Linking Semantics and Syntax in Mandarin Serial Verbs

Jung-hsing Chang
National Chung Cheng University

1. Introduction

In modern Mandarin, both resultative verb constructions (hereafter, RVCs) and serial verb constructions (hereafter, SVCs) can be composed of two lexical verbs. The two verbs of an RVC denote the cause and result relationship, whereas the two verbs of an SVC denote the cause and purpose relationship. This paper discusses RVCs and SVCs in Mandarin within the framework of Role and Reference Grammar (RRG), developed by Van Valin and LaPolla (1997), with the aim of finding out how NP arguments are linked to syntax in these two different constructions. Following van Voorst (1988), Dowty (1991), van Hout (1993), Tenny (1994), Croft (1998), Rosen (1996, 1999), Van Valin and LaPolla (1997:128), Chang (2003), this paper argues that it is the participant role an argument plays in the logical structure, rather than the thematic role an argument plays, that determines how and where the argument is linked to the syntax.

The rest of this paper is divided into the following parts. Section 2 introduces the linking algorithms in RRG; Section 3 discusses the linking of arguments to syntax in RVCs, while Section 4 discusses the linking of arguments to syntax in SVCs. Section 5 is the concluding remarks.

2. Linking algorithms in RRG

In RRG, the linking algorithm works both from the syntax to the semantics and from the semantics to the syntax. It has postulated a single syntactic representation and a single semantic representation and there is a direct mapping between the semantic representation and the syntactic representation.

The semantic representation of a sentence is based on the lexical representation of verbs. Following Dowty (1979), Van Valin and LaPolla (1997) use *states* as primitives, representing the end state of an event. They reformulate Vendler's (1967) four categories, using logical definitions and the primitives BECOME, DO, and CAUSE. The derivational relationships between Vendler's four aspectual categories are given in (1).

(1) Logical structures for different aspectual categories

a. State:
predicate' (x) or (x, y)

b. Achievement:
[BECOME **predicate'** (x) or (x, y)]

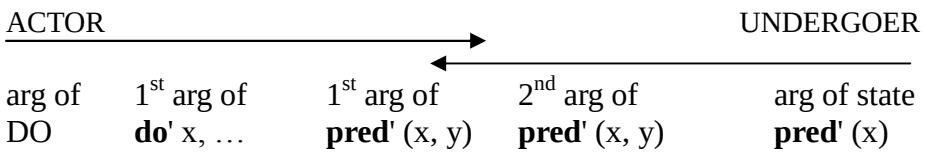
c. Activity:
[**do'** (**predicate'** (x) or (x, y))]

d. Accomplishment:
([**do'** (**predicate'** (x) or (x, y))] CAUSE [BECOME (**predicate'** (y) or (z))])

Van Valin and LaPolla (1997:102) present *constants* (which are normally predicates) in boldface followed by a prime, whereas they present *variable elements* in normal typeface (e.g., x, y, etc.). The elements in both boldface and prime are part of the vocabulary of the semantic metalangauge used in the decomposition; they are not words from any particular human language. The capital letters such as CAUSE and BECOME are modifiers of the predicate in the logical structure. Note that there is no special formal indicator when a predicate is stative. All activity logical structures contain the generalized activity predicate do', which serves as the marker of membership in this class.

There are three steps for linking semantics to syntax. The first step is to constitute the logical structure and then replace the variables in it with referring expressions. The next step is to determine which argument is actor and which is undergoer. This selection is based on the Actor-Undergoer Hierarchy, as given in (2). This hierarchy refers to the argument positions in logical structures. The leftmost argument in the hierarchy will be selected as actor, and the rightmost will be selected as undergoer.

(2) The Actor-Undergoer Hierarchy



[⟶ = increasing markedness of realization of argument as macrorole]

After actor and undergoer have been selected, the third step is to map the arguments

into the syntax. It should be pointed out that RRG adopts a construction-specific conception of grammatical relations; it allows the selection of the appropriate clause structure and the selection of the privileged syntactic argument ('subject') for each construction. The hierarchy governing the selection of privileged syntactic arguments is given in (3). In syntactically accusative constructions, the highest ranking macrorole is default choice, while in syntactically ergative constructions, the lowest ranking macrorole is default choice.

(3) Privileged syntactic argument selection hierarchy:
arg of DO > 1st arg of do' > 1st arg of pred' (x, y) > 2nd arg of pred' (x, y)
> arg of pred' (x)

After the brief introduction of the linking algorithms in RRG, in what follows, I will investigate how these linking algorithms are used to account for the systematic grammatical phenomena of RVCs and SVCs in Mandarin.

3. Mandarin resultative verb constructions

3.1 Different types of Mandarin RVCs

Before discussing the argument linking in RVCs, I will first classify Mandarin RVCs into six different types, based on the following two criteria: (a) how many arguments each of the verbs takes (e.g., transitive or intransitive), and (b) whether the arguments from two different verbs denote the same entity. In the following discussion, I will point out the related syntactic structures associated with different types of RVCs.

Mandarin RVCs involving the two verbs such as *ku-xing* 'cry-awake' can be composed of two intransitive verbs. It is noted that the single argument of V_1 (i.e., *ku* 'cry') and the single argument of V_2 (i.e., *xing* 'awake') can either refer to the same entity (RVC of Type I) or refer to two different entities (RVC of Type II), as shown in (4) and (5), respectively.

(4) RVC in which arg. of V_1 = arg. of V_2 (Type I)

Zhangsan	ku	xing	le.
Zhangsan	cry	awake	LE

'Zhangsan was awake from crying.'

(5) RVC in which arg. of $V_1 \neq$ arg. of V_2 (Type II)

Zhangsan	ku	xing	le	Lisi.
Zhangsan	cry	awake	LE	Lisi

'Lisi was awake from Zhangsan' crying.'

Because the two arguments of the RVC in (4) denote the same entity, only one of the identical arguments is realized in the syntax, i.e., $NP_1+V_1V_2$, in which the argument of V_1 (i.e., NP_1) is represented in the subject position, while the argument of V_2 is not overtly realized in syntactic structure. The arguments of the RVC in (5) do not refer to the same entity; therefore, both arguments must appear in syntactic structure, i.e., $NP_1+V_1V_2+NP_2$, in which the argument of V_1 (i.e., NP_1) is represented in the subject position, whereas the argument of V_2 (i.e., NP_2) is represented in the position immediately following the second verb (i.e., V_2).

It is noted that the RVC of Type II composed of two intransitives such as *ku* 'cry' and *xing* 'awake' in (5) can have a corresponding *Ba*-construction, as shown in (6), but it does not have a corresponding Verb-copying construction, as shown in (7). Note that when there are two identical verbs occurring in a given sentence, it is the first identical verb, rather than the second one that is thought of as a copied verb (see Chang 2003 for related discussion).

(6) *Ba*-construction

Zhangsan	ba	Lisi	ku	xing	le.
Zhangsan	BA	Lisi	cry	awake	LE

'Lisi was awake from Zhangsan's crying.'

