A Dynamic Syntax Account of Argument Realization in Mandarin

Wenshan Li

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In memory of Madame Jinrong Chen

盖人心之灵．莫不有知．而天下之物．莫不有理．

惟于理有未穷．故其知有不尽也．《大学》

There are no human minds that do not have

knowledge; there are no things which exist that

do not observe principles. As not every principle

is uncovered, there is no limit to knowledge.

(*The Great Learning*)

Abstract

Natural languages are systems of forms and meanings; language understanding and language production are processes of establishing mappings between linguistic forms and meanings. The principles and rules governing the mapping between semantic roles and syntactic positions have long been a fundamental topic in contemporary linguistics. Such a mapping is usually called argument realization, argument mapping or argument linking. On the basis of the previous language-specific and crosslinguistic researches on this issue, this thesis picks out two tasks. One is the empirical task of the investigating the principles and rules governing the mapping between semantic roles and linear syntactic positions in Mandarin Chinese. The other is the theoretical task of the exploration of how argument realization principles and rules play their roles in the live temporal linear comprehension and production of sentences.

On the empirical side, this thesis mainly investigates the phenomenon of argument alternation, that is, the non-one-to-one mapping between semantic roles and syntactic forms (linear positions) in Mandarin and argues that alternative syntactic forms in which semantic roles are realized are not arbitrary but semantically motivated. More specifically, it proposes that alternative patterns of argument realization encode different types of events.

This thesis concentrates on three major cases of argument alternation. The first is the argument alternation in the resultative verb construction (RVC) that involves two verbs and expresses a complex event consisting of a first (activity) subevent and a second (resultative) subevent. The arguments of the two verbs are mapped onto the subject and the object alternatively and the argument sharing between the verbs results from syntactically constrained pragmatic inference. The argument realization

principles and rules of RVC are used to account for two puzzling cases of argument alternation in Mandarin, i.e. the locative alternation and the agentive alternation. This account of inverse argument realizations has the implication that argument alternations are semantically motivated rather than the result of arbitrary syntactic operation.

To facilitate the discussion of how different semantic representations arise in different process of comprehension, I adopt Dynamic Syntax (Kempson et al 2001; Cann et al 2005) which provides a package of working hypotheses about human language grammars and the formal tools for representing how grammars work. It is hypothesized in Dynamic Syntax that the grammar of a natural language is a set of constraints over language comprehension; sentences are understood and produced in context through left-to-right word-by-word parsing processes. Parsing processes are driven by the axiomatic requirement of establishing complete logical forms that can be enriched to full propositions. Such processes have the characteristic of semantic underspecification, including underspecified semantic relationships and underspecified semantic contents; semantic underspecification can and must be updated through non-demonstrative inference implemented in linguistic and non-linguistic contexts.

Using the framework I hypothesize that in RVC constructions the first verb provides a condition on the sort of event expressed by the second verb, encoding this in terms of event semantics. It is argued that only the argument of the latter are required to be realized in the string (or be contextually strongly determined) through pro-drop. Those of the activity predicate, however, are inferred through pragmatic means given the arguments that are realized. This directly accounts for the attested patterns of argument realization in RVC and explain the apparent gaps.

This analysis is extended to locative and agentive inversion constructions where it is hypothesized that there is null resultative predicate that explains why a non-agent can be realized as subject, even in the presence of a more agentive noun phrase in the string.

This thesis thus maintains the hypothesis that the mapping between semantic roles and syntactic positions is direct though not one-to-one. Although there is no one-to-one mapping between syntactic forms, the argument mapping rules can ensure efficient comprehension and production when they are applied in context.

This thesis provides a uniform account of different argument alternation phenomena that have been seen as unrelated to each other in the literature. The successful uniform explanation of the 'unrelated' phenomena of argument alternation can be generalized as a methodology: a thorough semantic analysis of various alternative syntactic constructions can reveal the subtle semantic differences between them and the importance of these subtle semantic difference for a theorectic account of argumenty alternation has been largely underestimated in the literature. This constitutes the foundation of a uniform explanation of syntactic phenomena that seem to be unrelated to each other. This success lights the hope of seeking semantics-based uniform accounts of other different kinds of syntactic phenomena in a single language and across languages in future research.

Declaration

This thesis is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

(*Wenshan Li*)

Signature

Acknowledgement

Four years ago, as my M.A. study of linguistics in Beijing came close to completion, I felt far from satisfied with my knowledge of this discipline. All by chance, I came across the personal homepage of Dr. Ronnie Cann where I found a large number of linguistic papers written in a theoretical framework called Dynamic Syntax, about which I knew nothing. With curiosity and hesitation, I wrote to Ronnie, telling him that I wanted to 'learn' Dynamic Syntax from him but I had little background of formal linguistics. A few days later, I received Ronnie's reply full of encouragement; a few months later, I became Ronnie's PhD student. From then on I have kept receiving from Ronnie encouragement and numerous indispensable suggestions of different kinds on my doctoral research. Without all that Ronnie has done for me, the completion of my PhD research is impossible. I am also grateful to my second supervisor Dr. Nicolas Gisborne. Nik offered me many crucial suggestions on my research and on the revision of the thesis. Nik read the most important chapters of my thesis and gave me many comments that are essential for the completion of my work.

During the four-year long ordeal, I also could not do without the help and support from many friends and colleagues within the department of Linguistics and English Language. Professor Caroline Heycock and Professor Ruth Kempson were my examiners but they did far more than examine my thesis. Martha Robinson, Anna Stepowany, Georoge Argyropoulos and John-Sebastian Schutte as my friends were important sources of confidence. I also cannot forget to mention Kaori Muira who occasionally debated with me in a provocative way, from which I benefited a lot. Cyprian Laskowski, Gareth Roberts, Sean Roberts, Justine Quillinan all offered liberal help with a number of puzzling facts concerning English that I came across during my research. I thank for their efficient and friendly service the administrative

Contents

Abbreviations

Abbreviations used in the thesis including those in cited texts are listed below.

ALL	allative case
APP	applicative marker
BA	a particle expressing affecting relationship in Mandarin
BEI	a particle expressing inverse affecting relationship in Mandarin
DAT	dative case
CL	classifier
EXP	experiential aspect
FEM	feminine gender
FOC	focus
FV	final vowel
LOC	locative marker/predicate
MASC	masculine gender
MPL	masculine plural
MSG	masculine singular
NEG	negative particle
NEG.IMP	negative particle for imperative in Mandarin
NEG.PFT	negative particle for perfect aspect in Mandarin
NOM	nominative case
PFT	perfect aspect
PL	plural number
PROG	progressive aspect
PRS	present tense
PRT	particle
SG	singular number
SUB	subject marker

Chapter One
Inverse Argument Relation as a Focus of Inquiry

1.1 Prelude

Repeating an unfunny joke is sometimes funny. A child was bored and turned to his grandmother for some jokes. The grandmother repeated a verse of doggerel:

> *Shuo hu   hua, dao hua hu,*   ‖ *gong niu xia   ge mu   niu du…*
>
> say   nonsensical speech say speech nonsensical,   male   ox   reproduce CL female ox   calf
>
> 'Say fudge, say egduf[1], a bull reproduces a female calf…'

The child wondered how it was possible that a bull give birth to a female calf. The grandmother, with some complacency and enthusiasm, told him that she just put what she wanted to say in reverse and the right way was *mu niu xia ge gong niu du* (=a female ox [cow] reproduced a male calf) but the right way was not funny at all. That child was me. Linguistic inversion is part of my life. Metathesis has been so common in my speech that I was punished many times by my Chinese teachers because of errors of inversion in reciting classic texts. This seems to be in my genes since I have been told recently that errors of inversion pop up in my daughter's everyday speech although I am in Great Britain and she is in China.

The above anecdote may not be particularly memorable but it is told here to draw attention to the relationship between forms and meanings in natural languages. Using the right linguistic forms to express meanings is so natural that we, as native speakers of one language or more, tend to lose the awareness that we have to express

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[1] *Egduf* is the inverse spelling of *fudge*.

meanings in right linguistic forms. If one asks a native speaker of some language to produce an unacceptable sentence in that language, the latter may have to make great effort to give one and finally realize that it is never easy to make errors of speech intentionally. Making errors of speech is relatively so unfamiliar that we usually laugh when we hear errors of speech. Average speakers usually do nothing but laugh and would seldom wonder why the two forms *Zhangsan xihuan Lisi* 'Zhangsan like Lisi' and *Lisi xihuan Zhangsan* 'Lisi like Zhangsan' do not mean the same. When you present these questions to a friend who speaks the same language as you do but has neither interest nor training in linguistics, she may put her hand on your forehead to see if you have a fever; otherwise you would not ask a question about something that is common sense.

In the scientific studies of languages, linguists are not supposed to underestimate the value of common sense. A silly question in everyday life may not sound silly but rather interesting and even challenging. It may even become the foundation of a linguistic hypothesis. We as linguists have never been in a position to say that we know all about the form-meaning correspondence that is as natural as the falling of an apple that hit Isaac Newton's head[2].

1.2 Argument Realization: A Central Issue in Linguistics

Identifying the rules in the correspondence between grammatical forms and participants of various types of events, such as the eater and the food in an eating activity, or the baker and the food in a baking event, has long been taken to be an important task for linguists. This is understandable even from a layperson's point view because languages are usually used to express events. If the most familiar meaning-form correspondence is not taken into consideration in linguistics, it is doubtful that linguists are really doing science. Meaning-form correspondence is

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[2] Whether Newton had really ever been hit by an apple is an issue for historians.

known as argument linking or argument realization (c.f. Levin and Rappaport-Hovav 2005) in that linguists adopt a logical point of view in addressing this issue. The linguistic expressions for event participants are usually treated as logical arguments, and verbs, which schematically express events, are usually treated as logical predicates. Different participants of events are grouped into some coarse-grained classes, called semantic roles or thematic roles such as agent, patient and so on. For example *John* and *Mary* in *John hit Mary* are the agent and the patient respectively. But this is only a small sample of all the semantic roles that linguists have raised. A full introduction to semantic roles will be given later in this thesis. Traditionally, research into argument realization mainly concerns the correspondence between coarse-grained semantic roles and grammatical forms, which are encoded by word orders in some languages such as Mandarin and English, or morphological forms in some languages such as Russian and Georgian.

Intuitively, semantic roles are part of the lexical semantics of verbs. The rules according to which semantic roles are syntactically realized (expressed) are taken to be the lexical properties of verbs. The semantic roles in the lexical semantics of a single verb may be linguistically expressed in various ways. This phenomenon is called argument alternation. Researchers interested in argument realization aim to uncover the factors that motivate and constrain argument alternation. For example, the semantic roles associated with the English verb *give* can appear in at least in two syntactic patterns *John gave Mary a flower* and *John gave a flower to Mary*. The semantic roles associated with the Chinese verb *da* '*hit*' can be expressed in at least two syntactic patterns *Zhangsan da-le Lisi* 'Zhangsan hit-PFT Lisi' (=Zhangnsan hit Lisi) or *Zhangsan ba Lisi da-le* 'Zhangsan BA Lisi hit-PFT' (=Zhangsan hit Lisi). Argument alternation is puzzling and interesting since it poses a number of questions: Why can some verbs but not others undergo argument alternation? What

motivates argument alteration? Is it possible to identify regularity out of the diversity of argument alternation?

Many different theories have been proposed to answer these questions. In the mainstream transformation grammar framework (c.f Chomsky 1981), semantic roles are assumed to be strictly mapped onto the argument positions in an underlying syntactic structure from which a surface syntactic structure is derived via transformation. Diversity of semantic role-syntax correspondence arises as transformational operations are applied to derive surface syntactic structures from underlying syntactic structures (c.f. Baker 1988). So far, this approach to the diversity of argument realization has been the most influential though it has always been controversial as well. In some non-mainstream but influential theoretical frameworks, such as Lexical Functional Grammar (LFG, c.f. Bresnan 1982 and Dalrymple 2001), Generalized Phrase Structure Grammars (GPSG, c.f. Gazdar et al 1985), Head-Driven Phrase Structure Grammar (HPSG, c.f. Pollard 1994), Role and Reference Grammar (RRG, c.f. Van Valin 1993) among others, no underlying syntactic structures are hypothesized, and semantic roles are assumed to be mapped directly onto surface grammatical forms. The diversity in argument alternation is explained through non-transformational mechanisms.

In spite of many disputes among them, the existing theories based on familiar and similar linguistic data agree upon the following point: there exists a general principle of argument realization that some semantic roles tend to take precedence over others in being expressed/ realized as the subject. This is illustrated by the Chinese sentence *Zhangsan da Lisi* 'Zhangsan hit Lisi', where *Zhangsan* (the hitter, or the agent) is the subject and *Lisi* (the hit, or the patient) is the object, or by the English sentence *John hit Mary* in English where *John* is the subject and *Mary* is the object. A working hypothesis that many existing theories on argument realization adopt is

that semantic roles are ranked hierarchically according to their priorities in being realized as the subject. A thematic hierarchy can be schematically represented as $A > B > C > D > E > …$(where A, B, C, D and E are thematic/semantic roles such as agent, patient, instrument, theme, location among others). A thematic role is more prominent than its neighbour to the right. And a more prominent role has priority to a less prominent role in being mapped onto the subject of a sentence when they both need to be expressed. Linguists working on argument realization have proposed many different versions of universal thematic hierarchy. The disagreement among linguists as to what the universal thematic hierarchy is like leads to the question of whether there is a universal thematic hierarchy, the question of whether it is right to explore the rules of argument realization in such an approach, and the question of how argument alternation should be accounted for if semantic roles are rigidly mapped onto syntax according their rankings on a universal thematic hierarchy. Different linguists propose different answers to the questions. Some choose to stick to this approach but others give it up and develop theories without the universal thematic hierarchy being a theoretical primitive. Besides, different theorists also disagree on what syntax of natural language is, which in turn affects how they look at the correspondence between semantics and syntax. A literature review will be made, where these different theories will be introduced and compared in detail.

Against the background of the literature on argument realization, this thesis highlights inverse argument realization, which refers to the phenomenon where the semantic roles in the events expressed by some verbs are realized in two ways (at least). In one case, one of two semantic roles associated with a verb is realized as the subject and the other as the object but in the other case the two semantic roles are realized the other way round. What is interesting with this kind of argument alternation is that it does not occur without constraints. Pinning down the constraints on and motivations for such argument alternation is not trivial to the understanding

of the relationship between linguistic forms and meanings. Usually, with two alternative syntactic patterns on a paradigm of inverse argument realization, one is taken to be the canonical pattern and the other is taken to be the inverse. The criterion of recognizing the canonical pattern is the general principle of argument realization that is widely recognized in the literature. This principle is further introduced in the next section, which is followed by the section where inverse argument realization is illustrated with examples.

1.3 A Principle of Argument Realization

A hypothesis that is widely adopted in the works on argument realization is that the more prominent argument (typically an agent) of a verb is realized as the subject and the less prominent argument (typically a patient) is realized as the object (c.f. Fillmore 1968; Baker 1988; Grimshaw 1990; Dowty 1991; Rappaport-Hovav & Levin 1998 among many others). The following English sentences observe this hypothetical principle.

(1.1)   a.   *John kicked Mary*.
        b.   *Mary kicked John*.

In (1.1a), the subject *John* is understood as the agent and the object *Mary* is understood as the patient. In contrast, in (1.1b), the subject *Mary* is understood as the agent and the object *John* as the patient. There is no possibility in the English language that (1.1a) and (1.1b) have the same literal meaning. This principle also applies to typical sentences in Mandarin Chinese. For example, the sentences in Mandarin in (1.2) semantically and structurally align well with their English counterparts.

(1.2)   a.   *Zhangsan ti-le   Lisi.*
                        kick-PFT
                'Zhangsan kicked Lisi.'

        b.   *Lisi ti-le   Zhangsan.*
                    kick-PFT
                'Lisi kicked Zhangsan.'

Likewise, (1.2a) and (1.2b) cannot have the same meaning, showing that the recognized principle of argument realization holds in Mandarin.

The principle is said to work in complex sentences as well. Consider the following examples.

