation whose O does not receive a theta role from V of the RVC.

Specifically, in (10b), the tree receives the patient role from the hack, putting the leaves in a situation where it can receive no imaginable thematic role, violating the Participant Sharing constraint. As a result, (10b) is blocked.

Below, we implement our analysis in a Davidsonian event semantics (Davidson 1967).

5 Implementation

Following Kratzer’s (1996) event identification, we formalize the above idea using an RVC-formation rule (13).

(13) RVC FORMATION

a. Transitive V₁: Λλλ′λ″e₁[P(x)(y)(e₁)] + Λλλ″s₂[R(e₁)(s₂) ∧ P(z)(y)(e₁) ∧ Q(x)(s₂) ∧ x ∈ θ(e₁)]

b. Intransitive V₁: Λλλ′e₁[P(x)(e₁)] + Λλλ″s₂[R(e₁)(s₂) ∧ P(y)(e₁) ∧ Q(x)(s₂) ∧ x ∈ θ(e₁)]

Three things need to be mentioned. First, existentially binding of the internal argument of V₁ represents the idea that O is never an argument of V₁. Second, Participant Sharing is modeled by [O] ∈ θ(e₁), where [θ] = λeλθx (x bears a theta role to e). Third, R represents the relation between e₁ and s₂, I leave it open whether R is Causal (Kratzer 2005) or Temporal (Rothstein 2004). The results of applying (13) to (10)−(12) are shown in (14)−(16).

(14) [((10))] = ∃e₁∃s₂[R(e₁)(s₂) ∧ hack(Zhangsan)(z)(e₁) ∧ fallen(leave)(s₂) ∧ the leaves]

Pragmatics tells us the leaves can only be interpreted as the patient of hack; [((10))] simplified to:

[((10))] = ∃e₁∃s₂[R(e₁)(s₂) ∧ hack(Zhangsan)(z)(e₁) ∧ fallen(leave)(s₂) ∧ the leaves]
= \text{PATIENT}(e_1)
\]
Since $z$ is the internal argument of $V_1$, $z = \text{PATIENT}(e_1)$; the above formula becomes:
$$[(10)] = \exists e_1 \exists s_2[R(e_1)(s_2) \land \text{hack}(\text{Zhangsan})(\text{the leaves})(e_1) \land \text{fallen}(\text{the leaves})(s_2)]$$
Thus, we get the right interpretation for (10) and predict it cannot have the ‘indirect’ reading.

(15) \[
[(11)] = \exists e_1 \exists s_2[R(e_1)(s_2) \land \text{cry}(\text{Zhangsan})(e_1) \land \text{wet}(\text{the handkerchief})(s_2) \land \text{the handkerchief} \in \theta(e_1)]
\]
Pragmatics tells us that the handkerchief can be interpreted as the location of cry, and the formula can be simplified to:
$$[(11)] = \exists e_1 \exists s_2[R(e_1)(s_2) \land \text{cry}(\text{Zhangsan})(e_1) \land \text{wet}(\text{the handkerchief})(s_2) \land \text{the handkerchief} = \text{LOCATION}(e_1)]$$

(16) \[
[(12)] = \exists z \exists e_1 \exists s_2[R(e_1)(s_2) \land \text{hack}(\text{Zhangsan})(z)(e_1) \land \text{blunt}(\text{the axe})(s_2) \land \text{the axe} \in \theta(e_1)]
\]
Pragmatics tells us that the axe can be interpreted as the instrument of hack (in the context of being blunt), and the formula can be simplified to:
$$[(12)] = \exists z \exists e_1 \exists s_2[R(e_1)(s_2) \land \text{hack}(\text{Zhangsan})(z)(e_1) \land \text{blunt}(\text{the axe})(s_2) \land \text{the axe} = \text{INSTRUMENT}(e_1)]$$

6 A Transparent Syntax-Semantics Interface

The above semantics is compatible with a VP-complementation syntax as in (17). In (17), $V_1$ takes $V_2P$ as its complement; $O$ starts out as the complement of $V_2$ and adjoins to $V_1P$.