(7) Verb-copying construction

*Zhangsan	ku	Lisi	ku	xing	le.
Zhangsan	cry	Lisi	cry	awake	LE

'Lisi was awake from Zhangsan's crying.'

Mandarin RVCs can be composed of a transitive verb (e.g., V_1) and an intransitive verb (e.g., V_2). Such RVCs can be divided into three different groups: (a) the second argument of a transitive verb (V_1) is identical with the single argument of an intransitive verb (V_2) (Type III); (b) the first argument of a transitive verb (V_1) is identical with the single argument of an intransitive verb (V_2) (Type IV), and (c) none of the three NP arguments are identical (Type V). For example, the RVC involving the verb complex *da-po* 'hit-broken', as in (8), is

composed of a transitive verb *da* 'hit', which has two arguments (e.g., *Zhangsan* and *boli* ‘glass’), and an intransitive verb *po* 'broken', which has one argument (e.g., *boli* ‘glass’). In this type of RVC (Type III), the second argument of V_1 is identical with the single argument of V_2. Sentences with this type of RVC have a corresponding *Ba*-construction, as in (9), but they do not have a corresponding Verb-copying construction, as in (10).

(8) RVC in which 2nd arg. of V_1 = arg. of V_2 (Type III)

Zhangsan	da	po	le	poli.
Zhangsan	hit	broken	LE	glass

'Zhangsan hit the glass and as a result the glass was broken.'

(9) *Ba*-construction

Zhangsan	ba	poli	da	po	le.
Zhangsan	BA	glass	hit	broken	LE

'Zhangsan hit the glass and as a result the glass was broken.'

(10) Verb-copying construction

*Zhangsan	da	boli	da	po	le.
Zhangsan	hit	glass	hit	broken	LE

Like the RVC in (8), the RVC in (11) is also composed of a transitive verb and an intransitive verb, but unlike the RVC in (8), the RVC in (11), in which the first argument of V_1 is identical with the single argument of V_2, can have a corresponding Verb-copying construction, as in (12), but it does not have a corresponding *Ba*-construction, as in (13).

(11) RVC in which 1st arg. of V_1 = arg. of V_2 (Type IV)

Zhangsan	he	zui	jiu.
Zhangsan	drink	drunk	wine

'Zhangsan was drunk from drinking wine.'

(12) Verb-copying construction

Zhangsan	he	jiu	he	zui	le.
Zhangsan	drink	wine	drink	drunk	LE

'Zhangsan was drunk from drinking wine.'

(13) *Ba*-construction

*Zhangsan	ba	jiu	he	zui	le.
Zhangsan	BA	wine	drink	drunk	LE

The RVC in (14) is also composed of a transitive verb and an intransitive verb, but in this type of RVC, the two verbs such as *chang* 'sing' and *ya* 'hoarse' have totally three different NP arguments. Since none of these three arguments refer to the same entity, all of them are represented in the syntax. The sentence may involve a Verb-copying structure when the argument of V_2 occurs after the second verb, or it may involve both the *Ba*-structure and the Verb-copying structure at the same time when the argument of V_2 occurs before the first verb, as in (15).

(14) RVC with no identical arguments (Type V)

Zhangsan	chang	ge	chang	ya	le	sangzi.
Zhangsan	sing	song	sing	hoarse	LE	throat

'Zhangsan sang songs and his throat became hoarse as a result.'

(15) RVC with Verb-copying construction + *Ba*-construction

Zhangsan	chang	ge	ba	sangzi	chang	ya	le.
Zhangsan	sing	song	BA	throat	sing	hoarse	LE

'Zhangsan sang songs and his throat became hoarse as a result.'

The last type of RVCs (Type VI) involve two transitive verbs such as *xue* ‘study’ and *hui* ‘know’ and the two arguments of V_1 are the same as those of V_2, as given in (16). This type of RVC has a corresponding *Ba*-construction, but it does not have a corresponding Verb-copying construction, as shown in (17) and (18).

(16) RVC in which 1^{st} arg. of V_1 = 1^{st} arg. of V_2, and 2^{nd} arg. of V_1 = 2^{nd} arg. of V_2

Ta	xue	hui	le	zhe	ge	jishu.	(Type VI)
he	study	know	LE	this	Cl.	skill	

'He learned the skill.'

(17) *Ba*-construction

Ta	ba	zhe	ge	jishu	xue	hui	le.
he	BA	this	Cl.	skill	study	know	LE

'He learned the skill.'

(18) *Ta xue zhe ge jishu xue hui le.[1]
he study this Cl. skill study know LE

I have discussed six types of RVCs according to the number of arguments the given verbs take, and whether the given arguments refer to the same entity. The syntactic distribution of these types of RVCs can be summarized as follows:

type	**Arguments of verbs**	**Surface form**	***Ba*-construction**	**Verb-copying construction**
I	V1(Vi)+V2(Vi) arg. of V_1 = arg. of V_2	*ku-xing* 'cry-awake' $NP_1+V_1V_2$	No	No
II	V1(Vi)+V2(Vi) arg. of $V_1 \neq$ arg. of V_2	*ku-xing* 'cry-awake' $NP_1+V_1V_2+NP_2$	Yes	No
III	V1(Vt)+V2(Vi) 2nd arg. of V_1 = arg. of V_2	*da-po* 'hit-broken' $NP_1+V_1V_2+NP_2$	Yes	No
IV	V1(Vt)+V2(Vi) 1st arg. of V_1 = arg. of V_2	*he-zui* 'drink-drunk' $NP_1+V_1V_2+NP_2$ (rare) $NP_1+V_1+NP_2+V_1V_2$	No	Yes
V	V1(Vt)+V2(Vi) No identical arguments	*chang-ya* 'sing-hoarse' $NP_1+V_1+NP_2+V_1V_2+NP_3$	Yes	Yes
VI	V1(Vt)+V2(Vt) 1st arg. of V_1 = 1st arg. of V_2 2nd arg. of V_1 = 2nd arg. of V_2	*xue-hui* 'study-know' $NP_1+V_1V_2+NP_2$	Yes	No

Table 1: different types of RVCs and syntactic constructions associated with them

3.2 The Linking of arguments in RVCs to syntax

The RVCs in Mandarin are accomplishment verbs; based on the distribution of arguments in different types of RVCs in Table 2, the logical structure of RVCs in Mandarin is proposed as in (19), in which both the do' predicate and the BECOME predicate can be either transitive or intransitive. The arguments with subscripts such as x, y, and z indicate whether the arguments are co-indexed.

[1] The reader may find it possible for this sentence to have a corresponding Verb-copying construction, in addition to the *Ba*-construction, if the noun phrase *zhe ge jishu* 'this skill' is replaced with *Fawen* 'French', as in *Ta xue Fawen xue hui le* (he study French study know LE) 'He learned French.' However, in this case, the NP *Fawen* 'French' is not considered as an endpoint participant.

type	Arguments of V_1		Arguments of V_2	
	1st arg.	**2nd arg.**	**1st arg.**	**2nd arg.**
RVC I	**NP_x**		**NP_x**	
RVC II	NP_x		NP_y	
RVC III	NP_x	**NP_y**	**NP_y**	
RVC IV	**NP_x**	NP_y	**NP_x**	
RVC V	NP_x	NP_y	NP_z	
RVC VI	**NP_x**	**NP_y**	**NP_x**	**NP_y**

Table 2: Distribution of the arguments in RVCs

(19) ([**do**' (predicate' (x) or (x, y))] CAUSE [BECOME (**predicate**' (x) or (z) or (y) or (x, y))]).