(1.3)   *John wanted to kick Mary.*
(1.4)   *John ordered Mary to kick Tom.*

In the literature (c.f. Larson et al 1992: vii-viii)), the sentences in (1.3) and (1.4) are treated as 'control constructions'. Specifically, it is assumed in the literature that the secondary verb (*to*) *kick* in these sentences has a subject and the subject is a phonologically null pronoun. In (1.3), the subject of the tensed verb *wanted* is *John*, which is qualified as the anaphoric antecedent of the implicit subject of the secondary verb *kick*. Since the implicit subject is the agent of the second verb *kick*, then *John* is understood as the agent of the secondary verb. And the object of *kick*, *Mary,* is understood as the patient. In (1.4), the object of the tensed verb *ordered* is *Mary* and *Mary* is the anaphoric antecedent of the implicit subject of the secondary verb *kick*. Then *Mary* is understood as the agent of *kick*. *Tom* is the object of *kick* and is understood as the patient.

The English sentences in (1.4) have counterparts in Mandarin, for example (1.5).

(1.5)   *Zhangsan mingling Lisi ti   Wangwu.*

                    order   kick

              'Zhangsan ordered Lisi to kick Wangwu.'

Assuming that the second verb *ti* 'kick' in (1.5) has an implicit subject and this implicit subject takes the object *Lisi* of the fist verb *mingling* 'order' as its anaphoric antecedent, we are not surprised that *Lisi* is understood as the agent of *ti* 'kick'. *Wangwu* is the object of the verb *kick* and is understood as the patient of this verb. The soundness of the hypothetical principle is justified by its crosslinguistic explanatory force demonstrated above.

1.4 Inverse Argument Realization

In spite of its soundness in most cases, the principle of argument realization encounters puzzling exceptions across languages, where a less prominent semantic role is realized as the subject and a more prominent semantic role is realized as the object. These exceptions are instantiated by locative inversion constructions across many languages like English and Chicheŵa (c.f. Bresnan 1994) and Mandarin Chinese, and agentive inversion constructions Georgian (c.f. Blevins 2007) and Mandarin Chinese (c.f. Her 2006, 2009). Inverse argument realization is also reported to appear in some cases of the resultative verb construction in Mandarin Chinese (c.f. Y. Li 1991, 1993 and 1995).

In Bresnan and Kanerva (1989), it is hypothesized that the theme is a more prominent role and the location a less prominent role. The sentence in (1.6a), where the theme *my friend* is realized as the subject, is predicted by the general principle of argument realization and is taken to be a canonical construction. In the locative

inversion sentence in (1.6b), the location *among the guests* is realized as the subject according to Bresnan and Kanerva (1989). This construction is not directly predicted by the general principle and it even seems to go against the principle.

LOCATIVE INVERSION IN ENGLISH (Bresnan 1994)

(1.6) a.   *My friend Rose was sitting among the guests.*   [CANONICAL]

       b.   *Among the guests was sitting my friend Rose.*   [INVERSE]

.

Locative inversion is also found in Chicheŵa (c.f. Bresnan and Kanerva 1989; Bresnan 1994); this is illustrated in (1.7).

LOCATIVE INVERSION IN CHICHEŴA (Bresnan and Kanerva 1989)

(1.7) a.   *Chi-tsîme chi-li   ku mu-dzi.*   [CANONICAL]

             7-well   7.SUB.be 17 7-village

             'The well is in the village.'

       b.   *Ku mu-dzi   ku-li   chi-tsîme.*   [INVERSE].

             17 3-village 17-SUB.be 7-well

             'In the village is a well.'

In (1.7a), the theme is realized as the subject and the location is realized as the object[3]. In (1.7b), the location is realized as the subject and the theme is realized as the object. Locative inversion is found in Mandarin as well.

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[3] There are disputes over whether the argument expressions in these sentences should be recognized as subjects and objects as Bresnan and Kanerva (1989) suggest. Even there are disputes over what subject and object are. I am provisionally on Bresnan and Kanerva's side and will define these notions below.

LOCATIVE INVERSION IN MANDARIN

(1.8) a. *Yi-qun ren   zhan zai dajie-shang.*   [CANONICAL]

one-CL person stand LOC street-top

'A group of people stand on the street.'

  b. *Dajie-shang zhan-le   yi-qun ren.*   [INVERSE]

street-top   stand-PFT one-CL person

'On the street stood a group of people.'

In (1.8a), the theme *yi-qun ren* 'one-CL person' (=a group of people) is expressed as the subject and the location *zai dajie-shang* 'LOC street-top' (=on the street) appears as the object. In (1.8b), the theme *dajie-shang* is the subject with the locative marker *zai* disappearing, and the theme *yi-qun ren* appears as the object.

Another case of inverse argument realization is the agentive inversion in Mandarin, illustrated by the following two examples.

AGENTIVE INVERSION IN CHINESE

(1.9) a. *San-ge   ren   chi yi-guo fan.*

Three-CL person eat one-CL rice

'Three persons ate one pot of rice.'

  b. *Yi-guo   fan chi san-ge   ren.*

one-pot rice eat three-CL person

'Three persons ate one pot of rice.'

In (1.9a), the subject *san-ge ren* 'three-CL person' (=three people) is the agent and the object *yi-guo fan* 'one-CL rice' (=one pot of rice) is the patient. In (1.9b), which

includes exactly the same words as (1.9a), the subject *yi-guo fan* 'one-CL rice' (=one pot of rice) is the patient and the object *san-ge ren* is the agent.

The agentive inversion construction is also observed in some cases of the resultative construction in Mandarin. A representative instance is the sentence given below.

(1.10) a.   *Na-zhong yao   <u>chi</u>-si bushao ren.*   [INVERSE]

          that-CL   medicine eat-die many person

          'Many people ate that kind of medicine and died as a result.'

     b.   *Bushao ren   <u>chi</u>-le   na-zhong yao.*   [CANONICAL]

          Many   person eat-PFT that-CL   medicine

          'Many people took/ate that kind of medicine.'

In (1.10a), the subject *na-zhong yao* 'that-CL medicine' (=that kind of medicine) is understood as the patient of the verb *chi* 'eat' and the object *bu-shao ren* 'many person' (=many people) is understood as the agent of the verb *chi* 'eat.' In contrast, when the verb *chi* 'eat' is used in a single-verb sentence, as is the one in (1.10b), the agent is realized as the subject *bushao ren* 'many person' (=many people) and the patient is realized as the object *na-zhong yao* 'that-CL medicine' (=that kind of medicine).

To sum up, various cases of inverse argument realization challenge the general principle of argument realization. In the literature, these various cases of inverse argument realization have been treated separately as different phenomena. In this thesis, I will argue that the three cases of inverse argument realization are closely related and that inverse argument realization does not violate the general principle of argument realization as it seems to. The goal and methodology that the theoretical account of inverse argument realization are summarized in the next section.

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1.5 The Goal and Methodology of This Study

What is presented in this thesis is a qualitative study. The focus of this study is inverse argument realization in Mandarin. I will argue that inverse argument realization seems to, but actually does not, violate the general principle of argument realization mentioned above. Inverse argument realization is semantically motivated. Canonical constructions and inversion constructions express different meanings. Viewing argument realization from the perspective of comprehension, this thesis takes different patterns of argument realization to be the epiphenomena of different dynamic processes of building different semantic representations. In such dynamic processes, some semantic relationships are constructed through the actions that are triggered by the on-line parsing of linguistic forms. Others are constructed through pragmatic inference. Inverse argument realization epiphenomenally arises out of this latter meaning-building mechanism.

The hypothesis behind this work is formulated on the basis of a description of the resultative verb construction (RVC) (e.g. 1.10). The meaning of this construction is a complex event consisting of an activity, such as eating, playing, or sleeping etc. (called the first subevent) and a resultative state, such as being tired, being happy and so on (usually called the resultative subevent). A thorough description of different argument realization patterns in RVC reveals that the arguments of the resultative predicate must be realized in a transitive RVC sentence. The patterns of argument realization in RVC are summarized in the form of a principle and several rules. After the description, I will look into how the principle and rules are implemented in a parsing grammar developed in the framework of Dynamic Syntax (Kempson et al 1999, 2001; Cann et al 2005), which will be introduced soon. I will demonstrate how various patterns of argument realization in transitive RVC sentences come into being through dynamic processes of semantic interpretation construction.

The Dynamic Syntax accounts of how the different patterns of argument realization in RVC arise lays the foundation for a uniform account of the agentive inversion construction and locative inversion construction in Mandarin. Specifically, the agentive inversion construction and the locative inversion construction are semantically similar to RVC. They express a complex event consisting of a first sub-event and a resultative sub-event although they involve only one verb in each case. Based on the semantic similarity between RVC and the agentive and locative inversion constructions, I assume that inverse argument realization in the latter two constructions and the inverse argument realization in some instances of RVC arise through similar parsing processes. Such parsing processes and the corresponding semantic representations constructed through them can be clearly depicted in the formalisms provided by Dynamic Syntax.

1.6 The Framework of Dynamic Syntax

Dynamic Syntax (Kempson et al 2001; Cann et al 2005) hypothesizes that a grammatical sentence is the epiphenomenon of parsing a string of words in context through which a complete proposition is constructed. A parsing process is a series of actions through which semantic information is built up stepwise and combined together to form a complete proposition. The primitive meaning-constructing actions defined in Dynamic Syntax are hypothesized to be language-universal but they are taken in various ways across languages. There are three types of actions: lexical actions, computational actions and pragmatic actions. Lexical actions are those actions that are activated as words are parsed. It is characteristic of Dynamic Syntax to hypothesize that the information that a word encodes includes a package of actions in additional to a conceptual formula. Lexical actions obligatorily fire as words are parsed. Computational actions and pragmatic actions are actions that are not activated through parsing words. General computational actions usually

constitute transition rules, the application which ensures the successful transition from one parsing stage to the next toward the construction of a complete propositional formula in the end. Pragmatic actions are taken as there is a need of pragmatic inference. Languages differ from each other with respect to what actions are triggered when words are parsed and when computational actions and pragmatic actions are needed as various parsing processes are carried out.

According to Dynamic Syntax, a parsing process in a language usually, if not always, involves semantic underspecification of some kind, and update. Presently, two kinds of semantic underspecification are recognized in Dynamic Syntax: semantic-content underspecification and semantic-structure underspecification. Semantic content underspecification is typically observed in the parsing of pronouns. That is, the parse of a word contributes a provisional placeholder rather than a contentful formula for the construction of a proposition. The placeholder, represented as a metavariable in Dynamic Syntax, must be replaced finally by some contentful formula because a propositional formula containing a placeholder is incomplete. Semantic-structural underspecification refers to the fact that the semantic status of a conceptual formula in a propositional formula under construction is initially unfixed and has to be fixed later. Dynamic Syntax defines different mechanisms to update the two types of semantic underspecification. The Dynamic Syntax account of inverse argument realization to be presented in this thesis relies heavily on the two types of semantic underspecification and their corresponding updating mechanisms.

1.7 The Map of the Thesis

Chapter two provides a short descriptive grammar of Mandarin. This chapter begins with a discussion of the concept of syntactic function that is widely used in language description, explaining in what sense syntactic functions, mainly subject and object, are used in my description of Mandarin. A description of the basic grammar of

Mandarin follows. Through this description, the way meanings and grammatical forms correspond to each other in Mandarin is preliminarily demonstrated.

Chapter three is a review of a number of existing general theories about argument realization. These theories can be roughly are classified into two major types: those involving the concept of thematic hierarchy as a theoretical primitive and those not relying on the concept of thematic hierarchy. This review will highlight the fact that the general principle of argument realization introduced above is assumed in various forms in the different existing theories. This review gives the background for the current research.

Chapter Four consists of two parts. In the first part an introduction of Dynamic Syntax is made, including the general hypotheses of human language in general, specific theoretic primitives and representational formalisms in this framework. In the second part, the issue of argument realization, which has long been a research topic in various generative grammars, is probed in Dynamic Syntax. This is the first discussion of argument realization from a parsing perspective.

Chapter Five describes the resultative verb construction (RVC) which involves diverse patterns of argument realization. The description is carried out in a traditional way, giving a classification of this construction and describing its basic characteristics but the focus of the description is the semantic relationships between the verbal components and the argument expressions in transitive RVC sentences. The attested patterns of argument realization in this construction are described one by one and the unattested patterns are described parsimoniously. This description covers many data that have not been noticed before. Finally, I summarize the description with a principle and several rules of argument realization in transitive RVC sentences.

Chapter Six is a Dynamic Syntax account of the argument realization patterns in RVC. This chapter starts with a review of a number of existing theories on RVC, pointing out some of the deficiencies that these works suffer. Then the Dynamic Syntax account of RVC is presented, in which it is shown that the various argument realization patterns in transitive RVC sentences are epiphenomena arising from diverse parsing processes through which various semantic representations are constructed. Particularly, many data that have not been properly noticed and cannot be accounted for in existing works now are uniformly accounted for in my theory.

In Chapter Seven, the problem of the agentive inversion is explored. This chapter starts with a traditional description of the phenomenon at issue and moves onto a review of the literature. Next a thorough semantic analysis of the agentive inversion construction is made. On the basis of this analysis, I argue that the agentive inversion construction, like RVC, expresses a complex event although it involves only a single verb. Put in Dynamic Syntax terms, parsing the agentive inversion construction gives rise to a complex semantic representation. This complex semantic representation is similar to that constructed in parsing an RVC sentence but different from that constructed in parsing the corresponding canonical agentive construction. Inverse argument realization arises in the process of constructing the complex semantic representation.

Chapter Eight treats the locative inversion in Mandarin. This chapter considers three basic locative constructions. Among them, two are respectively taken to be the canonical locative construction and the locative inversion construction. There is telling evidence that the locative inversion construction and the canonical locative construction express two similar but different complex events. The inverse argument realization phenomenon involved in the locative inversion construction can be

explained in the same way as that involved in the agentive inversion construction. Specifically, parsing a locative inversion construction gives rise to a complex semantic representation similar to that constructed out of parsing an RVC sentence.

Chapter Nine is the conclusion, summarizing the contents of this thesis and pointing out the implication of the current research for the overall enterprise of argument realization and linguistic theorization in the framework of Dynamic Syntax. Several further questions of argument realization in Chinese are presented and a speculative discussion on the potential of extending the analysis in this thesis across languages is made, both of which are the tasks in future research.

Chapter Two
Grammatical Forms in Mandarin

2.1 Introduction

Research into argument realization aims at identifying the rules that govern the correspondence between grammatical forms and semantic roles. In this chapter I will describe some central grammatical forms in Mandarin. Traditionally, the description of grammar relies on concepts of syntactic functions (also known as grammatical functions or grammatical relations). Terminology for syntactic functions adopted from traditional linguistic studies is interpreted in different ways for different purposes. Actually, not only syntactic functions but also many other linguistic terminologies have this problem. Haspelmath (2006), in his discussion of the terminology of crosslinguistic description of case, indicates that linguists with different backgrounds use the same terms for somewhat or radically different concepts, or they use different terms for very similar or identical concepts. For example, the term subject is used in many ways: There is 'logical subject', which is a component of a proposition. There is psychological subject, which is the word or words referring to what is already known to the hearer. Subject is also used to refer to an actor, or one who does something in an event (c.f. Robins 1967). Even if subject and object are narrowly defined to refer to syntactic functions, syntacticians of different theoretical persuasions may still use them to refer to different theoretical substances. Baker (1988: 6) points out that the exact status of syntactic function in linguistic theory is a controversy that divides theoretical frameworks.[4] There is a general tendency for syntactic functions, however defined, to be taken to be the grammatical forms that semantic roles are mapped onto.

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[4] Baker (1988:6) takes the stance that '…grammatical functions, whatever their ultimate theoretical status, play a key role in the association between meaning and form…'

In the following description of Mandarin, I adopt a very narrow definition of syntactic functions, or grammatical forms. They refer merely to the linear positions of argument expressions relative to verbs in this language. These are concrete linguistic forms rather than any abstract syntactic structures or relations hypothesized in the literature. Nevertheless, this narrow definition is not unrelated to those abstract syntactic functions mentioned in the literature because in many previous works word orders have long been taken to be one of the coding strategies of those abstract syntactic functions. To make clear the similarities and dissimilarities between the way the various notions of syntactic function are used in the literature and the way they are used in this thesis, I will review some discussions on syntactic functions before carrying out my own description of the basic grammar of Mandarin Chinese on the basis of these notions.