(17) \[
\begin{array}{c}
\text{DP} \\
\text{V}_1\text{P} \\
\text{V}_1\text{P}(\text{RVC FORMATION}) \\
\text{O}_i \\
\text{V}_1 \\
\lambda_i \\
\text{V}_2 \text{P} \\
\text{V}_2 \text{P} \\
\text{DP} \\
\text{t}_i \\
\end{array}
\]

Our semantics (RVC FORMATION) is compatible with (17) in the following sense: first, $O$ is always an argument of $V_2$, because it is merged there, and thus $O$ always receives a theta role from $V_2$. Second, movement of $O$ to an adjunct position within $V_1P$ syntactically ensures that $O$ gets a thematic role from $V_1$, if we assume that an NP receives a theta role from a verb if the NP appears within the verb’s maximal projection. But $O$ is not an argument of $V_1$, because $V_1$ takes a VP as its complement, not $O$ (assuming function-argument application requires syntactic sisterhood). Finally, subsequent movements of $V_1$-i and $V_2$-i derive the correct surface order $S+V_1-V_2+O$ (Collins 2002, for its application to Chinese RVC, see Liu 2014).


(18) Complex head $[S \{O \{V_1, V_2\}]$]

This is because: Participant Sharing requires $V_1$ to assign a theta role to $O$; if we further assume that for an NP to receive a theta role from a verb, the NP has to appear within the verb’s maximal projection, then $O$ cannot receive a theta role from $V_1$ in (18) because $O$ is not within $V_1P$ ($O$ is only within $V_2P$).

The VP complementation syntax in (17) is further supported by behaviors of event modifiers, as noticed by Liu (2014).
(19) S V₁-V₂ O DurP
Zhangsan zuo tian da-kai le men san xiaoshi
Zhangsan yesterday hit-open PRF door three hours
‘Yesterday, Zhangsan opened the door, and the door remained open for 3 hours.’

(20) S DurP V₁-V₂ O
Zhangsan zuo tian san xiaoshi cai da-kai le men
Zhangsan yesterday three hour then hit-open PRF door
‘Yesterday, Zhangsan tried to open the door for three hours, and then, the door got open.’

Sentences (19)–(20) show independent modification: V₁ and V₂ can be independently modified. Specifically, in (19), the post-RVC temporal modifier (for) three hours modifies V₂ open while in (20), the pre-RVC temporal modifier (for) three hours modifies V₁ hit. This supports a VP complementation syntax for RVC, because different modifiers can attach to different verbal phrases.

Finally, simple verbs allow V + Durative Phrase + Object order while RVC does not (21)–(22).

(21) V + DurP + Object
wo (yijing) kai ershi nian jichengche le
I (already) drive twenty years taxi PRF
‘I have (already) driven taxi for twenty years.’ (Lin 2008)

(22) *RVC + DurP + Object
*Zhangsan da-kai le san fenzhong men
Zhangsan hit-open PRF three minutes door
‘Zhangsan has opened the door and the door opened for three minutes.’

This fact is explained by the movement of O in (17), which will always strand the Durative Phrase V₂P-finally. For details, see Liu 2014.

7 Conclusion

We have shown that the object of an RVC has to receive thematic roles from both V₁ and V₂; we call this requirement Participant Sharing and encoded it in the RVC formation rule; we further showed that Participant Sharing is compatible with the fact that both V₁ and V₂ can be independently modified; we finally concluded that these semantic facts ask for a VP complementation syntax for Mandarin RVCs.

References


Some speakers might find (19) not very natural; I think it’s because it violates a well-know (perhaps phonological) ‘Postverbal Constraint’ which prefers only one constituent following the verb in Mandarin Chinese. Thus, moving the object preverbally as in (i) makes (19) perfect, and crucially, the DurP still modifies the V₂ after the object moves, thus not affecting the argument made here.

(i) Zhangsan yesterday BA door hit-open PRF three hours.


Department of Linguistics
Rutgers University
New Brunswick, NJ 0890
markliu@rci.rutgers.edu