As mentioned in Section 2, the three steps for linking semantics to syntax are: (a) to constitute the logical structure and then replace the variables in it with referring expressions; (b) to determine which argument is actor and which is undergoer, based on the Actor-Undergoer Hierarchy, and (c) to link the arguments into the syntax.

After the logical structure of RVCs is constituted and the variables in it are replaced with referring expressions, we need to determine which argument is actor and which is undergoer. The actor and undergoer are selected according to the Actor-Undergoer Hierarchy, proposed by Van Valin and LaPolla (1997), as given in (2).

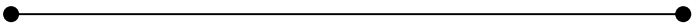
As previously discussed, an RVC comprising a transitive verb and an intransitive verb is allowed to have three distinct or two sharing NP arguments. When two NP arguments refer to the same entity, one is syntactically expressed while the other is not. To account for which NP argument is syntactically expressed and which is not, I suggest the Reference-tracking Hierarchy, as in (20). It is suggested that when the two arguments refer to the same entity, only the NP argument with the macrorole in a higher hierarchy is syntactically expressed. The unrealized NP argument is bound to the NP with the macrorole in a higher hierarchy. (The macroroles with 1 or 2 indicate whether the given macrorole is denoted by V_1 or V_2.)

(20) The Reference-tracking Hierarchy for Mandarin RVCs:
$Actor_1 > Actor_2 > Undergoer_2 > Undergoer_1$

As for the linking of arguments to the subject and the object, according to van Voorst's

(1988) analysis, event structure is represented as a line bounded at one end by a point that marks the origination (initiation) of the event and at the other by a point that marks the event's termination, as shown in (21). Van Voorst identifies the initiation point with 'the object of origin or actualization' (i.e., the participant that is responsible for launching or effecting the event), and identifies the endpoint with 'the object of termination' (i.e., the participant that determines when the event is complete).

(21) object of origin/actualization event object of termination



subject direct object

Croft (1998:51) also suggests that subject and object linking are determined by what participant is present at the edges of the profiled part of the event in the event frame. That, is, the participant linked to subject is at the beginning of its span of the causal segment, whereas the participant linked to object is at the end of its span. Following van Voorst (1988) and Croft (1998), I propose that the macrorole linked to subject is at the beginning of the causal chain, while the macrorole linked to object is at the endpoint of its span. The macrorole at the beginning of the causal chain for subject complies with Van Valin and LaPolla's (1997) privileged syntactic argument [PSA] selection: the highest ranking macrorole is default choice. In this paper it is suggested that the macrorole $Actor_1$, which participates in the initiation of the causal chain, is the privileged syntactic argument, whereas the macrorole $Undergoer_2$, which participates in the endpoint of the causal chain, the default choice for the direct core argument.

From the observation of the surface forms in different types of Mandarin RVCs, the constructional template for Mandarin RVCs is given in (22).

(22) Contructional template for Mandarin RVCs

SUBJ-NP Copied V+OBJ-NP *Ba*+OBJ-NP V_1+V_2 OBJ-NP

The constructional template in (22) has shown that there are four different positions for linking the arguments of RVCs: (a) the subject position, (b) the position immediately following a copied verb, (c) the position immediately following the word *ba*, and (d) the position immediately following the second verb. The linking principles, as proposed in (23), account for how the arguments in Mandarin RVCs are linked to syntax. The linking system for Mandarin RVCs is suggested as in (24).

(23) The Linking Principles for RVCs in Mandarin:

Principle A: The $Actor_1$ is linked to the subject position.

Principle B: The $Undergoer_2$ is linked to the position immediately following the second verb, or the position immediately following the word *ba*.

Principle C: The $Undergoer_1$ is linked to the position immediately following a copied verb.

(24) The linking system for RVCs in Mandarin

CONSTRUCTIONAL TEMPLATE &
SYNTACTIC FUNCTIONS: PSA Copied V+OBJ *Ba*+OBJ V_1+V_2 OBJ

REFERENCE TRACKING HIERARCHY:

$Actor_1 > Actor_2 > Undergoer_2 > Undergoer_1$

[When two arguments refer to the same entities in logical structure, only the NP argument with the macrorole in a higher hierarchy is syntactically expressed.]

SEMANTIC MACROROLES: Actor Undergoer

ACTOR ⟶ UNDERGOER ⟵

arg of DO	1st arg of **do**' x, …	1st arg of **pred**' (x, y)	2nd arg of **pred**' (x, y)	arg of state **pred**' (x)

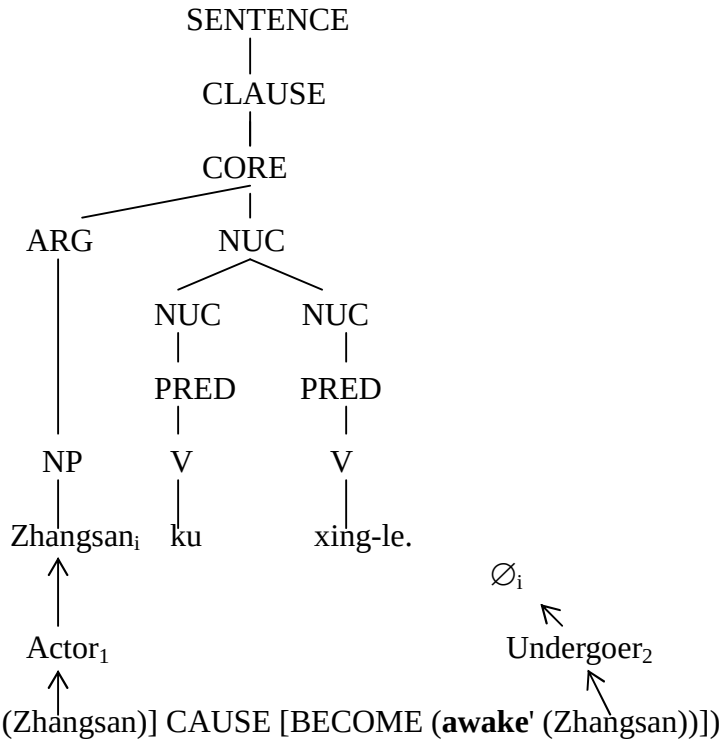
[⟶ = increasing markedness of realization of argument as macrorole]

Argument positions in LOGICAL STRUCTURE

As already pointed out by Van Vanlin and LaPolla (1997:531), the RVCs in Mandarin involve a nuclear juncture, in which a single core contains multiple nuclei. The RVC of Type I, as in (25) is composed of two intransitive verbs, and the two NP arguments refer to the same entity. To account for how the arguments are linked to syntax, we first constitute the logical structure of the RVC involving the verbs such as *ku-xing* 'cry-awake'; then, we

replace the variables in the logical structure with referring expressions and select a macrorole for each NP arguments in the logical structure (e.g., $Actor_1$ and $Undergoer_2$), following the Actor-Undergoer Hierarchy in (2). Because $Actor_1$ and $Undergoer_2$ refer to the same entity, only $Actor_1$ can be syntactically expressed, while $Undergoer_2$ is not, because $Actor_1$ is higher than $Undergoer_2$ in the hierarchy, following the Reference-tracking Hierarchy in (20). $Actor_1$ (i.e., *Zhangsan*) is the default linking for the subject position, following the linking principle A, given in (23).