The remainder of this chapter unfolds as follows. Section 2.2 reviews discussions of subjects and objects across languages, where these functions are posited as language-universal and are taken to be clusters of linguistic features that the components of sentences have. Against this background section 2.3 proposes tight definitions of syntactic functions in Mandarin on the basis of empirical facts in this language. Section 2.4 is a comparison of two prominent syntactic functions in Mandarin, the subject and the topic, which are both related to preverbal positions. Section 2.5 gives a sketchy description of some behavioural features of the major syntactic functions in Chinese. Section 2.6 looks into peripheral syntactic functions collectively called syntactic adjuncts, including those that appear in preverbal positions and those that appear in postverbal positions. Through these discussions, a basic descriptive grammar of Mandarin is presented. Section 2.7 is a summary of this chapter.

2.2 Syntactic Functions in the literature

In the literature, syntactic functions are also called grammatical functions or grammatical relations. These mainly include subject, object and various oblique functions or adjuncts. Andrews (1985) claims that grammatical relations are a set of abstract concepts that constitute an intermediate link between semantics and pragmatics on the one hand, and coding features on the other hand. Semantic roles are ultimately signalled by 'overt coding features' such as word order, case marking and agreement. It is difficult, however, to provide a coherent account of how coding features and semantic roles they express are connected; therefore, 'it seems better to posit an intervening level of grammatical structure: the coding features indicate the grammatical structure of the sentence, and the grammatical structure determines the semiotic functions' (Andrews 1985: 63). This review focuses on discussions of two major syntactic functions: subject and object.

2.2.1 Crosslinguistic Properties of Subjects

Keenan (1976: 305-333) gives a list of around 30 coding, behavioural and semantic characteristics of subjects in basic sentences across languages. The characteristics are classified into four major types, each of which is further divided into a number of types.

A.   AUTONOMY PROPERTIES

A-group includes three properties that are collectively called autonomy properties. The first kind of autonomy (A-1) is 'independent existence' (Keenan 1976: 312). Independent existence refers to conceptual independence: the entity that the subject expresses exists independently of the action or property expressed by the predicative word. For example *John* is the subject in the sentence *John built a house* and the subject exists independently of the building event while the existence of *the house* is dependent on the event expressed by the verb.

A-2 is syntactic indispensability. Keenan (ibid: 313) points out that a non-subject element may often be eliminable from a sentence with the result still being a complete sentence but the subject usually cannot be freely deleted. For example, in English the string *John hunts lions* is a complete sentence but the string *hunts lions* is not. According to Keenan, the second string is incomplete because its subject is illegally deleted.

A-3 is autonomous reference. This property is generally understood to be such that the reference of the subject must be determinable by the addressee at the moment of utterance and it cannot be made to depend on the reference of other syntactic components. For example the pronoun *he* in the sentence *He loves John* cannot refer to *John*, but *himself* in *John admires himself* can only refer to *John*. In Malagasy, which is a VOS language, the subject follows the object but it is still impossible for the subject to be referentially dependent on the object. For example (c.f. Keenan 1976: 314 (12), *manaja tena Rabe* 'respect self Rabe' (=Rabe respects himself) is acceptable but *manaja and-Rabe tena* 'respect ACC-Rabe self' (=Rabe respects himself) is not. Keenan claims that autonomous reference is plausibly a universal necessary condition on the subjecthood of a basic sentence.

B.   CASE MARKING PROPERTIES

B-group concerns case-marking properties. Case marking properties are morphological forms of words. In some languages, the subject of a basic sentence takes some morphological marker. In many cases, the subject of an intransitive sentence is not marked but the subject of a transitive sentence is. However, there are also exceptions. For example, in Motu (Malayo Polynesian, New Guinea: see Capell, 1969 in Keenan 1976: 320; unfortunately, no examples are quoted in Keenan's work) both transitive and intransitive subjects are marked (by different markers) but

transitive objects are not. The examples in Capell (1969) are given as follows: *mero na e gini-mu* 'the boy is standing' is an intransitive sentence where *mero* 'boy' is marked as the subject by the particle *na*; *mero ese aniani e heni-gu* 'the boy food gave me' is a ditransitive sentence where *mero* 'boy' is marked by the particle *ese* as the subject but the object *aniani* 'food' is formally unmarked (Capell 1969: 36).

C & D. SEMANTIC ROLE AND IMMEDIATE DOMINANCE

C-group concerns semantic role. Keenan (ibid: 321) points out that the semantic role of the referent of a basic subject is predictable from the form of the main verb. The subject usually expresses the agent of the action, or the addressee of imperative. D-group states that the subject of a sentence is said to be dominated by the root node S, which is, in fact, a theory-specific assumption in the Chomskyan transformational grammar rather than an empirical fact.

2.2.2 Objects across Languages

Just like the subject, the object is also defined in various ways. Andrews (1985) defines the object as a grammatical relation associated with the function O. The function O refers to a nominal phrase (NP) with the patient role in a transitive sentence. This definition is an important semantic characterization of objects. Objects have their own coding strategies and behavioural features.

Dalrymple (2001), drawing on her knowledge of the literature, raises three widely recognized features of objects including agreement, case-marking, and relativization. Often but not always, objects are uniquely identified by agreement. Some languages have object agreement. Case-marking can distinguish objects in some limited circumstances. Dalrymple (2001) indicates that there is no one-to-one relation between an argument's morphological case and its grammatical function. Givón (1997) notes that in the Kinyarwanda language only an object can be relativized with a gap. Relativization of subject in this language requires the use of a

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resumptive pronoun (c.f. Dalrymple 2001: 20). The diverse understandings of the concept of object implies that this concept must be specifically defined in a specific study. This is what I will do in this work.

2.2.3 Disputes on Syntactic Functions

Clearly, languages are so different from each other in terms of the specific forms in which the abstract syntactic functions exhibit themselves that some linguists doubt whether there are really a set of abstract syntactic functions behind diverse linguistic forms in different languages and whether there is the need to posit such an abstract level of syntactic representation as syntactic functions in linguistic studies.

Croft (1991) challenges the feasibility of identifying the same set of syntactic functions through different tests across languages. He argues that it is doubtful to take two syntactic functions identified through two different morphosyntactic tests to be the same even within one language, let alone those across languages. Croft is particularly critical of the concept of criterial tests of the syntactic functions in a specific language. In this kind of tests, only certain aspects of a grammatical behaviour are taken as indicative of a universal category and other aspects of the same grammatical behaviour are simply not good tests or not indicative of universal category (Croft 1991: 10). For example, the test of the object in a pre-defined active sentence in English can take two criteria: An NP is the object if it obligatorily turns up in the postverbal position in a transitive sentence and it can appear as the NP agreeing in number with *be* in the corresponding passive sentence. However, there are NPs that necessarily occur in the postverbal position but cannot occur as the subject of a passive construction. In this latter case the postverbal obligatoriness is simply taken not to be a good test and the passive construction is a good one. Croft argues that there are no sound reasons for such a choice of criteria.

In some theoretical frameworks, the hypothesis of universal syntactic functions is straightforwardly rejected. For example, in the Role and Reference Grammar (RRG), it is pointed out that (Van Valin 1993: 50):

'it [RRG] does not claim that all languages have grammatical relations in addition to semantic roles, which are universal. On the other hand, in those languages in which a non-semantic grammatical relation can be motivated, the syntactic function posited need not have the same properties in each language; that is, the role of this syntactic function in the grammar of language *X* may be very different from that played by the syntactic function in language *Y*, and consequently the two cannot be considered to be exactly the same.'

My opinion toward the issue of syntactic functions is that adopting abstract syntactic functions as language-universal concepts seems to unify linguistic diversity but in fact muddies the water because a language-universal syntactic function, say 'subject', means different linguistic properties in different languages; at least, it has different coding strategies in different languages. And it is not clear whether those universal properties of subject given on Keenan's list are inherently related to each other or not. Therefore, I suggest that the terms used in language description must be language-specifically defined first. Languages can be compared descriptively only when they are described in their own terms and a comparative work is meaningful not in the sense that different languages are described in the same set of terms but rather in the sense that the motivation for the variation of linguistic forms in one language can be compared with its counterpart in another language. It is unhelpful to posit a set of abstract language-universal syntactic functions in advance and impose them on the description of specific languages.

In this thesis, I adopt the notions of syntactic function but care must be taken as these are defined in a narrow sense when Mandarin is dealt with. They mainly refer to those observable grammatical forms and behavioural features in this particular language. I pay attention to how these language-specific grammatical forms express meanings.

2.3 Syntactic Functions in Mandarin

In this section, I define the syntactic functions in Mandarin. I will mainly cover subject, topic and objects. Adjuncts are described only briefly. A description of basic sentences in Mandarin is presented simultaneously as the syntactic functions are defined.

2.3.1 The Subject in Mandarin

Wang (1943/1944/1954/1985) takes the obligatoriness of a syntactic component in a context-independent sentence as the definitional criterion for subjecthood. He presents an imagined scene in which two speakers are involved in a dialogue. One speaker suddenly produces an utterance that is not related to the discourse context.

'Suppose we are not waiting for anyone but I suddenly shout *lai-le*! ['come-PRT' (=coming)]. You must be at a loss at my words. Then you ask *shui lai-le*? ['who come-PFT (=who is coming?)]. I reply *Zhang xiansheng lai-le*. ['Zhang mister come-PFT (=Mr Zhang is coming.)]. The term *Zhang xiansheng* [Zhang mister(=Mr Zhang)] is the host of the sentence and is called the subject.' (Wang 1985: 32).

According to Wang's definition, the preverbal phrase exercises the function of subject in the sentence. The following examples show that context-independent sentences in Mandarin must have a subject.

(2.1)   a.   *Zhangsan lai-le.*

                   come-PFT

           'Zhangsan came.'

       b.   * *lai-le.*   (context-independent)

           come-PFT

       c.   * *Lai-le Zhangsan.*

           come-PFT

In sentence (2.1a) the only obligatory argument expression *Zhangsan* appears in the preverbal position - it is the subject. Sentence (2.1b) is unacceptable without a rich enough context in that the sentence does not have a subject. Sentence (2.1c) has a postverbal argument expression but this postverbal expression is not the subject and the sentence is not acceptable.

This definition of the subject involves a coding feature-the preverbal position. The presence of an expression in the subject position is necessary when a sentence is produced context-independently. But the subject can sometimes do without a corresponding lexical form when a sentence is uttered in context. For example, two speakers are waiting for another person to arrive. One of them suddenly says *Lai-le*! 'come-PFT' (=Coming!). The other one should know who is coming. The sentence is semantically complete although there is no lexical form for the subject. Following the practice in the literature, I take the subject to be a null pronoun.

2.3.2 The Object in Mandarin

As the preverbal position is taken to be the subject position in Chinese, the postverbal position is taken to be the object position. When a verb entails two semantic roles and they are both expressed, typically one of them appears in the preverbal position and the other appears in the postverbal position and a sentence of

this kind is called a transitive sentence. The preverbal lexical form is the subject and the postverbal one is the object. This is illustrated in (2.5).

(2.2) a. *Zhangsan xihuan Lisi.*

      like

     'Zhangsan likes Lisi.'

   b. *Lisi xihuan Zhangsan.*

      like

     'Lisi likes Zhangsan.'

In (2.2a), the preverbal expression *Zhangsan* is the subject while the postverbal expression *Lisi* appears in the postverbal position and is the object. Similarly, in (2.2b) the preverbal expression *Lisi* is the subject and the postverbal expression *Zhangsan* is the object.

In the postverbal domain, there can be more than one obligatory argument expression, given a verb such as *gei* 'give'. Changing the word order of the two postverbal arguments leads to the change of meaning.

(2.3) a. *Zhangsan gei-le Lisi yi-duo hua.*

      give-PFT   one-CL flower

     'Zhangsan gave Lisi a flower.'

   b. * *Zhangsan gei-le yi-duo hua Lisi.*

      give-PFT one-CL flower

    # 'Zhangsan gave a flower Lisi.'

(2.3a) is a fully acceptable sentence. The postverbal NP *Lisi* is understood as the recipient of an entity, and the other postverbal NP *yi-duo hua* 'one-CL flower' (=a

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flower) is the entity that is transferred. The word order of *yi-duo hua* 'one-CL flower' (=a flower) and *Zhangsan* in (2.3b) is the reverse of that in (2.3a); then *yi-duo hua* (= a flower) in (2.3b) is understood as the recipient of an entity and *Lisi* is understood as the theme (transferred entity), which is a weird reading, as is indicated by the symbol #, because a flower cannot be a recipient and therefore (2.3b) is semantically unacceptable according to our world knowledge. Thus, it is desirable to distinguish the two arguments in the postverbal position. They are both arguments and they both appear in the postverbal area; therefore both are called objects. The object that is closer to the verb is the first object and the other is the second object. The two objects express different semantic roles.

2.4 The Subject versus the Topic

Li and Thompson (1976) (see also Hong 1956; Householder and Cheng 1967; Tai 1973; Huang 1973; Alleton 1973; and Chao 1968) insist that Chinese is a topic-prominent language because when there is more than one preverbal term expression in a sentence the sentence-initial term expression is not necessarily the semantic argument of a following verb. Such a term expression is usually called the topic. This is illustrated by the following examples quoted from Li and Thompson (1981: 86).

(2.4)   a.   *Zhangsan, huzi   hen chang.*

                        whisker very long

                'As for Zhangsan, his whisker is long.'

        b.   *Lisi,   shou zongshi fang zai   zhuozi-xiamian.*

                        hand always put   LOC desk-bottom

                'As for Lisi, his hands are always put below the desk.'

        c.   *Zhangsani, Lisi renshi tai.*

                        know he

‘As for Zhangsan, Lisi knows him.’

d.   *Zhangsan$_i$, ta$_i$ renshi Lisi*.

        he   know

‘As for Zhangsan, he knows Lisi.’

In (2.4a) and (2.4b) the topics *Zhangsan* and *Lisi* do not receive any semantic roles from the verbs. In (2.4c) and (2.4d) the topics, which are both *Zhangsan*, receive semantic roles from the verbs. These semantic roles, however, are equally received by the object pronoun.

In the following case, the topic and the subject both receive some semantic roles from the verb and there is no pronoun in the object position (see (2.5)).

(2.5)   *Zhei-ge ren*,   *Zhangsan renshi*.

        this-CL   person   know

‘This person, Zhangsan knows.’

In (2.5) the topic receives a semantic role as the object in the corresponding transitive sentence as illustrated in (2.6).

(2.6)   *Zhangsan renshi zhei-ge ren*.

                know   this-CL person

‘Zhangsan knows this person.’

The two sentences collectively result in the impression that an object can be ‘moved’ from its original position to the preverbal position. The topic (2.5) is known as ‘left-dislocated object’ in the literature of transformation grammar. I do not adopt this theory-specific term in my description of Chinese grammar. Instead, I call the

first expression *zhei-ge ren* 'this-CL person'(=this person) in (2.5) the topic and the postverbal expression *zhei-ge ren* 'this-CL person' (=this person) in (2.6) the object although the two expressions obtain the same semantic role from the verb *renshi* 'know'. To say the object in (2.5) is the object and the topic in (2.6) is a left-dislocated object is just one out of many theories that are intended to account for why they can receive the same semantic role from the verb at issue. However, this theoretical issue is not a major concern in this descriptive chapter.

2.5 Some Behavioural Features of the Subject, the Topic and the Object

In the literature on syntactic functions, it is pointed out that syntactic functions have behavioural features (c.f. Falk 2006; Keenan 1976). These features include (i) anaphoric prominence, (ii) shared argument in coordinate clauses, (iii) discourse topic, (iv) definiteness, (v)wide scope, (vi) control, (vii) raising and so on. I will briefly demonstrate that the syntactic functions in Mandarin defined above do have some behavioural features proposed in the literature but I will not look into the issue why they have such behavioural features.

The subject in an antecedent clause can control the 'deleted' subject of a subsequent clause. This is illustrated by the following examples:

PRONOMINALIZATION CONTROLLER (SUBJECT)
(2.7) a.   *Zhangsan$_i$ kanjian Lisi* [ ]$_i$ *jiu   pao.*

       see   then run-PFT

    'Zhangsan saw Lisi and he (Zhangsan) run away.'

  b.   * *Zhangsan kanjian   Lisi$_i$* [ ]$_i$ *jiu   ku.*

       see   then run

    'Zhangsan saw Lisi and he (Lisi) ran away.'

(2.7a) and (2.7b) are the same sentence in terms of words and word order. This sentence is well-formed for the meaning given in (2.7a) where the subject of the first clause *Zhangsan* is taken to be the anaphoric antecedent of a zero-form subject (indicated by [ ]) of the subsequent clause. The sentence is not well-formed for the meaning given in the English translation in (2.7b).

However, it should not be ignored that such a behavioural feature is also available to a topic. When a sentence has a topic that is different from the subject, the topic can control the zero-form subject in a subsequent clause. This is illustrated by the following sentence (c.f. Li and Thompson 1976: 469: (28)).

PRONOMINALIZATION CONTROL (TOPIC)

(2.8) *Nei-kuai tian$_i$ daozi zhang de   hen da, suoyi* [ ]$_i$ *hen   zhiqian.*
that-CL   land   rice   grown PRT very big so   very valuable
'That piece of land (topic), rice grows very big, so it (the land) is very valuable.'

In (2.8), the topic *na-kuai tian* 'that piece land' (=that piece of land) is the controller of the null subject of the subsequent clause.

An important distinction between the subject and the topic is that the subject can be the anaphoric antecedent of a reflexive object but the topic cannot (c.f. Li and Thompson 1981). The following examples are adapted from Li and Thompson (1976: 478).

(2.9) a. *Zhangsan$_i$ xihuan ta-ziji$_i$.*
like   himself

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'Zhangsan likes himself.'

b.   *Zhagnsan$_i$ da ta-ziji$_i$.*

                 hit himself

         'Zhangsan hit himself.'

(2.10) a.   * *Zhangsan$_i$, Lisi xihuan ta-ziji$_i$.*

                    like   himself

        * 'Zhangsan (topic), Lisi likes himself (Zhangsan).

b.   * *Zhangsan$_i$, Lisi da ta-ziji$_i$.*

                 hit he-self

        * 'Zhangsan (topic), Lisi hit himself (Zhangsan).'

In (2.9a) and (2.9b), the subject *Zhangsan* is the anaphoric antecedent of the reflexive object. However, the topic *Zhangsan* in (2.10a) and (2.10b) cannot be the anaphoric antecedent of the reflexive object.

What deserves mentioning in passing is that although a topic is not the semantic argument of a following verb in some cases it must be semantically related to the rest of the sentence in some way; otherwise the sentence will not be acceptable. For example, in (2.8) the topic, *na-kuai di* (=that piece of land) is not a semantic argument of the verb *zhang* 'grow' in the first clause but it is arguable that this topic is a semantic adjunct to the verb. Specifically, the rice grows well in that piece of land. The topic expresses the location for the rice-growing event. A sentence wherein the hanging topic is semantically unrelated to the following clause is unacceptable. This is illustrated in (2.11).

(2.11)   * *Zhangsan, Lisi manmande zha-zhe   yanjing.*

                     slowly   blink-PROG   eyes

        * 'Zhangsan (topic), Lisi was slowly blinking his eyes.'

In a sentence like (2.11), there is not any semantic relationship between the topic *Zhangsan* and the following clause - such a sentence is unintelligible. It has always been claimed that there is an 'aboutness' relation between the topic and the rest of the sentence (called the comment in Chao (1968) and Li and Thompson (1981)). This aboutness is an underspecified semantic relationship between the topic and the comment (the clause following the topic). The underspecified semantic relationship can always be enriched into a specific semantic relationship in context.

2.6 Peripheral Syntactic Functions

The above description of the syntactic functions has provided us with an overview of the relevant basic grammatical forms of Mandarin Chinese. In this section, I enrich this overview by describing some peripheral syntactic functions. In this work these syntactic functions are collectively called syntactic adjuncts since they are optional for the well-formedness of context-independent sentences. Semantically, these adjuncts do not express the participants of an event but express the time, duration, frequency, manner, cause, location, and modality of an event. In terms of syntactic distribution, most of these adjuncts appear in the preverbal domain and only a few appear in the postverbal domain.

2.6.1 Preverbal Adjuncts

The preverbal adjuncts exhibit diversity of syntactic distribution. Some of them can appear either before or after the subject but others can appear only after the subject.

(2.12) a. <u>*Huoxu*</u> *Zhangsan qu-guo   Beijing*.

perhaps   go.to-EXP

'Perhaps Zhangsan went to Beijing.'

b.   *Zhangsan <u>huoxu</u> qu-guo   Beijing*.

perhaps go.to-EXP

'Perhaps Zhangsan went to Beijing.'

In (2.12a), *huoxu* 'perhaps' appears in the sentence-initial position. In (2.12b) the same adjunct follows the subject. Similar to the modality adjunct, the time adjunct can either precede the subject or follow the subject as is illustrated below.

(2.13) a.　　*Zuotian Zhangsan qu-guo　Beijing.*

　　　　　yesterday　　　　go.to-EXP

　　　　　'Yesterday Zhangsan went to Beijing.'

　　　b.　　*Zhangsan zuotian　qu-guo　　Beijing.*

　　　　　　　　yesterday go.to-EXP

　　　　　'Yesterday Zhangsan went to Beijing.'

In contrast, the adjuncts of other types are not allowed to precede the subject or only reluctantly precede the subject.

(2.14) a.　?　*Jingchang Zhangsan lai　kan　wo.*

　　　　　often　　　　　come see　I

　　　b.　　*Zhangsan jingchang lai　kan wo.*

　　　　　　　often　　come see I

　　　　　'Zhangsan often comes to see me.'

Jingchang 'often' in (2.14) is a frequency adjunct. The appearance of this adjunct before the subject is only marginally acceptable but its appearance after the subject is fully acceptable.

The adjunct of manner usually follows the subject. It can precede the subject only in some poetic texts. Putting the manner adjunct in front of the subject makes an everyday sentence peculiar.

(2.15) a. *Ta qiaoqiaode zou-le*.

she steathily   walk-PFT

'She left steathily.'

b. ?*Qiaoqiao-de ta   zou-le*.[5]

steathily   she walk-PFT

2.6.2 Postverbal Adjuncts

The postverbal adjuncts are rather restricted semantically and syntactically. In intransitive sentences, the postverbal adjunct is usually a duration adjunct or frequency adjunct.

(2.16) a. *Zhangsan zou-le   san   tian*.

walk-PFT three day

'Zhangsan walked for three days.'

b. *Zhangsan lai-le   san   ci*.

come-PFT three time

'Zhangsan came three times.'

In transitive sentences, adjuncts may either appear between the verb and the object or follow the object. This distribution, however, is not free (c.f. Li and Thompson 1981). If the object is definite or human, an adjunct can either stand between the

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[5] A very famous Chinese poet Xu Zhimo in the early 20th century wrote a popular poem describing his farewell to the University of Cambridge: *qingqing-de wo zou-le, zhengru wo qingqing-de lai.* (=Lightly I leave, just as I lightly come); in the first part of the sentence, the manner adjunct *qingqing-de* 'lightly' precedes the subject *wo* 'I', but in the second part of the sentence, the same adjunct follows the subject.

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verb and the object or follow the object, e.g. (2.17a) and (2.17b). If the object is indefinite/generic and non-human, an adjunct can appear only between the verb and the object, which is illustrated in (2.18a) and (2.18b).

(2.17) a.   *Zhangsan kan-le   Lisi bantian*.

                         watch-PFT   quite.a.moment

                         'Zhangsan watched Lisi for quite a while.'

        b.   *Zhangsan kan-le   bantian   Lisi*.

                         watch-PFT quite.a.moment

                         'Zhangsan watched Lisi for quite a while.'

(2.18) a.   *Zhangsan kan   bantian   shu*.

                         watch quite.a.moment book

                         'Zhangsan read books for quite a while.'

        b.   * *Zhangsan kan   shu   bantian*.

                         watch book quite.a.moment

Additionally, some adjuncts may appear either in the preverbal position or in the postverbal position and produce different semantic effects. For example, the duration adjunct can appear in the preverbal position when the sentence expresses a telic event, i.e. an event with an endpoint, but it appears in the postverbal position when the sentence expresses an atelic event, i.e. an event without an endpoint.

(2.19) a.   *Zhangsan san   fenzhong chi-le   liang-wan fan*.

                         three minute   eat-PFT two-CL   rice

                         'Zhangsan ate two bowls of rice in three minutes.'

        b.   *Zhangsan chi-le   san   fenzhong (*liang-wan) fan*.

                         eat-PFT three minute   two-CL   rice

                         'Zhangsan ate (*two bowls of) rice for three minutes.'

The compatibility of a sentence with a preverbal duration adjunct or a postverbal duration adjunct can be used as the diagnostics for telicity/atelicity. I will adopt these diagnostics for the remainder of this thesis.

Aside from these postverbal adjuncts, some other syntactic elements (not including the sentence-final particles or the postverbal aspect markers) may also appear in the postverbal area. The following two sentences illustrate this point.

(2.20) a.   *Pingguo*, *Zhangsan chi-le*   *san-si-ge*.

        apple   eat-PFT three-four-CL

        'Apple, Zhangsan ate three or four.'

    b.   *Ditan shao-le*   *yi-ge   dong.*

        rug   burn-PFT one-CL hole

        'The rug was burnt and there was a hole in it.'

For (2.20a), there is a topic *pingguo* 'apple' in the sentence and there is a stranded quantifier (a numeral plus a classifier) in the postverbal position. The question is whether such a stranded quantifier is an adjunct or something else. Since this expression is closely related to a participant of the event, unlike the duration adjunct or frequency adjunct which is related to the event as a whole, it is advisable to take this quantifier expression to be an object. There is some debate in the literature about cases like (2.20b) where the postverbal element is not a typical semantic argument of the verb and is optional for the well-formedness of the sentence. Considering its syntactic optionality, I provisionally take it to be an adjunct[6].

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[6] If we are allowed at this stage of discussion to assume that the meaning of sentence involves an implicit resultative predicate, the adjunct will be regarded as the object of the implicit predicate. But I will not do this without sufficient evidence in this chapter.

2.7 Summary

The general goal of argument realization is to make out the rules that govern the mapping between semantic roles and grammatical forms. In this study, the grammatical forms in Mandarin are called syntactic functions. The syntactic functions defined in this chapter include the subject, the (first and the second) objects, the topic and various adjuncts. This thesis will focus mainly on the correspondence between semantic roles on the one hand and the subject and objects defined above on the other hand.

Chapter Three
Various Approaches to Argument Realization in the Literature

3.1 Introduction

In this chapter I will review several general approaches to argument realization found in the literature. As in the previous chapters, this literature view starts with an introduction to some basic concepts that are widely used in the literature. The concepts include argument structure and semantic role.

Section 3.2 is about argument structure and semantic role. Section 3.3 is a review of the literature on argument realization covering three general approaches to this issue, including theories with thematic roles as primitives, theories without thematic roles and theories based on event structures. This review serves three purposes: it shows that there is a putatively recognized principle of argument realization across many previous works; and through this review I will point out the problems or flaws that previous approaches face, and I will extract useful ideas from previous works. Section 3.4 is the conclusion, where the problems to be solved and the working hypotheses to be adopted in this thesis are summarized.

3.2 Two Basic Concepts in Argument Realization

Argument structure and semantic role are concepts widely used in the literature on argument realization. Like many other linguistic terms such as case and syntactic function, the two concepts are used in diverse ways by linguists with different theoretical backgrounds. In this section, I will briefly discuss what argument structure and semantic role are.

3.2.1 Argument Structure

There is a major ongoing debate about the nature of argument structure. Some (Jackendoff 1990 and 1992; Pustejovsky 1995) claim that it is a structured representation of the lexical semantics of a verb. Others (Alsina 1996, 2001; Manning 1996; Grimshaw 1990; Bresnan 1995; Mohanan 1994) take argument structure to be an abstract syntactic representation. In fact, there is further split among linguists who hold similar views. For example Jackendoff and Pustejovsky's definitions of argument structure are not exactly the same although they both claim that argument structure is a lexical semantic structure. Likewise, Grimshaw and Bresnan's definitions of argument structure differ although they both claim that argument structure is a syntactic construct. Furthermore, these linguists adopt different theoretical frameworks and therefore the argument structures that they define interact with other parts of the theoretical models of grammar in different ways.

For those who claim that an argument structure is a syntactic representation, a verb takes a particular number of syntactic arguments. The number of arguments that the verb can take is an arbitrary syntactic property of the verb. On the other hand, a verb has a lexical semantic structure in which semantic information is stored. The lexical argument structure determines the syntactic behaviour of the verb and the lexical semantic structure gives the semantic content of the verb. In Grimshaw (1990), an argument structure is taken to be part of a lexical entry and it interfaces with the lexical semantic structure on one side and with D-structure on the other. The argument structure of a verb is derived from its lexical semantic structure and the arguments in the verbal argument structure are mapped onto the syntactic positions in the deep structure of a sentence where the verb appears. For example, the verb *announce* in English has the argument structure *announce* (Agent(Goal(Theme)) (c.f. Grimshaw 1990: 4 (6)). In this argument structure, there are three arguments. The

three arguments respectively have Agent, Goal and Theme roles. The left-to-right linear order represents the rankings of thematic prominence of the three thematic roles. The thematic rankings of the arguments determine how they are mapped onto D-structure (deep structure) hypothesized in the framework of Government and Binding. The general principle of argument realization based on thematic prominence will be discussed in Section 3.3.

Grimshaw claims that the argument structure of a lexical item is largely predictable from its meaning. The organization of the argument structure for a predicate is taken to be a reflection of its lexical semantics and the argument structure of a predicate is supposed to be derivable from its lexical semantics. Specifically, only a part of the lexical semantic information of a verb is syntactically relevant - semantic roles entailed by the verb. Grimshaw suggests that it is semantic roles in the argument structure of a verb rather than anything else that are mapped onto the syntactic positions on D-structure.

Similarly Mohanan (1994) and Bresnan (1995), who work in the framework of Lexical-Functional Grammar, distinguish lexical argument structure from lexical semantic structure and assume that an argument structure is a structural representation of the syntactic arguments and their relative rankings of semantic prominence. In an argument structure, there are two types of information: one is the arity of the verb, i.e. the number of syntactic arguments; the other is the relative thematic prominence of the arguments. However, specific information about semantic roles is not stored in the argument structure. This approach differs from Grimshaw (1990), who hypothesizes that the arguments in the argument structure of a verb map onto the syntactic positions in the deep structure of a sentence. Mohanan (1994) and Bresnan (1995) hypothesize that the arguments in the argument structure of a verb are mapped onto grammatical functions (subject, object and oblique) on

the abstract functional-structure (f-structure) which itself is related to constituent structure (c-structure) via functions encoded in c-structure rules. In other words, semantic roles associated with verbs in this framework are not directly mapped onto surface syntactic structures. An intermediate level of representation, f-structure, is postulated. To sum up, those who take argument structure to be syntactic in nature assume that argument structures only accommodate syntactically relevant semantic information. Of course they differ from each other in many other aspects, which I will not elaborate on here.

Pustejovsky (1995) is representative of those who take an argument structure to be a semantic structure. In his generative lexicon framework, Pustejovsky claims that an argument structure is a necessary component of lexical semantics. Pustejovsky (1995: 63-64) distinguishes four types of arguments for lexical items:

(a)   TRUE ARGUMENTS are syntactically realized parameters of the lexical item, e.g. *John* in the sentence *John arrived late*.

(b)   DEFAULT ARGUMENTS are those arguments that are not necessarily expressed. And such arguments can be expressed in the qualia structure (a structural representation of the secondary semantic contents), e.g. *out of bricks* in the sentence *John built the house out of bricks*.

(c)   SHADOW ARGUMENTS are those parameters which are semantically incorporated into the lexical item. For example, *with an expensive butter* in the sentence *Mary buttered her toast with an expensive butter* is a SHADOW ARGUMENT of the verb *butter*.

(d)   TRUE ADJUNCTS are the parameters which modify the logical expression but are part of the situational interpretation and are not

tied to any particular lexical item's semantic representation such as *on Tuesday* in *Mary drove down to New York on Tuesday*.

In this Pustejovskian lexical semantic representation, all the information that is related to a verb is included but the information is classified into different types. Importantly, the 'semantic arguments' are divided into those which are obligatorily realized in syntax and those which are optionally realized in syntax. This distinction, however, is what motivates the separation of argument structure and semantic structure as different constructs for Grimshaw (1990) and others who take argument structure to be syntactic in nature.