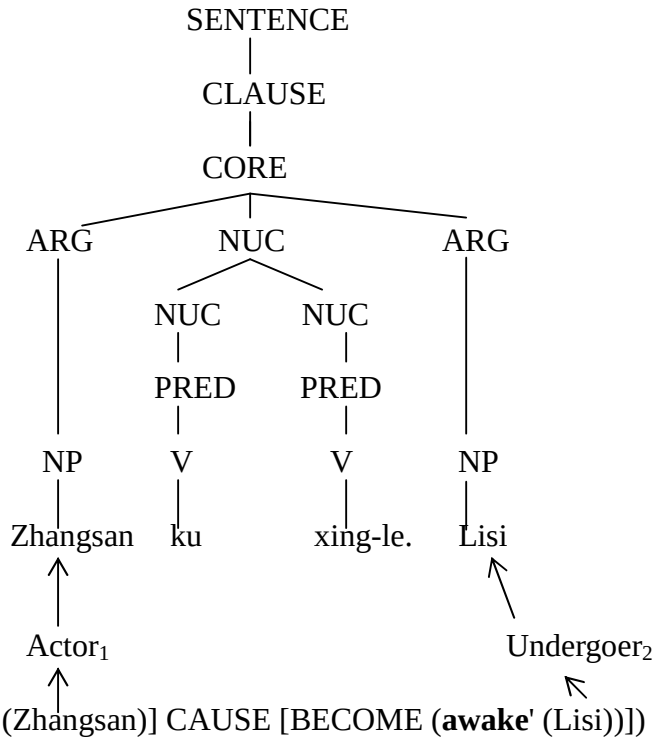
(25) Zhangsan ku xing le.
Zhangsan cry awake LE
'Zhangsan was awake from crying.'



Though the Type II RVC in (26) is also composed of two intransitive verbs, the two arguments are not identical. Therefore, both arguments can be syntactically expressed. The argument of V_1 (i.e., *Zhangsan*) is selected as the $Actor_1$ and the argument of V_2 (i.e., *Lisi*) is selected as the $Undergoer_2$. According to the linking principles A and B, given in (23), $Actor_1$ (i.e., *Zhangsan*) is linked to the subject position, whereas $Undergoer_2$ (i.e., *Lisi*) can be linked to either (a) the position immediately following the second verb, as shown in (26), or (b) the

position immediately following the word *ba*, as given in (27a). The structure in (27b) represents the structure of sentence (27b).

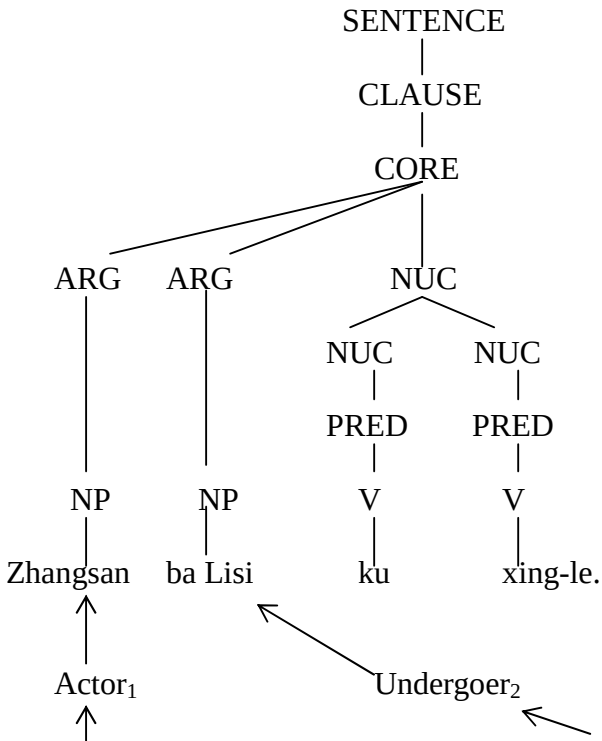
(26) Zhangsan ku xing le Lisi.
Zhangsan cry awake LE Lisi
'Lisi was awake from Zhangsan' crying.'



([do' (**cry**' (Zhangsan)] CAUSE [BECOME (**awake**' (Lisi))])

(27) a. Zhangsan ba Lisi ku xing le.
Zhangsan BA Lisi cry awake LE
'Lisi was awake from Zhangsan's crying.'

b.



([do' (**cry**' (Zhangsan)] CAUSE [BECOME (**awake**' (Lisi))])

In the RVC of Type III, as given in (28), the first verb contains two arguments, whereas the second verb contains one. The argument of V_2 refers to the same entity as the second argument of V_1. The first argument of V_1 is selected as $Actor_1$, the second argument of V_1 is selected as $Undergoer_1$, whereas the argument of V_2 is selected as $Undergoer_2$. Because $Undergoer_1$ and $Undergoer_2$ refer to the same entity, $Undergoer_2$, which is higher than the $Undergoer_1$ in the hierarchy, is syntactically expressed, following the Reference-tracking Hierarchy. According to the linking principles, given in (23), the $Actor_1$ (i.e., *Zhangsan*) is linked to the subject position, while the $Undergoer_2$ (i.e., *poli* 'glass') can be linked to the position immediately following the second verb, as in (28), or the position immediately following the word *ba*, as in (29).

(28) Zhangsan da po le poli.
Zhangsan hit broken LE glass
'Zhangsan hit the glass and as a result the glass was broken.'

(29) Zhangsan ba poli da po le.
Zhangsan BA glass hit broken LE
'Zhangsan hit the glass and as a result the glass was broken.'

The RVC of Type IV, as given in (30), involves three arguments denoted by a transitive verb and an intransitive verb. The first argument of V_1 (i.e., *Zhangsan*) is selected as the $Actor_1$, the second argument of V_1 (i.e., *jiu* 'wine') is selected as the $Undergoer_1$, while the argument of V_2 (i.e., *Zhangsan*) is selected as the $Undergoer_2$. It is noted that the $Actor_1$ and the $Undergoer_2$ refer to the same entity; therefore, the $Actor_1$, which is higher than the $Undergoer_2$ in the Reference-tracking Hierarchy, is syntactically expressed. Based on the linking principles in (23), the $Actor_1$ is linked to the subject position whereas the $Undergoer_1$ is linked to the position immediately following a copied verb (here, *he* 'drink'), as (30) shows. It should be pointed out that it seems that the $Undergoer_1$ (i.e., *jiu* 'wine') can also occur in the position immediately following the second verb, as in (31a), but such kind of example is rare. The $Undergoer_1$ can occur in the position immediately following the second verb of an RVC only when it is non-referential.[2] Therefore, the replacement of the non-referential NP *jiu* 'wine' with other NPs such as *pijiu* 'beeir' or *na ping jiu* (that Cl. wine) 'that bottle of wine', etc. is not possible, as in (31b).