The dispute about whether argument structure is semantic or syntactic is largely related to the dispute over what constitutes the lexical semantics of a verb. If one hypothesizes that the lexical semantic content of a verb is far richer than the syntactically relevant information, then it is reasonable to take argument structure to be a level of representation independent of lexical semantics. In contrast, if one hypothesizes that the lexical semantic content of a verb is restricted to the semantic roles that are entailed by verbs, then it is not unreasonable to take an argument structure to be the full representation of the lexical semantic content of a verb. Other information related to a verb can be treated as part of the speakers' world knowledge rather than part of lexical semantics. For example, *kick* in English typically entails two arguments, the kicker (agent) and the kicked (patient). A question is whether the information including time, place, manner and so on should be treated as part of the lexical semantics of the verb *kick*. The answer to this question varies. It involves a dispute over the distinction between lexical meaning and pragmatically inferred meaning, which is still plaguing the philosophy of language (see Cappelen and Lepore 2005: ix for a latest recall of this long-lasting dispute). I do not attempt to answer this question in this thesis. Instead, I assume that if a verb expresses an event,

the participants of this event must be represented in the argument structure of the verb but the circumstantial roles such as time and location are included in the argument structure of non-verbal predicates, which interact with verbs predicates through sharing an event argument (c.f. Davidson 1967; see Chapter 6 for details). In other words, arguments and adjuncts are not just syntactically different; they have different semantic relationships to the predicate expressed by a verb. This actually constitutes a semantic explanation of the difference between arguments and adjuncts that have been frequently mentioned in the literature[7].

3.2.2 Semantic Role

Semantic role is also known as thematic role. This concept has been used many times without clear definition in the previous chapters. A semantic role may refer to either a specific role entailed by a specific verb, such as the killer or the killed entailed by the verb *kill*, or a rough-grained semantic role, such as AGENT, PATIENT, GOAL, EXPERIENCER, LOCATION, THEME or INSTRUMENT. A list of the coarse-grained semantic roles that are usually mentioned in the literature is given below (Andrews 1985: 68-71).

> AGENT: a participant which the verb specifies as doing or causing something, possibly intentionally.
>
> PATIENT: a participant which the verb characterizes as having something happen to it, and as being affected by what happens to it.
>
> LOCATION: a circumstantial role that gives the location of a participant, rather of the event or state as a whole.
>
> EXPERIENCER: a participant who is characterized as aware of something.
>
> RECIPIENT: a participant who receives something.

---

[7] Some works, such as Marten (2002), claim that arguments and adjuncts are alike since they have many similarities. My argument is that if they are treated alike, the dissimilarities are left unaccounted for. Therefore, it is still necessary to distinguish arguments and adjuncts.

THEME: a participant which is characterized as being in a state or position, or changing its state or position.

CAUSER: a participant who causes something, but does not act intentionally.

Attention should be paid to the distinction between the lexical semantic meaning of an expression and the semantic role it receives from a verb. For example, the proper names like *London, Shanghai* and *New York* refer to places - these are their lexical semantic contents rather than their semantic roles. They can be understood as themes in some sentences such as *Beijing/Shanghai/London/New York is very big*. Similarly, the temporal expressions like *this morning*, *the year 2000* and *the whole day* can receive the theme role in the sentence like *this morning/the year 2000/the whole day was too short*. Semantic roles have different theoretical statuses in different theories of argument realization. In some theories of argument realization, they are theoretical primitives. In others, they are taken to be secondary concepts or just mnemonic tags. Some representative argument realization theories in the literature are reviewed in the following section.

3.3 Theories about Argument Realization

Since the 1960s, a number of competing approaches to argument realization have been proposed but none of them has ever been able to account for all the attested semantics-syntax mapping phenomena in familiar languages. These different approaches are reviewed below. This review will show what the different approaches implicitly share a hypothesis although they differ in many aspects.

3.3.1 Mapping Algorithms with Thematic Roles as Primitives

It has long been hypothesized that there are a set of language-universal semantic roles (like, but not necessarily the same as, those given in 3.2.3). Fillmore (1968:33) proposes a semantic role-based argument mapping algorithm: 'If there is an A[gent], it becomes the subject; otherwise, if there is an I[nstrument]', it becomes the subject;

otherwise the subject is the O[bjective].' Based on this observation, a hierarchy of semantic roles can be established. On this hierarchy semantic roles stand next to each other according to their priorities of being realized as the subject and the object. Many linguists hypothesize that there is a language-universal thematic hierarchy. However, different versions of universal thematic hierarchy have been suggested by different theorists (Gruber 1965, 1976; Jackendoff 1972; Givón 1984; Foley and Van Valin 1984; Kiparsky 1985; Bresnan and Kanerva 1989; Grimshaw 1990)[8]. Levin and Rappaport-Hovav (2005) collect sixteen different hierarchies from the literature. A sample of five different versions of universal thematic hierarchy are quoted below (c.f. Levin and Rappaport-Hovav 2005: 162-163)

Fillmore (1971)

  Agent > Experiencer > Instrument > Patient > Goal/Source/Location

Baker (1989)

  Agent > Instrument > Theme/Patient > Goal/Location

Bresnan & Kanerva (1989)

  Agent > Beneficiary > Recipient/Experiencer > Instrument > Theme/Patient > Location

Givón (1984)

  Agent > Dative/Benefactive/Patient > Location > Instrumental/Associative > Manner

Van Valin (1993)

  Agent > Effector > Experiencer > Locative/Recipient > Theme>Patient

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[8] Some linguists suggest that the different priorities of these thematic roles in being realized as the grammatical subject is a reflection of some cognitive saliency of the thematic roles. For more discussions, see Bresnan and Kanerva (1989); Fillmore (1977); Givón (1984); Dik (1997) among many others. Jackendoff (1990) (c.f. Rappaport-Hovav and Levin (2004)) define the prominence of thematic roles in terms of the depth of embedding of the roles in the structure of event denoted by a verb. Larson's (1988) definition of prominence is based on the order of composition of arguments with the verb.

Croft (1998) points out that the main problem with thematic hierarchy theories is that there is no consensus on how many thematic roles are necessary although every theorist assumes that those roles they choose are necessary. Dowty (1989, 1991) (c.f. Beaver 2006: 238) notes that the number of roles can and to some degree do proliferate as more and more subtle distinctions are made. As the number of thematic roles varies across various 'universal' hierarchies, the rankings of the thematic roles change as well. For example, the rankings of locative and the theme on Van Valin's hierarchy are the reverse of those of the same thematic roles on other hierarchies having the same two roles, which implies neither Van Valin's rankings nor other rankings can be used to directly account for all patterns of argument realization.

Additionally, in spite of the differences between them, the relative rankings of the recipient and the theme on Van Valin's (1993) hierarchy and Bresnan & Kanerva's (1989) both face empirical challenges from argument alternation. For example in English the *giving*-event can be expressed in at least two ways: *John gave Mary a flower* and *John gave a flower to Mary*. If arguments are mapped onto syntactic structures strictly according to their relative rankings on the universal thematic hierarchy, this variation of argument realization should be forbidden.

Another challenge against the thematic hierarchy approach is that an event can be expressed by different verbs whose arguments are realized in opposite ways. For example, *frighten* and *fear* in English are said (see Grimshaw 1990) to express the same event but their arguments are realized in different ways: *John frightened Mary* but *Mary feared John*. No single thematic hierarchy theory can directly explain the co-existence of these alternative patterns of argument realization. Grimshaw (1990) suggests that this problem can be solved through assuming a causative tier in

addition to the thematic tier; one argument that ranks lower than another on the thematic tier may rank higher than the latter on the causative tier; and the rankings of the arguments on the causative tier determine how the arguments are realized syntactically. With the introduction of the causative tier, Grimshaw gives an explanation of the puzzle of *frighten* versus *fear*. The theme of *frighten* obtains the most prominent role on the causative tier and is realized as the subject although it ranks lower than the experiencer on the thematic tier. Introducing a causative tier that overrides the thematic tier can explain some cases that cannot be accounted for by the thematic hierarchy alone. However, this theory still does not account for the argument alternation involving the verb *give*[9].

In spite of the diversities of thematic roles and thematic rankings across different thematic hierarchies, the agent is always included and has the highest ranking. This is also the least disputable aspect of various thematic hierarchy-based theories. This hypothesis faces a challenge from the agentive inversion phenomenon that has been introduced; that is, in Chinese, *Yi-guo rou chi wu-ge ren* 'one-CL rice eat five-CL person' (=One pot of meat feeds five people who eat it) is a sentence where the agent is realized as the object and the patient is realized as the subject. The hypothesis that the agent is the most prominent role and is always realized as the subject when it must be realized cannot directly explain the phenomenon of the agentive inversion construction where the agent is realized as the object and a less

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[9] Rappaport-Hovav and Levin (2004) note that the two-tier theory cannot explain why verbs such as *see* or *love* do not have corresponding causative verbs as *fear*. I think this criticism is not right because the two-tier theory provides only the necessary condition for the *fear/frighten* alternation rather than the sufficient condition. That is, it is not necessary that every verb (in English) semantically similar to *fear* must have a corresponding *frighten*-type counterpart. Put straightforwardly, the pairing of *fear* and *fright* is an epiphenomenon arising from comparing the lexical properties of two different verbs, not necessarily predictable on the basis of any potential strict cognitive principle.

prominent role is realized as the subject. Various specific solutions to this challenge have been proposed and I will discuss these further in due course.

To conclude, it appears hopeless to formulate a single thematic hierarchy that can cover all the generalizations (Rappaport-Hovav and Levin 2004). In Newmeyer's (2002:65) words, 'There is reason for strong doubt that there exists a Thematic Hierarchy provided by UG. That seems to be the best explanation for the fact that after over three decades of investigation, nobody has proposed a hierarchy of theta-roles that comes close to working.' These criticisms cast an air of deep pessimism over the thematic hierarchy approach to argument realization. Facing this situation, theorists have different responses. Some chose to formulate theories of argument realization without invoking the notion of thematic hierarchy. Others seek to improve the thematic hierarchy approach through deconstructing the thematic hierarchy and looking for more fine-grained semantic factors that regulate the patterns of argument realization. Some of these responses to the challenges to the thematic hierarchy theories are proposed in the literature and they are reviewed below.

3.3.2 Mapping Theories without Thematic Hierarchy

There are theories in which the mapping rules are formulated without a thematic hierarchy taken to be a theoretical primitive. In this section I review the localist approach, the semantic entailment approach, and the aspectual role approach.

3.3.2.1 Localist Approach

In the localist approach to semantics-syntax mapping (Gruber 1965; Jackendoff 1972, 1976, 1990; Anderson 1971/1977 among many others), all events are reduced to motion and location events. The semantic roles are reduced to a small inventory of localist roles involved in motion and location events. The mapping of arguments onto syntax is then regulated by iconic correspondence between the localist roles in

location and motion events on the one hand and grammatical functions on the other. This means that no matter how many different semantic roles are recognized, they are not directly visible to the mapping algorithms - they are reduced to (or mapped as) theme, path, goal and source which, in turn, map iconically onto syntax. The localist approach encounters empirical challenges as well. Levin and Rappaport-Hovav (2005) indicate that the localist role theme is sometimes the subject, for example in *the scooter belongs to Taylor* and sometimes the object, for example in *Taylor owns the scooter*. The iconic way of mapping between the localist roles and grammatical functions such as subject and object in English does not hold strongly. The question is whether the semantic roles that *own* entails are the same as those that *belong to* entails. If they do not, we do not have to be worried about why these two verbs co-exist. A real problem with the localist approach is that the localist roles cannot distinguish the semantic difference between *belong to* and *own* since these two verbal expressions are taken to be identical in terms of the semantic roles that they entail, which however strongly goes against native speakers' intuition. What's more, the localist assumption presupposes the assumption that various specific semantic roles entailed by different verbs must be reduced to localist roles. This in turn implies that there is a need to establish the rules of reducing verb-specific semantic roles to localist roles; otherwise the localist reduction is as suspect as theorists' arbitrary speculation.

Although the localist approach does not fare well, it provides a new perspective for seeking the potential mapping algorithms. It can be imagined that if there are semantic factors other than thematic roles that work as the semantic primitives in mapping algorithms, then mapping between thematic roles and their morphosyntactic forms will be just an epiphenomenon. In this case, it won't be surprising that there are so many mismatches between semantic roles and syntactic structures. This way of thinking is exhibited in the Proto-Role theory (Dowty 1991)

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and the aspectual role theory (Tenny 1994). For these two approaches, semantic roles are retained as the mnemonic tags of the arguments and what is at work in mapping the arguments onto morphosyntax is not the relative rankings of semantic roles but other semantic factors and semantic roles are dragged along by the working semantic factors this way and that, which explains why no single thematic hierarchy ever proposed can accommodate all the attested patterns of argument realization. The Proto-Role theory and the aspectual role theory are introduced below. These approaches do not resort to reduction of semantic roles to other semantic factors.

3.3.2.2 Mapping Algorithms with Semantic Entailments as Primitives

Dowty (1991), following earlier works by Ladusaw and Dowty (1988) and Dowty (1989), proposes two sets of lexical semantic entailments as the primitives for the mapping algorithms. The two sets of entailments are the Proto-Agent entailments and the Proto Patient entailments. The lexical entailments are the properties assigned by the predicate to its arguments. A set of algorithmic rules of semantics-syntax mapping are formulated in terms of the correspondence between the proto-agent and the proto-patient on the one hand and the subject and the object on the other hand. Proto-Agent argument entailments and Proto-Patient entailments are given below (Dowty 1991:572):

PROTO-AGENT:

    i.   volitional involvement in the event or state

    ii   sentience (and/or perception)

    iii   causing an event or change of state in another participant

    iv.   movement (relative to the position of another participant)

    v.   exists independently of the event name by the verb

PROTO-PATIENT:

    i.   undergoes change of state

ii.   incremental theme

iii.   causally affected by another participant

iv.   stationary (relative to movement of another participant)

v.   does not exist independently of the event, or not at all

With these primitives, the following mapping algorithm is formulated.

ARGUMENT SELECTION PRINCIPLE (Dowty 1991: 576)

In predicates with a grammatical subject and object, the argument for which the predicate [lexically] entails the greatest number of Proto-Agent properties will be lexicalized as the subject of the predicate; the argument having the greatest number of Proto-Patient will be lexicalized as the direct object.

In this theory the arguments are not compared in terms of their rankings on a thematic hierarchy but rather in terms of the relative number of proto-agent or proto-patient entailments that they obtain. The arguments of different verbs may have different numbers of proto-agent or proto-patient entailments. Thus the argument realization patterns of the verbs that are semantically similar to each other may have different argument realization patterns since their arguments do not have equal number of entailments of the two kinds. The above argument realization principle has two corollaries:

COROLLARY 1: (ibid)

If two arguments of a relation have equal numbers of entailed Proto-Agent and Proto-Patient properties, then either or both may be lexicalized as the subject (and similarly for objects)

COROLLARY 2: (ibid)

> With three-place predicates, the non-subject argument having the greatest number of entailed Proto-Patient properties will be lexicalized as the direct object and the non-subject argument having the fewer entailed Proto-Patient properties will be lexicalized as an oblique or prepositional object (and if two non-subject arguments have approximately equal numbers of entailed P-Patient [sic] properties, either or both may be lexicalized as direct object).

The two corollaries can predict some possible argument alternation patterns. Corollary 1 predicts the two arguments are alternatively realized as the subject as long as they have equal number of proto-agent entailments. Corollary 2 predicts two arguments are realized as the object and the oblique alternatively. This approach can avoid the disadvantage that the theories assuming strict thematic rankings of semantic roles suffer. It allows the verbs that are semantically similar to each other not to have exactly the same argument realization patterns and allows a single verb to have alternative patterns of argument realization.

It should be pointed out that the Proto-Role theory is limited in terms of the scope of application. The mapping principle and its corollaries cannot predict what will happen when the argument of a three-place verb that has the largest number of proto-agent entailment is not realized. If one of the two arguments that do not have the largest number of proto-agent entailments is to be realized as the subject, we do not know which will be the favoured candidate.

Let's take the English verb, *place*, for example. It is indisputable that the agent has more Proto-Agent properties than the theme and locative arguments. This prediction is borne out by (3.1), in which the agent is the subject, the theme is the object and

the location is the oblique, i.e. the object of a preposition. But when the agent is not realized, the theme and the location can be realized as the subject and the object alternatively; for example (3.1b) and (3.1c) (Bresnan 1994: 78 (18)-(20)).