(30) Zhangsan he jiu he zui le.
Zhangsan drink wine drink drunk LE
'Zhangsan was drunk from drinking wine.'

(31) a. Zhangsan he zui jiu.
Zhangsan drink drunk wine
'Zhangsan was drunk from drinking wine.'

b. *Zhangsan he zui na ping jiu.
Zhangsan drink drunk that Cl. wine
'Zhangsan was drunk from drinking that bottle of wine.'

[2] In English, NP arguments such as *beer* in activity expression such as *drink beer* do not have definite reference and are called *inherent arguments* in Van Valin and LaPolla (1997). They cannot be interpreted as having any specific reference, and are treated quite differently from normal, referential arguments in two different ways: First, they can be freely omitted in English and in many other languages, and second, they are often incorporated into the verb (e.g., *She's gone beer drinking*) (Van Valin and LaPolla 1997:122-123).

The RVC of Type V in (32) involves three arguments denoted by a transitive verb and an intransitive verb. Since none of these three arguments refer to the same entity, all of them are represented in the syntax. The first argument of V_1 (i.e., *Zhangsan*) is selected as $Actor_1$; thus, it is linked to the subject position. The second argument of V_1 (i.e., *ge* 'song') is selected as $Undergoer_1$; thus, it is linked to the position immediately following a copied verb (here, *chang* 'sing'). The argument of V_2 (i.e., *sangzi* 'throat') is selected as $Undergoer_2$; thus, it can be linked to the position after the second verb, as in (32), or to the position immediately following the word *ba*, as in (33). The linking of $Undergoer_1$ and $Undergoer_2$ to syntax explains why an RVC may involve both the Verb-copying structure and the *Ba*-structure at the same time.

(32) Zhangsan chang ge chang ya le sangzi.
Zhangsan sing song sing hoarse LE throat
'Zhangsan sang songs and his throat became hoarse as a result.'

(33) Zhangsan chang ge ba sangzi chang ya le.
Zhangsan sing song BA throat sing hoarse LE
'Zhangsan sang songs and his throat became hoarse as a result.'

The RVC of Type VI, as in (34), is composed of two transitive verbs of *xue* 'study' and *hui* 'know'; therefore, there are four arguments in a given RVC. Following the Actor-Undergoer Hierarchy, the first argument of V_1 is selected as the $Actor_1$, the second argument of V_1 is selected as the $Undergoer_1$, the first argument of V_2 is selected as the $Actor_2$, while the second argument of V_2 is selected as the $Undergoer_2$. Note, however, that the Actor1 and the $Actor_2$ refer to the same entity, while the $Undergoer_1$ and the $Undergoer_2$ refer to the same entity. Following Reference-tracking Hierarchy, the $Actor_2$ and the $Undergoer_1$ are not expressed. When the $Actor_1$ is linked to the subject position and the $Undergoer_2$ is linked to the position immediately following the second verb, we have sentence (34), while when the $Undergoer_2$ is linked to the position immediately following the word *ba*, we have sentence (35).

(34) Ta xue hui le zhe ge jishu.
he study know LE this Cl. skill
'He learned the skill.'

(35) Ta ba zhe ge jishu xue hui le.
he BA this Cl. skill study know LE
'He learned the skill.'

3.3. Summary

In this section, I have shown how the complex linguistic phenomena of RVCs in Mandarin are accounted for in terms of the linking algorithms in RRG. I have proposed the Reference-tracking Hierarchy to illustrate which argument is syntactically expressed and which is not, when the two NP arguments refer to the same entity, and the linking principles to account for different syntactic patterns associated with the Mandarin RVCs.

In the sections that follow, I will account for the complex phenomena in Mandarin SVCs and show how these phenomena are accounted for in terms of the linking algorithms in RRG.

4. Mandarin serial verb constructions

4.1 Different types of Mandarin SVCs

Following the classification of Mandarin RVCs in Section 3.1, this section will categorize Mandarin SVCs with the cause-purpose relationship into different groups according to how many arguments each of the two verbs takes and whether the arguments denoted by the two verbs can refer to the same entity. It should be pointed out that unlike RVCs, SVCs do not have a corresponding counterpart of either the *Ba*-construction or the Verb-copying construction.

Mandarin SVCs may consist of a transitive verb, as V_1 and an intransitive, as V_2. There are two different syntactic representations for this type of SVCs. If the single argument of V_2 refers to the same entity as the first argument of V_1 (Type I), as shown in (36), the given SVC is represented as $NP_1+V_1+NP_2+V_2$, in which there is an NP argument intervening the two verbs. But if none of these arguments refer to the same entity (Type II), the given SVC is represented as $NP_1+V_1+NP_2+gei+NP_3+V_2$, in which the argument of V_2 is placed immediately before the second verb and is marked by *gei* ‘give/for/to’, as shown in (37). Note, however, that the SVC denoting the cause-purpose relationship in which the argument of V_2 is identical with the second argument of V_1 is not found.

(36) SVC in which 1st arg. of V_1 = arg. of V_2 (Type I)

Ta	pu	maotan	shuijiao.
He	spread.out	blanket	sleep

'He spread out the blanket in order to sleep.'

(37) SVC with no identical arguments (Type II)

Ta	pu	maotan	gei	women	shuijiao.
He	spread.out	blanket	GEI	we	sleep

'He spread out the blanket for us to sleep.'

Mandarin SVCs can be composed of two transitive verbs, thus, involving totally four arguments. Such RVCs can be divided into four different groups: (a) the first argument of V_1 refers to the same entity as the first argument of V_2, while the second argument of V_1 refers to the same entity as the second argument of V_2 (Type III); (b) the second argument of V_1 refers to the same entity as the second argument of V_2, but the first argument of V_1 and the first argument of V_2 refer to two different entities (Type IV); (c) the first argument of V_1 refers to the same entity as the first argument of V_2, but the second argument of V_1 and the second argument of V_2 denote different entities (Type V), and (d) none of the arguments denoted by the two verbs refer to the same entity (Type VI), as exemplified in (38)-(41).

(38) SVC in which 1st arg. of V_1 = 1st arg. of V_2; 2nd arg. of V_1 = 2nd arg. of V_2 (Type III)

Ta	dao	jiu	he.
he	pour	wine	drink

'He poured wine to drink.'

(39) SVC in which 1st arg. of $V_1 \neq$ 1st arg. of V_2; 2nd arg. of V_1 = 2nd arg. of V_2 (Type IV)

Ta	dao	jiu	gei	women	he.
he	pour	wine	GEI	we	drink

'He poured wine for us to drink.'

(40) SVC in which 1st arg. of V_1 = 1st arg. of V_2; 2nd arg. of $V_1 \neq$ 2nd arg. of V_2 (Type V)

Ta	tuo	wazi	xi	jiao.
He	take.off	socks	wash	feet

'He took of his socks to wash his feet.'

(41) SVC with no identical arguments (Type VI)

Ta	tuo	wazi	gei	women	xi	jiao.
He	take.off	socks	GEI	we	wash	feet

'He took of his socks for us to wash his feet.'

The SVC of Type III, in which the arguments denoted by V_1 are identical with the arguments denoted by V_2, is represented as $NP_1+V_1+NP_2+V_2$, but if the first argument of V_1 does not have the same entity as that of V_2, the given SVC is represented as $NP_1+V_1+NP_2+gei+NP_3+V_2$ (Type IV). However, if the SVC in which the first arguments of both V_1 and V_2 refer to the same entity, while the second arguments denoted by both V_1 and V_2 does not, then the given SVC will be represented as $NP_1+V_1+NP_2+V_2+NP_3$ (Type V). When none of the arguments denoted by two transitive verbs of an SVC refer to the same entity, the syntactic representation of this given SVC is $NP_1+V_1+NP_2+$*gei*$+NP_3+V_2+NP_4$ (Type VI).

I have discussed six types of SVCs according to the number of arguments the given verbs take, and whether the given arguments refer to the same entity. The syntactic representations of different types of SVCs can be summarized as in Table 3.

type	**Arguments of verbs**	**Surface form**
I	V1(Vt)+V2(Vi) 1st arg. of V_1 = arg. of V_2	*pu-shuijiao* 'spread.out-sleep' $NP_1+V_1+NP_2+V_2$
II	V1(Vt)+V2(Vi) 1st arg. of $V_1 \neq$ arg. of V_2	*pu-shuijiao* 'spread.out-sleep' $NP_1+V_1+NP_2+$*gei*$+NP_3+V_2$
III	V1(Vt)+V2(Vt) 1st arg. of V_1 = 1st arg. of V_2 2nd arg. of V_1 = 2nd arg. of V_2	*dao-he* 'pour-drink' $NP_1+V_1+NP_2+V_2$
IV	V1(Vt)+V2(Vt) 1st arg. of $V_1 \neq$ 1st arg. of V_2 2nd arg. of V_1 = 2nd arg. of V_2	*dao-he* 'pour-drink' $NP_1+V_1+NP_2+$*gei*$+NP_3+V_2$
V	V1(Vt)+V2(Vt) 1st arg. of V_1 = 1st arg. of V_2 2nd arg. of $V_1 \neq$ 2nd arg. of V_2	*tuo-xi* 'take.off-wash' $NP_1+V_1+NP_2+V_2+NP_3$
VI	V1(Vt)+V2(Vt) 1st arg. of $V_1 \neq$ 1st arg. of V_2 2nd arg. of $V_1 \neq$ 2nd arg. of V_2	*tuo-xi* 'take.off-wash' $NP_1+V_1+NP_2+$*gei*$+NP_3+V_2+NP_4$

Table 3: SVCs and their syntactic representations

4.2 The linking of arguments in SVCs to syntax

SVCs in Mandarin can be composed of a transitive verb and an intransitive verb, or two transitive verbs. When the second verb of an SVC is intransitive, the argument of V_2 can refer

to the same entity as the first argument of V_1, or it can refer to the entities different from the two arguments of V_1, but it cannot refer to the same entity as the second argument of V_1. However, if the second verb is transitive, both arguments of V_2 can refer to the same entities as those of V_1, or the second argument of V_2 is identical with the second argument of V_1, or the first argument of V_2 is identical with the first argument of V_1. Based on the distribution of arguments in different types of SVCs in Table 4, the logical structure of SVCs in Mandarin is proposed as in (42). Since in an SVC the first event is done for the purpose of achieving the second event, the logical structure of an SVC is thought of as involving a do' predicate and an INTENTION predicate.

type	**Arguments of V_1**		**Arguments of V_2**	
	1st arg.	**2nd arg.**	**1st arg.**	**2nd arg.**
SVC I	**NP_x**	NP_y	**NP_x**	
SVC II	NP_x	NP_y	NP_z	
SVC III	**NP_x**	**NP_y**	**NP_x**	**NP_y**
SVC IV	NP_x	**NP_y**	NP_z	**NP_y**
SVC V	**NP_x**	NP_y	**NP_x**	NP_z
SVC VI	NP_x	NP_y	NP_z	NP_w

Table 4: Distribution of the arguments in SVCs

(42) ([**do**' (**predicate**' (x, y))] CAUSE [INTENSION (**predicate**' (x) or (y) or (z) or (x, y))]).

After the logical structure of an SVC is constituted and the variables are replaced with referring expressions, the arguments are selected for macroroles, according the Actor-Undergoer Hierarchy, given in (2). The macroroles with the subscripts such as 1 and 2 (e.g., $Actor_1$, $Undergoer_1$, $Actor_2$, and $Undergoer_2$) indicate whether the given macrorole is denoted by V_1 or V_2.

In addition, as discussed in the RVC cases, when there are two identical arguments, one of the arguments is not syntactically expressed. I believe the Reference-tracking Hierarchy for SVCs in Mandarin, as given in (43) can account for which argument is syntactically expressed and which one is not. The Reference-tracking Hierarchy states that when two macroroles refer to the same entity in logical structure, only the macrorole in a higher hierarchy is syntactically expressed.

(43) The Reference-tracking Hierarchy for Mandarin SVCs
$Actor_1 > Actor_2 > Undergoer_1 > Undergoer_2$

Note that the Reference-tracking Hierarchy for Mandarin SVCs is different from that for Mandarin RVCs, given in (20) is that the $undergoer_1$ is higher than the $Undergoer_2$ in the Reference-tracking Hierarchy for Mandarin SVCs, while in the Reference-tracking Hierarchy for Mandarin RVCs the $Undergoer_2$ is higher than the $Undergoer_2$. In RVCs, the $Undergoer_2$ is considered as the endpoint participant, but in SVCs, the $Undergoer_1$ is conceived of as an endpoint participant, because only when the action denoted by V_1 is completed can the action denoted by V_2 takes place. The beginning of the second event implies the completion of the first event; therefore, the second argument of V_1 is thought of as an endpoint participant.