(3.1) a.   *Susan has placed a tarte Tatin on the table.*

　　　 b.   *A tarte Tatin has been placed on the table.*

　　　 c.   *On the table has been placed a tarte Tatin.*

This alternation is observed crosslinguistically. Take the verb *fang* 'put' in Chinese for example. The example in (3.2a) is predicted by Dowty's mapping principle directly.

(3.2) a.   *Zhangsan fang-le ji-ben   shu   zai   zhuozi-shang.*

　　　　　　　　 put-PFT several-CL book LOC   table-top

　　　　　　 'Zhangsan put some books on the table.'

　　　 b.   *Zhuozi-shang fang-le ji-ben   shu.*

　　　　　　 table-top   put-PFT several-CL book

　　　　　　 'On the table was put several books.'

　　　 c.   *Ji-ben   shu fang zai zhuozi-shang.*

　　　　　　 Several-CL book put LOC table-top

　　　　　　 'Several books were put on the table.'

In a placement event, the theme obviously has obviously undergone a change of place and the location is a position relative to which a movement happens. This means that the theme should be realized as the subject and the location is realized as the object. This predicts (3.2c), in which the theme is realized as the subject and the location as the object but it does not predict (3.2b) where the location is realized as the subject and the theme as the object.

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Similarly, the locative inversion in Chicheŵa (c.f. Bresnan and Kanerva 1989) also poses an empirical challenge to the Proto-Role theory. As in Chinese and English, the location and the theme can be realized alternatively as the subject and the object although they do not have equal number of proto-agent entailments. These cases are illustrated by (3.3) (Bresnan 1994: 54(1b) and (2b)).

(3.3) a. *A-lendô-wo a-na-bwé-á*   *ku-mu-dzi.*

2-visitor-2 those-SUB-REC-PST-come-IND 17-3-village

'Those visitors came to the village.'

b. *Ku-mu-dzi   ku-na-bwé-á   a-lendô-wo.*

17-3-village 17 SUB-REC PST-come-IND 2-visitor-2 those

'To the village came those visitors.'

In (3.3a), the theme, i.e. the people who undergo movement, is realized as the subject and the location as the object as predicted by the Proto-Role theory. In (3.3b), however, the location is realized as the subject, and the theme, which moves, is realized as the object. This is not straightforwardly predicted by the Proto-Role theory.

Another empirical fact not covered by Dowty's algorithms comes from the Bantu language Kichaga (c.f. Bresnan and Moshi 1990). In this language the applicative transitive verb can take three arguments, the agent, the patient and the beneficiary. The patient has the proto-patient entailments including 'undergo change of state', 'incremental theme' and 'causally affected by another participant' and it does not have any proto-agent properties. The beneficiary has the proto-agent entailment 'sentience' and the proto-patient entailments 'undergoes a change', 'casually affected by another participant'. According to Dowty's algorithm, when all the three

arguments are realized, the agent is realized as the subject, the patient as the object and the beneficiary as the oblique/prepositional object. The prediction is corroborated by the transitive sentence in Kichaga, e.g. (3.4a) (Bresnan and Moshi 1990: 148: (2)).

(3.4) a.   *N-a̋-ı̋-lyì-í-à*   *m̀-kà k-élyà*

             FOC-1 S-PR-eat-AP-FV   1-wife 7-food.

             'He is eating food for/on his wife.'

But when the agent is not realized, either of the other two non-subject arguments can be realized as the subject with the other as the object, e.g. (3.4b) and (3.4c) (ibid:150: (5b/5c)).

(3.4) b.   *M̀-kà n-a̋-ı̋-lyì-í-ò*   *m̀-kà*

             1-wife FOC-1-S-PR-eat-AP-PAS 7-food

             'The wife is being benefited/adversely affected by some one eating the food.'

      c.   *K-èlyá k-ı̋-lyì-í-ò*   *m̀-kà*

             7-food 7S-PR-eat-AP-PAS 1-wife

             'The food is being eaten for/on the wife.'

In (3.4b), the beneficiary is the subject and the patient the object; in (3.4c), the patient is the subject and the beneficiary the object. It can be easily noticed that the beneficiary has a proto-agent entailment 'sentience' and the patient has no proto-agent entailment but the proto-agent entailment of the beneficiary does not equip the beneficiary with any priority in being expressed as the subject. This puzzling fact lies beyond the scope of the Proto-Role theory.

The well-known locative alternation in English involving the verbs like *spray* and *load* is equally a challenge. The following examples, mentioned in many works, are taken from Goldberg (2006: 36)

(3.5) a.   *Pat loaded the wagon with the hay*.

       b.   *Pat loaded the hay onto the wagon*.

(3.6) a.   *Pat sprayed the wall with paint*.

       b.   *Pat sprayed paint onto the wall*.

Intuitively, *wagon* and *wall* in the above two events have three proto-patient entailments: i) 'undergoes change of state'; iii) 'causally affected by another participant' and iv) 'stationary (relative to movement of another participant'; *hay* and *paint* have two proto-patient entailments: i) undergoes change of state and iii) causally affected by another participant[10]. According to Dowty's algorithms, *wagon* and *wall* should be realized as the object, and *hay* and *paint* as the oblique. This prediction is consistent with (3.5a) and (3.6a) but is challenged by (3.5b) and (3.6b).

Besides, it has been suggested by some linguists (Davis 2001; Rappaport-Hovav and Levin 2005) that not all lexical entailments have equal power in affecting actual mapping. Davis (2001) points out that the ultimate causer of a causativized verb is invariably the subject, regardless of the proto-agent lexical entailments of the causee (the demoted subject). Davis also notes that it is not necessary that the causer be always more proto-agentive than the cause. For example in the Finnish sentence given in (3.7) (c.f. Beavers 2006: 25 (9a)), the causee presumably has both 'volition' and 'sentience' entailments while the causer has only causation entailment.

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[10] It seems that both the theme and the location can get the 'incremental' entailment because the theme is gradually moved onto the location and the location is gradually occupied. In this situation, 'incremental' entailment does not have any effect on the priority of argument realization because both arguments have this entailment and its effect is cancelled out.

(3.7)   *Uutinen   puhu-tt-i   nais-i-a   pitkään.*

          News-item talk-CAUS-PAST woman-PL-PART long-ILL

          'The news made the woman talk for a long time.'

Actually, Dowty does not make it clear whether the verbs the Proto-Role theory deals with are simple verbs or complex verbs. If Dowty's theory is restricted to simple verbs, the data from Kichaga and from Finnish may not be real problems since these data respectively involve applicative verbs and causative verbs, neither of which are simple verbs. But the locative inversions in Chinese, English and Chicheŵa which all involve simple verbs at least on the surface still remain as problems.

In spite of the theoretical and empirical challenges against the Proto-Role theory, Beaver (2006) adapts this theory in his research on the object/oblique alternation in English. Beaver argues that the implicational relationships among the lexical semantic entailments that Dowty provides are relevant to argument realization algorithms. Beaver (2006) attaches importance to the implicational relationships among the proto-patient semantic entailments in particular. For Beaver, the arguments that have proto-patient semantic entailments all have the characteristic of 'affectedness'. When there is more than one 'affected' argument, there can be an implicational relationship between them, i.e. one argument has the property of totality of affectedness and the other argument has the property of underspecified totality of affectedness. Put straightforwardly, the 'affected' arguments are 'affected' to different degrees: One is 'totally' affected and the other is also affected but it is not clear whether the latter 'affected' argument is totally affected or not. Beaver's argument mapping theory is that in an double object construction (c.f. Beaver 2006: 44), the totally affected argument is realized as the object and the

argument whose totality of affectedness is underspecified is realized as the oblique. The most typical instances that this mapping theory deals with are the *spray/load* locative alternation. I quote the *load* examples that Beaver raises in his work (Beaver 2006: 47(2)).

(3.8) a.   *John loaded the hay onto the wagon*.

       b.   *John loaded the wagon with the hay*.

Following Anderson's (1971/1977) concept of 'holistic' interpretation, Beaver (2006: 48) indicates that when the location is realized as the direct object it must come to be 'completely' filled up. Similarly, when the locatum is realized as the object, it must come to be 'completely' moved. Beaver also cites some diagnostic sentences to support the 'holistic' interpretation claim, which I do not quote to save space (see Beaver 2006: 48 (5)-(7) and 49 (8)-(10)). However, it can be easily noticed, but is unfortunately largely ignored, that the verbs in the examples to illustrate the 'holistic' interpretation or 'total affectedness' of the object in the locative alternation constructions all take the simple past tense (e.g. (3.8)). Beaver argues that he takes advantage of this kind of verb forms into order to avoid the mitigating effect from such operator as modals, negation, tense, aspect and quantification (Beaver 2006: 22). However, I must point out that Beaver's examples go against his intention to avoid the interfering factors because the past-tense form of a verb involves not only tense but also aspect. Therefore, all the examples, whether the sentences under observation such as (3.8) or the diagnostic sentences which are not cited here, are just illustrating the interpretations of some sentences with a particular tense and aspect, i.e. the past-tense plus an unnamed aspect, which is usually related to a perfect aspect reading. It is this unnamed aspect, I argue, that induces the completely affected reading for the object. The evidence for my argument goes as follows.

If the past tense form is replaced with some other forms, the 'holistic' reading of the object cannot hold as strongly as it does in the simple-past-tense sentence; this is illustrated by the sentences given below.

(3.8)   a'.   *John kept loading the wagon with (the) hay.*

     b'.   *John kept loading (the) hay onto the wagon.*

     a''.   *John stopped loading the wagon with (the) hay.*

     b''.   *John stopped loading (the) hay onto the wagon.*

     a'''.   *John was loading the wagon with (the) hay.*

     b'''.   *John was loading (the) hay onto the wagon.*

In the above sentences, the verb *load* appears in *–ing* form and the 'total affectedness' reading of the object obviously do not hold. Beaver might argue that in these sentences the *–ing* form affects the readings of these sentences. If he does so, he argues against himself since the past-tense form of the verb also affects the reading of the sentences where it appears. If the object had an inherent 'total affectedness' reading, the verb form would not be able to cancel this reading. Obviously, such an inherent 'total affectedness' reading does not exist. Arguably, the holistic reading of the objects in (3.8a) and (3.8b) is a result of the interaction of the aspectuality of the sentence, the tense and the world knowledge rather than syntactically encoded[11]. To sum up, the hypothesis on which Beaver develops his own theory about the object/oblique alternation is empirically undermined. And his belief that the simple-past tense form sentence can avoid the mitigating effects from modals, negation, tense, aspect and quantification is totally wrong since even the simplest sentence in English cannot be free of aspect and tense. The location and

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[11] Ronnie Cann (p.c.) points out that even the sentence *John loaded the wagon with some hay but it wasn't enough to fill it* is perfectly acceptable.

theme are both proto-patient roles in comparison with the agent but there is no convincing evidence that 'totality of affectedness' determines which of them is realized as the object.

3.3.2.3 Mapping Algorithms with Aspectual Roles as Primitives

Another approach to argument realization is the aspectual approach. By aspectual approach, different linguists focus on different aspects of aspectuality. Some focus on causal relationship, e.g. Grimshaw (1990), Rappaport-Hovav and Levin (1998) among others. Others focus on the boundedness/telicity/delimitedness, such as Tenny (1987, 1994). In this section, I review Tenny's mapping theory. This theory starts with the Aspectual Interface Hypothesis (AIH) (c.f. Tenny 1994: 2):

> The universal principles of mapping between thematic structure and syntactic argument structure are governed by aspectual properties. Constraints on the aspectual properties associated with direct internal arguments, indirect internal arguments, and external arguments in syntactic structure constrains [sic] the kinds of event participants that can occupy these positions. Only the aspectual part of thematic structure is visible to the universal linking principles.

Under this hypothesis, Tenny proposes her theory of argument realization. She assumes that the direct internal argument plays a fundamental role in aspectual structure since it is the argument which can aspectually 'measure out the event' that the verb refers to (c.f. Tenny 1994: 10).

> MEASURING-OUT CONSTRAINT ON DIRECT INTERNAL ARGUMENTS
> (i) The direct internal argument of a simple verb is constrained so that it undergoes no necessary motion or change, unless it is motion or change which 'measures out the event' over time (where 'measuring

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out' entails that the direct internal argument play a particular role in delimiting the event.)

(ii) Direct internal arguments are the only overt arguments which can 'measure out' the event.

(iii) There can be no more than one-measuring-out for any event described by a verb.

Tenny restricts the applicability of the algorithms to the verbs that can express motion or change and assumes that , in the event expressed by the sentence *John ate the apple up*, only the apple is necessarily changed by being consumed. *John* might also be changed by becoming full, but that is not required in an interpretation of the sentence. Obviously, Tenny's notion of 'necessary change' refers to a change that is necessarily relevant to linguistic expression rather than a necessary change in a cognitive sense since *John* is definitely changed in the event no matter whether he gets full or not. Put otherwise, only the change of the apple is taken to be linguistically relevant.

Since Tenny's theory is formulated on the basis of AIH, this theory is clearly restricted to those verbs which can express events that involve the aspectual roles that Tenny defines. Verbs that do not fall into this group stand beyond the scope of explanation. For example, the verbs *like*, *hate* and *miss* among many others. Therefore, this is a modest theory.

Leaving aside those verbs that do not fall within the scope of explanation, we look into how Tenny accounts for the argument realization of the verbs that entail aspectual roles. Tenny indicates that two verb classes can express events that involve the MEASURE OUT aspectual role. These are the incremental-theme verbs, for example *eat* in *eat an apple*, and the change-of-state verbs, such as *ripen* in *ripen the*

fruit. Tenny also notices that the path object of 'route verbs' can 'measure-out' the event over time, for example *John pushed the car <u>to the gas station</u>*; but the path does not undergo change or motion during the event. Instead, it is the theme that undergoes a change. This means that necessary change and measure-out compete rather than cooperate. Tenny argues that in this case the theme is incorporated into the verb and *push the car* names an event as a whole. The *car-pushing* event is done over a distance. The construal that the theme must change in location along the distance follows from the fact that the event itself travels that course (Tenny 1994: 78). As a result, the path is the only semantic role that has the MEASURE OUT role.

Tenny's argument is interesting but it is problematic because there is evidence that the event expressed by a 'route verb' does not necessarily travel the course expressed by the path expression. Some native speakers of English report that the pushing action can be a momentary event, that is, the agent gives a thrust to the theme and the theme travels a course alone. For example, the sentence *I pushed the ball-pen to Sean* can express an event that the *ball-pen* moved to *Sean* after *I* gave it a thrust. Therefore, the construal of Tenny's example that the *car-pushing* event as a whole travelled the course is just a case-specific pragmatic inference rather than a lexical property of a 'route verb'.

In contrast with Tenny, I argue that the prepositional phrase is predicated of the theme, i.e. the *ball-pen*, rather than the pushing event expressed by the verb and that the path (*to*) *sean* does not measure out the pushing event but rather measures out the movement of the *ball-pen* although the movement is not expressed by an independent verb. If neither the path nor the theme measure out the event expressed by the verb, the mapping of an argument of the 'route-verb' onto the internal argument cannot be predicted by the aspectual role theory. However, if it is assumed that the movement of the theme itself is a 'necessary change' of the theme, i.e. the

'necessary change' does not have to be an object-internal physical change (just like the change of an apple in *John ate an apple*) Tenny's theory is still applicable to 'route' verbs but in a different way. Specifically, the argument that undergoes change of location is realized as the direct internal argument. This revision of the domain of the candidates for the direct internal argument implies that MEASURE-OUT is less important than NECESSARY CHANGE. To digress, in many cases the internal argument of a verb that Tenny (1994) is concerned with undergoes necessary change but does not measure out the event; for example, *John ate apples* does not express a delimited event and *apples* does not delimit the event but undergoes 'necessary change' (see also Verkuyl 1993).

Briefly, the verbs that can fall into the scope of Tenny's aspectual role theory are largely the verbs that express accomplishment (c.f. Vendler 1967) since only these verbs involve an argument that undergoes 'necessary change'. The accomplishment event has complex event structure consisting of an activity and a resultative state. The resultative state involves a semantic role that undergoes 'necessary change'. In these cases, 'necessary change' is sufficient to specify which semantic role is to be realized as the direct internal argument. The concept of 'measure out' itself is theoretically redundant although an argument of 'necessary change' may happen to delimit an event in some cases.

3.3.3 Event Approach

The two theories reviewed below both hypothesize that sentences express events and events have event structures. Semantic roles are mapped onto syntax according to their statuses in event structures. On the other hand, they differ with respect to the definition of event structure. The empirical facts that they are concerned with are not exactly the same.

3.3.3.1 Force-Dynamic Event Structure

Croft (1991) proposes an event structure-based theory of argument realization. Croft looks into the structural constitutions of events in terms of force-dynamic relation. The force-dynamic analysis specifies the transmission of force relationships between participants in events. Croft (1991) hypothesizes that a simple event is a segment of a causal network and involves an asymmetric transmission of force. The participants are distinguished in terms of their roles in a causal relationship. One participant is located on the upstream end in the force-transmission process and the other on the downstream end. The upstream participant is realized as subject and the downstream as object. Croft proposes the following principle concerning the syntactic realization of participants in events (Croft 1998: 31):

'Agents act upon Patients and hence in the physical causation events that are taken to be prototypical of transitive verbs, the Agent is linked to subject and the Patient linked to object....'

In addition, Croft proposes the concept of *profile* to account for some argument alternation phenomena. Croft illustrates the understanding of profile with the pair consisting of *break* and *broken*. It is said that the events denoted by these two words have the same frame or base but *break* profiles the whole process while *broken* profiles only the resultative state. Then the meaning of a verb involves two facets: the specification of the event type and the indication of which part of the event is denoted by the verb. A verb profile is independent of and not inferable from the force-dynamic event structure in the base/frame. Put differently, the force-dynamic event structure is the representation of the physical property of an event or objective property of an event but the profile is a linguistic representation of the physical property of the event.

For events that do not have force-dynamic structure or causal chain such as mental, spatial and possessive events, Croft (1991) suggests that they can be 'coerced' into the force-transmission model. Croft's proposal for the coercion of locative event into causal event is derived from Talmy's (1972, 1983, 1988; c.f. Croft 1991) figure-ground theory. Talmy (c.f. Croft 1991) hypothesizes that spatial configurations are organized into binary asymmetrical relations between figure and ground. Figure-ground configurations are non-causal relations. But when figure and ground are incorporated into the causal sequence, a 'causal' ordering must be imposed on them. Figure is realized as a more prominent syntactic function. For example *the tomato* and *the refrigerator* in the sentence *John put the tomato in the refrigerator* are in a locative relation but one of them is realized as the object and the other the oblique. Specifically, the figure is realized as the object and the ground as the oblique.

Croft emphasizes the fact that the figure-ground relation is only integrated into a causal chain but is not directly converted into a causal event. The figure-first coercion means is that the figure-ground relation becomes a directed cause-result relation: the ground *always* follows the figure in causal directionality. The figure-first coercion principle predicts that when the figure is the object, the corresponding ground is governed by the normal path expression but when the ground is the direct object, the corresponding figure takes an antecedent oblique form, *with*. This contrast can be illustrated by the sentence *Jane sprayed paint on the wall* versus the sentence *Jane sprayed the wall with paint*. In short, Croft argues that when ground is taken to be the end of a force-dynamic chain, it is realized as the object and the figure, which is the object by default, is instead realized as the *with*-marked oblique.

According to the figure-first coercion principle, the prepositions *onto* and *with* have different linguistic values: o*nto* is assumed to express a path while *with* is only a grammatical marker. I do not agree with this treatment of *with* because there is

evidence that w*ith* is not a pure grammar marker but rather has its semantic content. Even the thinnest English dictionary indicates that *with* can mean *having* or *possessing*, for example, *a woman with black hair* means *a woman having black hair*. If we assume that the preposition *with* denotes a possessive event, in which the possessor (recipient) is the figure and the possessum (theme) is the ground, the figure-first coercion principle can predict that the possessor is realized as the object and the possessum as the oblique. In other words, the *spray…onto* form and the *spray…with* form both follow the figure-first coercion principle and there is no distinction of 'markedness' between the two constructions. The difference between the *spray…onto* and *spray…with* is that they involve different resultative subevents. In the former, the resultative event is a locative (*onto*) subevent and in the latter the resultative subevent is a possessive (*with*) subevent. The resultative predicate determines what appears in the object position and what appears in the oblique position.

Treating *with* as a meaningful preposition is also applicable to the analysis of the case of possessum-first coercion. Croft points out that a possessive event can also be integrated into a causal chain. He proposes that the object realization follows the principle of possessum (possessed in Croft's own term)-first coercion principle. Croft takes the sentence *the dean presented an award to the valedictorian* to be a manifestation of the possessum-first coercion principle. However, it is arguable that *to* is not a possessive predicate but a directional/locative predicate. Croft assumes that the sentence *the dean presented the valedictorian with an award* is a marked form in that in this sentence the possessor is coerced into the causal chain. Correspondingly, the possessum is realized as the *with*-marked oblique. In this account, *with* is still taken to be meaningless. However, if we assume that *to* is a predicate expressing a locative event rather than a possessive event and instead assume that *with* is a meaningful preposition expressing a possessive relation, we

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find the *spray…onto/with* alternation and the *present…to/with* alternation can be theoretically unified.

It is shown in (3.9) that the *V…onto/to* construction always expresses a complex event that contains a resultative subevent of location and the *V…with* construction always expresses a complex event that contains a resultative subevent of possession.

(3.9) ALIGNMENT BETWEEN TWO ALTERNATION PARADIGMS

FIRST EVENT	LOCATIVE RESULTATIVE EVENT		POSSESSIVE RESULTATIVE EVENT	
	FIGURE	GROUND	FIGURE	GROUND
Spray	*the paint on*	*the wall*	*the wall*	*with paint*
Present	*an award to the valedictorian*		*the valedictorian with an award*	

In the theory illustrated by (3.9), no concept of 'markedness' is invoked. Nor is there any need to hypothesize the figure-first coercion principle and possessum-first coercion principle separately. The theme and the location in a locative resultative subevent are respectively realized as the object and the oblique (prepositional object). The possessor and the possussum of a possessive resultative subevent are realized respectively as the object and the oblique. The implication of this reanalysis of Croft's theory is that the lexical property of the resultative predicate should not be ignored since it affects the pattern of argument realization. This implication is actually the major argument of the current thesis, which I will elaborate on in due course.

3.3.3.2 Aspectual Event Structure

Rappaport and Levin (1998), following Grimshaw (1990) and Hale & Kayser (1993), recognize two aspects in the meaning of a verb, which are respectively called the 'structural' and the 'idiosyncratic'. The structural part in the meaning of a verb is an approximate structural representation of the aspectual property of the verb

recognized by Vendler (1967) and Dowty (1979). The structural part is also called event structure template. The lexical semantics of a verb consists of an event structure template and semantic constants. An event structure template consists of primitive predicates, such as ACT, STATE, BECOME and CAUSE and some participants, which are variables. Verbs of the same semantic class have the same event structure template. Semantic constants are word-idiosyncratic and can distinguish verbs of the same semantic class from each other. The basic event structure templates are given in (3.10) (Rappaport-Hovav & Levin (1998): 108).

(3.10) a.   [x ACT<MANNER>]   ACTIVITY

       b.   [x <*STATE*>]   STATE

       c.   [BECOME [x <*STATE* >]   ACHIEVEMENT

       d.   [[x ACT<MANNER>]CAUSE[BECOME[y <*STATE*>]]]   ACCOMPLISHMENT

       e.   [x CAUSE [BECOME [y <*STATE*>]]]   ACCOMPLISHMENT

The variables in the event structure templates obtain values from linguistic expressions in sentences.

Rappaport-Hovav and Levin hypothesize that this inventory of event structure templates pair with constants to form event structures. This pairing is illustrated by (3.11). (3.11a) is an event structure template; (3.11b) is the combination of the event structure template and the constant *dry*.

(3.11) a.   [[x ACT] CAUSE [BECOME[y <*STATE*>]]]

       b.   [[x ACT]CAUSE[BECOME [y <*DRY*>]]]

Rappaport-Hovav & Levin also assume that in some instances the constant has more associated participants than there are variables in the corresponding event structure template. In such a case, some participants cannot be paired with variables in the

event structure template. They distinguish two types of participants in an event structure: those that are licensed by both the event structure template and the constant and those that are licensed by the constant alone. They propose the following argument realization conditions (Rappaport-Hovav and Levin 1998: 113).

(3.12) ARGUMENT REALIZATION CONDITION:

      A.   There must be an argument XP in the syntax for each structural participant in the event structure.

      B.   Each argument XP in the syntax must be associated with an identified subevent in the event structure.

To paraphrase, structure participant in the event structure must be syntactically realized. A constant's argument that is not shared by the structure does not have to be realized. In order to explain the meaning of the unrealized arguments of a constant, Rappaport-Hovav and Levin devise a recoverability condition: the content of a constant participant must be recoverable from the context. The effect of recoverability condition is instantiated by the following two sentences (ibid: 120).

(3.13) a.   *Phil swept the crumbs onto the floor.*

       b.   *Phil swept the crumbs off the table.*

The verb *sweep* involves only two participants: the sweeper (agent) and the surface (patient); these two participants are present in the basic event structure for *sweep*. But in (3.13a) and (3.13b), the direct object is not an argument of *sweep*. According to Rappaport and Levin' theory, the patient argument of *sweep*, e.g. the surface of a table, needs not be expressed since it is a constant participant. What needs to be noticed is that they claim that the second argument of *sweep* 'need not' be expressed rather than 'cannot' be expressed. However, it can be argued that that the presence

of the second argument of *sweep* is not just unnecessary but rather is impossibile. Specifically, it is impossible to for the second argument of *sweep* to be expressed within the resultative construction unless this argument is the same as the argument of the resultative predicate. For example there is no way to find a position for the second argument of the verb *sweep*, e.g. *the table*, in a sentence, whether active (3.14) or passive (3.15).

(3.14) a.   * *Phil swept the table the crumbs onto the floor*.

   b.   * *Phil swept the table the crumbs off the table*.

(3.15) a.   * *The table was swept the crumbs onto the floor*.

   b.   * *The table was swept the crumbs off the table*.

In the wellformed sentences that express accomplishments, the so-called event structure participants are always those participants of the resultative subevent while the unexpressed arguments are always those participants of the first subevent. More examples are given in (3.16) to illustrate this point.

(3.16) a.   *That bastard drank the pub dry*.

   b.   *The pub was drunk dry*.

   c.   * *The bastard drank dry*.

In (3.16a) the drinker participant of the first subevent is realized but the drink participant is not; the only participant of the resultative subevent is realized as the subject of *dry*. In (3.16b) no participant of the first subevent is realized and the only participant of the resultative subevent is realized as the subject of the sentence. In (3.16c) a participant of the first subevent is realized as the subject but no argument of the resultative subevent is realized and the sentence is ill-formed.

The similar phenomenon can also be observed in other languages. I give an illustration from Mandarin Chinese below.

(3.17) a. *Zhangsan ku-shi-le   shoujuan.*

                 cry-wet-PFT handkerchief

                 'Zhangsan cried the handkerchief wet.'

     b. * *Zhangsan ku-shi-le.*

                 cry-wet-PFT

     c. *Shoujuan   ku-shi-le.*

                 handkerchief cry-wet-PFT

                 'The handkerchief got wet as a result of crying.'

In (3.17a), the participant of the first subevent *ku* 'cry' and the participant of the resultative subevent *shi* 'wet' are both realized syntactically - the sentence is well-formed. In (3.17b), the participant of *ku* 'cry' is expressed and the participant of the resultative subevent *shi* 'wet' is not - the sentence is ill-formed. In (3.17c), the participant of the first subevent is not expressed but the participant of the resultative event is realized. The sentence is well-formed.

To sum up, it can be seen from the illustrative examples that the structural participant is invariably a participant of the resultative subevent. If this observation is right, there is no need to retain the concept of 'structural participant'; instead it can be claimed that the participants of the resultative subevent must be expressed in a resultative construction, which is actually a hypothesis that this thesis adopts.

3.4 Conclusion

The literature review shows all the existing theories account for some data but cannot deal with others. In particular, argument alternation always causes empirical

problems. We must ask the question of why some verbs are involved in a particular type of alternation but others are not. This research looks into the issue of argument alternation and it concentrates specially on inverse argument realization in Mandarin.

Inverse argument realization is interesting for the following reasons: no existing argument realization theories can directly predict that the argument that is realized as the subject by default can be realized as the object when its co-argument that is realized as the object by default is realized as the subject.

Mohanan (1994:121) points out that an intuition shared by linguists that an agent is the prototypical subject. This intuition is expressed in GB as the condition that agents are external arguments. It is expressed in LFG as the condition that agents cannot be objects. All the various thematic hierarchies reviewed above put the agent higher than the patient. Recently, Ramchand (2008: 4) still emphasizes that 'lexical entries where the agentive instigator of an action is realized as the direct object, while the passive undergoer comes out as the subject, do not seem to be attested.' Baker (1988:11) describes this intuition from the perspective of grammatical function changing, claiming that no language has grammatical function changing process that would be described as subject → object; object → subject.

This thesis argues that inversion argument realization is semantically motivated; an inversion construction expresses a complex predication (a semantic representation of a complex event) that involves two predicates and two argument structures. The two predicates have different statuses in shaping the pattern of argument realization. One predicate (the resultative predicate) takes precedence over the other in shaping patterns of argument realization. The former predicate is the main predicate in the semantic representation of a sentence of inversion construction; the other predicate is the secondary predicate. However, the main predicate is not necessarily expressed

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by the main verb as has long been assumed in the literature. It even does not have to be linguistically expressed by an independent word.

Unlike the literature on argument realization where this issue is always discussed from a generative perspective, this thesis will investigate argument realization from a parsing perspective, showing that diverse patterns of argument realization turn out to be epiphenomenal impression of diverse dynamic processes of constructing semantic representation. The lexical property of a verb is modelled as a chunk of information consisting of a sequence of actions (lexical syntactic property), through which a simple/complex semantic representation (lexical semantics) is constructed. A verb that is involved in inverse argument realization always contributes at least a secondary predicate to a complex semantic representation, i.e. a compound propositional formula (see Chapters 6, 7 and 8 for details). The framework in which the parsing-perspective account is carried out will be introduced in the next chapter.

Chapter Four
Dynamic Syntax and Argument Realization in Parsing

4.1 Introduction

The literature review in Chapter 3 reveals that the semantic roles entailed by a verb can be expressed syntactically in various ways. This poses a challenge to syntactians who research semantics-syntax correspondence from the generative perspective. This fact, if viewed from the perspective of language comprehension, poses the question of how semantic roles are pinned down where there is no strict one-to-one correspondence between grammatical forms and semantic roles. This question is important because understanding a sentence largely means working out what the sentence says about events. Obviously, grammatical forms give far much less information than is needed to pin down semantic roles although they impose constraints on listeners' understanding. My concern is what grammatical forms do for specifying the referents of semantic roles, what may happen if grammatical forms do not provide enough information for specifying the referents of semantic roles, and what argument alternation is if observed from a parsing perspective. From such a parsing perspective, we would also ask what those abstract syntactic functions in traditional grammar are and what they do for the specification of semantic roles in language comprehension. I will pursue these questions in the framework of Dynamic Syntax (Kempson et al 2001; Cann et al 2005) which provides a package of useful theoretical concepts and formalisms for probing linguistic puzzles from a parsing (understanding) perspective.

Unlike the mainstream transformational grammar (Chomsky 1965, 1981 and 1995 inter alia), which hypothesizes that human linguistic competence is the knowledge of universal derivational rules through which various syntactic structures are derived,

Dynamic Syntax hypothesizes that human linguistic competence is the capability of understanding linguistic strings, i.e. the capability of retrieving meanings through parsing linguistic strings uttered in context, and the capability of producing linguistic strings is parasitic on the former capability (see Kempson et al 2005).

This model of language is concerned with two major issues: what information each lexical form contributes and how the information obtained from on-line lexical processing and that from context are combined into full propositional formulae. The machinery of Dynamic Syntax is introduced in sections 4.2-4.5. My discussion of argument realization in Dynamic Syntax is given in section 4.6-4.8. Section 4.8 is the conclusion of this chapter. The introduction is mainly based on Kempson et al (2001) and Cann et al (2005); other existing DS works are also referred to only when necessary. In this introduction I also include some necessary changes to the framework. The examples that serve the purpose of reflecting the spirit of the fundamental concepts in Dynamic Syntax mainly come from English, which saves much space since there is no need of glossing.