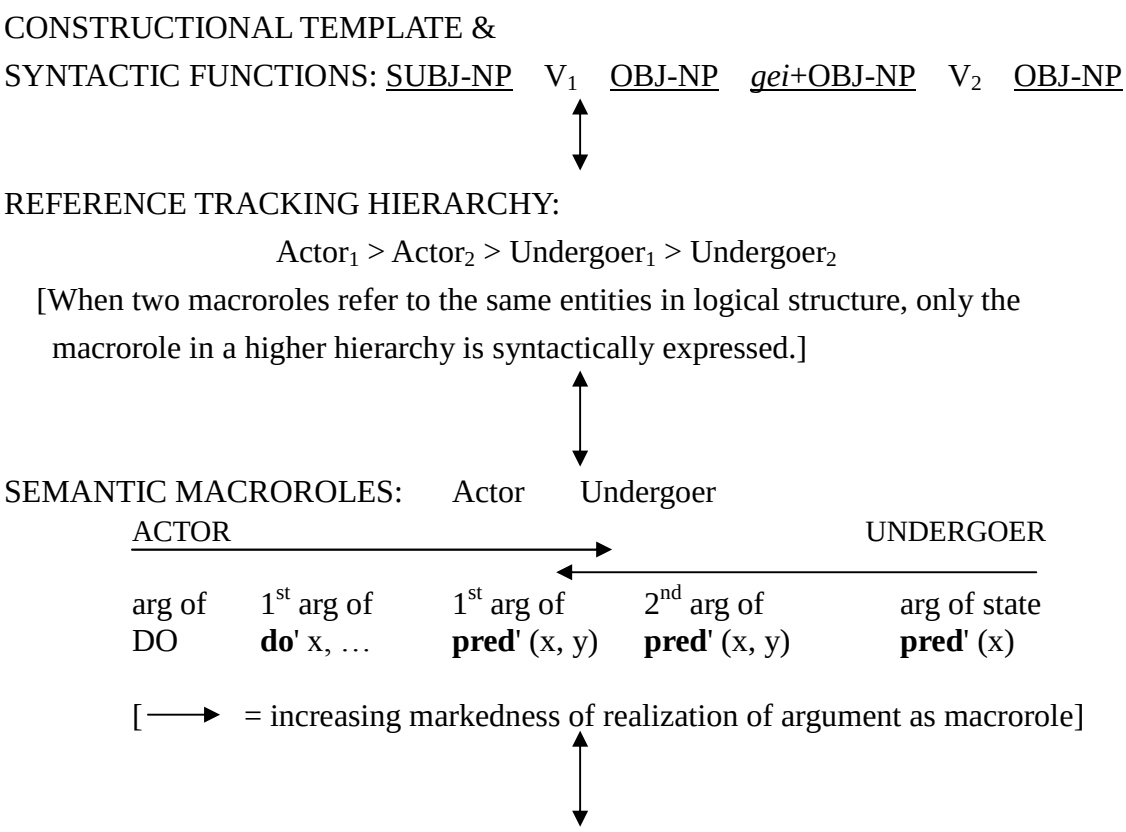
From the observation of the surface forms in different types of Mandarin SVCs, the constructional template for Mandarin SVCs is given in (44).

(44) Contructional template for Mandarin RVCs
SUBJ-NP V_1 OBJ-NP *gei*+OBJ-NP V_2 OBJ-NP

The constructional template in (44) has shown that there are four different positions for linking the arguments of SVCs: (a) the subject position, (b) the position immediately following the first verb, (c) the position immediately following the word *gei*, and (d) the position immediately following the second verb. The linking principles, as proposed in (45), account for how the arguments in Mandarin SVCs are linked to syntax. The linking system for Mandarin RVCs is suggested as in (46).

(45) The Linking Principles for SVCs in Mandarin:
Principle A: $Actor_1$ is linked to the subject position.
Principle B: $Undergoer_1$ is linked to the position immediately following the first verb.
Principle C: $Actor_2$ is linked to the position immediately following the word *gei*.
Principle D: $Undergoer_2$ is linked to the position immediately following the second verb.

(46) The linking system for SVCs in Mandarin

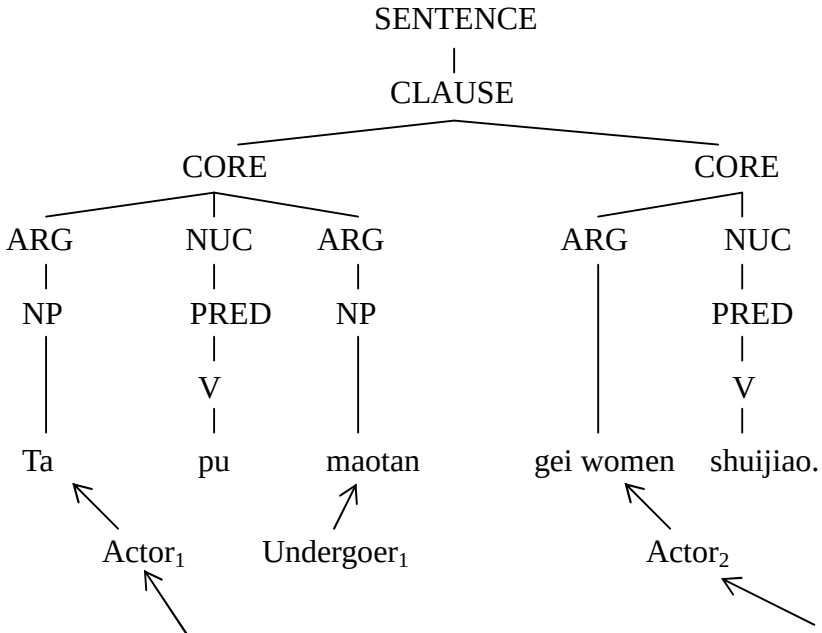


The SVCs in Mandarin involve a core juncture, in which a single clause has multiple cores. To account for how arguments are linked to syntax in the SVC of Type I, given in (47), the logical structure is constituted and the variables are replaced with referring expressions. The first argument of V_1 (i.e., *ta* 'he') is selected as $Actor_1$, the second argument of V_1 (i.e., *maotan* 'blanket') is selected as $Undergoer_1$, while the argument of V_2 (i.e., *ta* 'he') is selected as $Actor_2$. Since the $Actor_1$ and the $Actor_2$ refer to the same entity, only the $Actor_1$ is syntactically expressed, following the Reference-tracking Hierarchy, given in (43). Based on the linking principles proposed in (45), $Actor_1$ is linked to the subject position, whereas $Undergoer_1$ is linked to the position immediately following the first verb. If $Actor_1$ and $Actor_2$ do not refer to the same entity, as in the SVC of Type II, then both macroroles are linked to syntax. The $Actor_2$ is linked to the position immediately following the word *gei*, as (48a) shows. The structure in (48b) illustrates the linking of these two macroroles.

(47) Ta pu maotan shuijiao.
He spread.out blanket sleep
'He spread out the blanket in order to sleep.'

(48) a. Ta pu maotan gei women shuijiao.
He spread.out blanket GEI we sleep
'He spread out the blanket for us to sleep.'

b.



([**do**' (**spread.out**' (ta, maotan))] CAUSE [INTENSION (**sleep**' (women))]).

The SVC of Type III, as given in (49) is composed of two transitive verbs and the first argument of V_1 (i.e., *ta* 'he'), selected as $Actor_1$, is identical with the first argument of V_2, as selected as $Actor_2$, whereas the second argument of V_1 (i.e., *jiu* 'wine'), selected as $Undergoer_1$, is identical with the second argument of V_2, selected as $Undergoer_2$. Because of the Reference-tracking Hierarchy ($Actor_1$ > $Actor_2$ > $Undergoer_1$ > $Undergoer_2$), the $Actor_2$ and the $Undergoer_2$ are not realized in the syntax. Following the linking principles in (45), the $Actor_1$ is linked to the subject position, while the $Undergoer_2$ to the position immediately following the second verb. But if the $Actor_1$ and the $Actor_2$ do not refer to the same entity, as in the SVC of Type IV, given in (50), then the $Actor_2$ will be linked to the position immediately following the word *gei*.

(49) Ta dao jiu he.
he pour wine drink
'He poured wine to drink.'

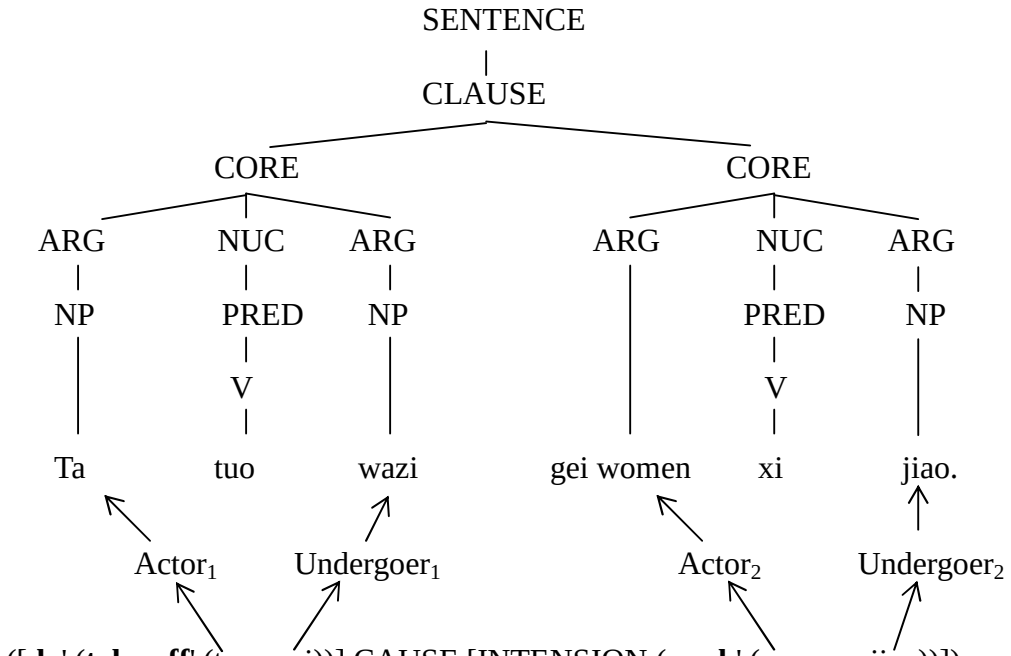
(50) Ta dao jiu gei women he.
he pour wine GEI we drink
'He poured wine for us to drink.'

Like the SVC of Type V, given in (51), the SVC of Type VI, given in (52a) is composed of two transitive verbs, involving totally four arguments. The arguments are selected as the $Actor_1$, the $Actor_2$, the $Undergoer_1$, and the $Undergoer_2$, respectively. In the SVC of Type VI, none of the macroroles refer to the same entity; therefore, all of the macroroles are realized in syntax. Following the linking principles in (45), the $Actor_1$ (i.e., *ta* 'he') is linked to the subject position; the $Undergoer_1$ (i.e., *wazi* 'socks') to the position immediately following the first verb; the $Actor_2$ (i.e., *women* 'we') to the position immediately following the word *gei*, while the $Undergoer_2$ (i.e., *jiao* 'feet') to the position immediately following the second verb, as shown in the structure of (52b). However, if the $Actor_2$ is identical with the $Actor_1$, as in the SVC of Type V, it will not be overtly expressed in the syntax, as shown in (51).

(51) Ta tuo wazi xi jiao.
He take.off socks wash feet
'He took of his socks to wash his feet.'

(52) a. Ta tuo wazi gei women xi jiao.
He take.off socks GEI we wash feet
'He took off his socks for us to wash his feet.'

b.



([**do**' (**take.off**' (ta, wazi))] CAUSE [INTENSION (**wash**' (women, jiao))]).

4.3 Summary

In this section, I have proposed the linking principles to account for how arguments are linked to syntax in Mandarin SVCs within the framework of RRG. It has been shown that the Reference-tracking Hierarchy is different from that for RVCs, and that in different constructions, the macroroles are linked to different syntactic positions in the constructional templates.

5. Conclusion

This paper has accounted for the complex grammatical phenomena in Mandarin RVCs and SVCs when they are associated with the *Ba*-construction, the Verb-copying construction, or the *Gei*-construction, in terms of the linking algorisms in RRG. In addition, it has proposed that the semantic macrorole of Undergoer should be divided into Undergoer_1 (the macrorole undergoes the action) and Undergoer_2 (the macrorole participates in the endpoint of the causal chain), and that when there are two identical macroroles in a logical structure, the marcrorole in a higher hierarchy is syntactically expressed while the other is not syntactically realized according to the Reference-tracking Hierarchy in question.

The study of this research has shown that in Mandarin RVCs, Actor_1 is linked to the subject position, Undergoer_1 is linked to the position immediately following a copied verb,

while Undergoer$_2$ is linked to the position immediately following the word *ba*. However, in Mandarin SVCs, Actor$_1$ is linked to the subject position, the Undergoer$_1$ is linked to the position immediately following the first verb, Actor$_2$ is linked to the position immediately following the word *gei*, whereas Undergoer$_2$ is linked to the position immediately following the second verb.

References

Chang, Jung-hsing. 2003. Event structure and argument linking in Chinese. Language and Linguistics, vol. 4.2:317-351.

Croft, William. 1998. Event structure and argument linking. *The Projection of Arguments: Lexical and Compositional Factors*, ed. by Miriam Butt and Wilhelm Geuder, 21-63. Stanford: CSLI Publications.

Dowty, David R. 1979. *Word Meaning and Montague Grammar: The Semantics of Verbs and Times in Generative Semantics and in Montague's PTQ*. Dordrecht: Reidel.

_____. 1991. Thematic proto-roles and argument selection. *Language* 67:547-619.

Rosen, Sara Thomas. 1996. Events and verb classification. *Linguistics* 34:191-223.

_____. 1999. The syntactic representation of linguistic events. Glot International 4.2:3-11.

Tenny, Carol L. 1994. *Aspectual Roles and the Syntax-semantics Interface*. Dordrecht: Kluwer.

Van Hout, A. 1993. Projection based on event structure. *Lexical specification and lexical insertion*, ed. by P. Coopmans, M. Everaert, and J. grimshaw. Hillsdale: Lawrence Erlbaum Associates.

Van Valin, Robert D., and Randy J. LaPolla. 1997. *Syntax: Structure, Meaning and Function*. Cambridge: Cambridge University Press.

van Voorst, Jan G. 1988. *Event Structure*. Amsterdam: John Benjamins.

Vendler, Zeno. 1967. *Linguistics in Philosophy*. Ithaca: Cornell University Press.

Graduate Institute of Linguistics
National Chung Cheng University
Min-Hsiung, Chia-Yi 621
Taiwan, R.O.C.
lngjhc@ccu.edu.tw