4.2 Hypotheses on Natural Language in Dynamic Syntax

We are familiar with the fact that children start to understand people around them before they can express their own meanings. This means that human beings must have the capability of processing linguistic input to retrieve semantic interpretation earlier than they can give linguistic output. Therefore it is reasonable to hypothesize that the capability of processing linguistic input is the first step of gaining a full command of a language. The acquisition of the grammar of a specific language relies largely on parsing the utterances that learners are exposed to. In this sense, human linguistic faculty is first and foremost a capability of language comprehension. The observations as such constitute the empirical foundation for the development of Dynamic Syntax.

In this theoretical framework, a sentence is a string of words the parse of which gives rise to a complete proposition. A parsing process is a sequence of actions and computations through which pieces of information are collected one by one and finally combined into a full propositional formula. The process of parsing a single sentence in natural language is driven by the axiomatic goal of constructing a full propositional formula. Observationally, the axiomatic goal is achieved step by step as words are parsed one by one. The processing of each word adds a package of information for achieving the axiomatic goal. The axiomatic goal is broken down into many subgoals step by step and these subgoals are achieved one by one. A sentence-parsing process is a process of monotonic information increment since the achievement of each subgoal means the collection of a package of information. A monotonic information-increment parsing process is expressed by the stepwise growth of a semantic tree. The goals, subgoals and information collected through parsing words are all recorded on various tree nodes.

4.3 Formulae, Types and Trees

A parsing process is one in which various types of information for building a propositional formula are collected through processing words and referring to context. Information includes semantic formulae and their types, structural relations between semantic formulae and others.

4.3.1 Semantic Formula and Semantic Composition

In Dynamic Syntax, a proposition is the result of the composition of a number of concepts. A concept is represented as a formula, written as Fo(α), where Fo is a label, indicating the presence of a formula and α is a concept that is obtained through lexical input or from context. Formulae in Dynamic Syntax have the following forms:

A common noun *man* in English contributes the contentful formula Fo(x, Man' (x)). In this formula, x is a free variable and Man' (x) is a restrictor which defines a set with respect to the variable x. Man', i.e. a word form plus a prime, represents the denotation of the English word *man*.

The indefinite article *a(n)* contributes a lambda term Fo(λP. ε, P). This expression deserves some attention since it involves two important operators λ and ε. The two operators have different functions. The lambda operator mainly indicates that the variable that it binds can be replaced by some term or variable through functional application. Functional application goes as follows: a formula including a lambda-bound variable λx. $\phi(x)$ ($\phi(x)$ is a restrictor containing x) is applied to another formula a, written as ($\lambda x.\phi(x)$) (a). The lambda-bound variable x in the restrictor ϕ/x is replaced by a, yielding the formula ϕ/a, which means a appears in ϕ. In the current case the variable is written as a capital letter P; this means that the variable can only be replaced by a contentful term through functional application. Fo(λP. ε, P) and Fo(x, Man'(x) can be combined through functional application: x, Man'(x) replaces P in Fo(λP. ε, P) yielding Fo(ε, x, Man'(x)), which is the semantic formula for the English expression *a man*.

The function of the epsilon operator is to pick out an arbitrary witness of a set (c.f. Hilbert and Bernays 1939). An epsilon term expresses an entity that is an arbitrary witness of a set. For example, Fo(ε, x, Man'(x)) expresses an arbitrary witness of the set defined by the restrictor Fo(x, Man'(x)) (see also Slater 1993 for some discussion on the theoretical meaning of the epsilon operator).

Similarly, an English expression like *every student* contributes the formula Fo(τ, y, Student' (y)). This formula arises through the semantic composition between Fo(λP.

τ, P) contributed by *every* and Fo(*x*, Student'(*x*)). Like ε, τ is also an operator; its function is to pick out all witnesses of a set.

A proper name *John* contributes the formula Fo(ι, *x*, John'(*x*)). This formula involves the ι-operator. The function of this operator is picking out a unique witness of a set. Since a proper name is a single word, the formula is directly projected by the word itself rather than constructed through semantic composition. As a convention, the formula expressed by a proper name such as *John* is usually simplified as Fo(John').

The formula of a two-place verb, such as *sing* in English, is written as Fo(λ*x*λy.Sing'(*y*, *x*)). This formula includes two variable *y* and *x* in the restrictor. The variable on the left *y* receives the semantic role of singer (agent) and the variable on the right *x* receives the semantic role of what is sung (theme). The two variables are both bound by the lambda operator. When this two-place predicate formula applies to the formula Fo(ALS'), which is the semantic representation of *Auld Lang Syne*, the left most lambda-bound variable *x* in the lambda expression is replaced by Fo(ALS'), yielding a one-place predicate formula Fo(λ*y*.Sing'(*y*, ALS')), which is the semantic representation of the expression *sing*(*s*) *Auld Lang Syne* in English. The one place predicate Fo(λy.Sing'(John', *y*)) can further apply to the formula Fo(John'), yielding the propositional formula Fo(Sing' (John', ALS')), which is the semantic representation of the sentence *John sings Auld Lang Syne*[12]. In a word, Dynamic Syntax hypothesizes that contentful expressions contribute formulae of different kinds and formulae are combined functional application, i.e. lambda calculus. Understanding of a sentence is mainly retrieving the semantic formulae of linguistic expressions and combining the semantic representations into propositional formulae through functional application. Of course, there are linguistic

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[12] What the third person singular morpheme does for the construction of the semantic representation is an issue open to discussion.

expressions that do not contribute formulae; but they contribute other information to the construction of propositional formulae. Expressions of this kind and the information that they contribute will be introduced in Section 4.4.7.

4.3.2 Semantic Type and Semantic Composition

It is introduced in the previous section that formulae can be combined through functional application. However, it is not the case that the combination of any two formulae through functional application yields a conceptually sound formula. For example in English *big* and *a* contribute two formulae: Fo(λx, Big'(x)) and Fo(λP. ε, P). Since the two formulae both contain lambda-bound variables, they can apply to each other one way or the other round, yielding either Fo(*Big'*(λP. ε, P)) or Fo(ε, λx. Big'(x))), but neither of these two formulae represents a sound concept. These examples show that the combination between formulae must be properly constrained to avoid the construction of nonsensical formulae.

To avoid wild combination of formulae, Dynamic Syntax uses a type-theoretical proof system to constrain formula combination. Every formula has a corresponding type, which is the semantic category of the formula, and a formula can only combine with another formula according to the rules of type reduction. Types provide minimal constraints over semantic composition. In Dynamic Syntax there are three basic types, *t*, *e* and *cn*, on the basis of which other types are defined. A table of the major types along with their exemplary formulae is given below. (Cann et al 2005: 36).

(4.1)   Types and Semantic Formulae[13]

Type	Description	Examples
Ty (e)	Individual term	Fo(Mary'), Fo(ε, x, Student'(x))
Ty (t)	Proposition	Fo (Sing'(John')),
		Fo (Upset'(Hilary')(Joan')
Ty (e→t)	(1-place) Predicate	Fo(Run'), Fo (Upset'(Hilary')
Ty (e→(e→t))	(2-place) Predicate	Fo (Upset'), Fo (Given (John')
Ty (e→(e→(e→t)))	(3-place) Predicate	Fo (Give'), Fo (Put')
Ty(t→(e→t))	(Propositional) Predicate	Fo(Believe'), Fo(Say')
Ty (cn)	Common noun	Fo (x, Student' (x)),
		Fo (y, Father' (John') (y))
Ty(cn→e)	Quantifier	Fo (λP. ε, P)

Types are not restricted to those given in the above table; other types can be defined in a similar way if need be. But in Dynamic Syntax there is no type raising or recursive definition of types, which are associated with other theoretical frameworks such as Montague Grammar and Categorial Grammar. Nor do the types in Dynamic Syntax represent the left/right order of natural language expression as those in Categorial Grammar.

Since each formula has a fixed type, the combination of formulae can happen only when their types can undergo type reduction. Suppose Ty(X→Y) is a one-place functor type and Ty(X) is an argument type, the type reduction rule can be stated as such that the application of Ty(X→Y) to Ty(X) yields Ty(Y). For instance the formula Fo (λx.Run'(x)) has the type Ty(e→t) and the formula Fo (John') has the type Ty(e); the two formulae can combine into Fo (Run' (John')) since their corresponding types can undergo type reduction and result in Ty(t). In this combinatorial process, functional application and type reduction happen simultaneously. The combination between Fo(ε, x, Big'(x)) and Fo(λP. ε, P)) is

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[13] Due to space limit, binders and variables in some formulae are omitted where no confusion would arise.

illicit because the two formulae respectively have Ty(e→t) and Ty(cn→e), which cannot undergo type reduction.

4.3.3 Requirement

Dynamic Syntax hypothesizes that a parsing process is, in the main, driven by type requirements or goals. A requirement is defined as a declaration identifying a formula of a specific type. A requirement is represented as ?Ty(X) where X ∈ {*e*, *t*…}. For example, ?Ty(t) represents the requirement for a formula of propositional type, ?Ty(e) represents the requirement for a formula of argument type, ?Ty(e→t) represents the requirement for a one-place predicate, and so on.

The ultimate goal of every parsing process is to identify a propositional formula, i.e. ?Ty(t). A successful parsing process starts with ?Ty(t) and ends with the satisfaction of this requirement. Empirically, the expressions that jointly provide the content of a proposition are parsed one by one; therefore it is hypothesized that ?Ty(t) is binarily broken down into sub-requirements, or sub-goals. Sub-goals are achieved one by one as words are expressed one after another and the information that satisfies sub-goals is combined through semantic composition eventually to satisfy the ultimate goal ?Ty(t). Goal-division and formula combination are represented with semantic trees.

4.3.4 Semantic Trees and Tree Logic

Dynamic Syntax adopts the logic of finite trees (LOFT) (Blackburn and Meyer-Viol 1994) to represent the process where the ultimate goal is broken down into sub-goals step by step in a binary way. The relationship between a goal and two immediate sub-goals are represented by a binary tree. The mother goal is put onto the topnode of the binary tree and the two daughter goals are respectively put onto the two daughter nodes. As a convention, the daughter leaf node is an argument node and the

right daughter node is a functor node. The effect of goal division is represented in Fig-4.1.

$$?Ty(t)$$
$$?Ty(e) \qquad ?Ty(e{\rightarrow}t)$$
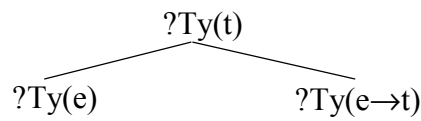
Fig-4.1

In addition, numerical indexes are used to strengthen the expressiveness of the tree representational formalism. Numerical indexes ranging over 0 and 1 are put onto tree nodes to indicate their addresses on a tree. It is stipulated that if a node is identified as Tn (n) (n is a string of 0s and 1s), its left daughter node is labelled with Tn (n0) and its right daughter is labelled with Tn (n1). Conventionally, the ultimate topnode of a tree has the address Tn(0); then its left daughter is Tn (00) and its right daughter is Tn (01) and so on; for example Fig-4.2.

$$Tn\,(0)$$
$$Tn(00) \qquad Tn(01)$$
$$Tn(010) \qquad Tn(011)$$
$$Tn(0110) \qquad Tn(\,0111)$$
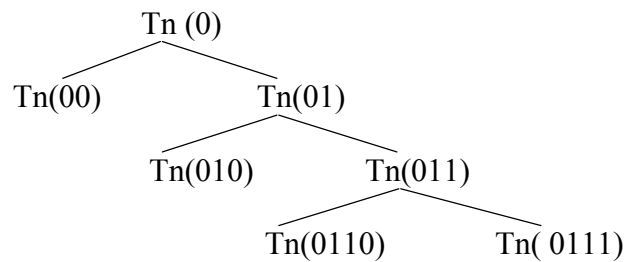
Fig-4.2

The tree nodes on the tree given in Fig-4.1 can be indexed as is shown in Fig-4.3.

$$Tn(0),\ ?Ty\,(t)$$
$$Tn\,(00)\ ?Ty(e) \qquad Tn(01),\ ?Ty(e{\rightarrow}t)$$
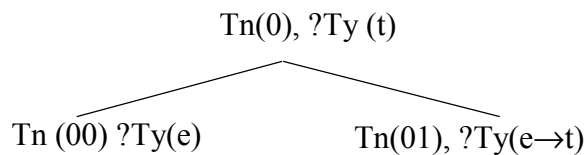
Fig-4.3

Along with the numerical tree indices, two basic modal operators are defined. One is ↓, indicating the daughter-of relation to an arbitrary node; the other is ↑, indicating

the mother-of relation to an arbitrary node. The numbers 0 and 1 are combined with the two modal operators to form fine-grained tree modalities as are listed below:

$\downarrow_0$: 'at an argument daughter node of an arbitrary node'

$\downarrow_1$: 'at a functor daughter node of an arbitrary node'.

The Kleene star is used with a modal operator to express underspecified tree relations.

$\downarrow_*$: 'at or somewhere below an arbitrary node'.

$\uparrow_*$: 'at or somewhere above an arbitrary node'.

The two symbols [ ] and < > are used together with the modal operators. Putting [ ] outside a modal operator indicates the universal reading 'for all nodes…'. Putting < > outside a modal operator indicates the existential reading 'there is a node…'. Symbol $<\downarrow>$ means that there is a node that is dominated by an arbitrary node'. Symbol $[\downarrow]$ means 'for all nodes that are dominated by an arbitrary node'. If a tree relation is followed by some declarative units, i.e., type requirement and/or formula and so on, it means the declarative units exist at a node that holds the given relation to an arbitrary node. For example, the expression $<\downarrow_0>$Fo (α) says that at the argument daughter node of an arbitrary node Fo (α) holds. The expression $<\downarrow_1>$Fo (β) says that at the functor daughter node of an arbitrary node Fo (β) holds. The expression $<\uparrow_0>$Fo (α) says that at the mother node of an arbitrary argument-type node Fo (α) holds. $<\downarrow_0><\downarrow_0>$Fo($\alpha$) says that at the argument daughter node of the argument daughter node of an arbitrary node Fo (α) holds; $<\uparrow_0>$ $<\downarrow_1>$Fo (β) says that at the functor daughter node of the mother node of the an arbitrary argument-type node Fo(β) holds, and so on. For example, standing at the topnode on the tree given Fig-4.3, we can describe the information on the left daughter node as $<\downarrow_0>$?Ty(e), the information on the right daughter node as $<\downarrow_1>$?Ty(e$\rightarrow$t).

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It should be pointed out in particular that the two modality $<\downarrow_*>$ and $\downarrow_*$ are specially differentiated in Dynamic Syntax. The former expression is used to refer to an unfixed node while the latter is used to refer to a fixed node in an underspecified way. For example, the expression $<\downarrow_*>Fo(X), Ty(Y)$ says that at the current node or at an unfixed node that is dominated by the current node there exists the information 'Fo(X), Ty(Y)'; in contrast, $\downarrow_*Fo(X), Ty(Y)$ says that at the current node or at a fixed node dominated by the current node there exists the information 'Fo(X), Ty(Y)'. In particular, the combinations of various modal operators with $\top$ are defined to mean that it is true that the current node has a fixed daughter/mother node or a fixed grand daughter/mother node or a fixed great-grand daughter/mother node and so on. This symbol will be widely used in defining various general computational rules below. I will give special clarification where these combinations are used. By the way, clarification about the meanings of complex DS representational language will be given in the form of @ X @ where X is a statement of classification and @ is used to indicate the beginning and the end of a statement of clarification.

4.4 The Growth of Semantic Trees

A semantic tree does not exist as a static construct in Dynamic Syntax; instead, it comes into being through stepwise growth as goals are divided into subgoals through the application of general computational rules or through actions that are induced by the parse of linguistic expressions. In every stage of a tree-growing process, a particular tree node is under construction, which is called the current node. A current node is indicated by the pointer, '◊'. The shift of current node is reflected by movement of the pointer from one node to another.

4.4.1 Actions

A number of fundamental parsing actions and computational rules have been defined in Dynamic Syntax. These actions are language-universal but languages differ in the particular form in which they allow these actions and computations to happen (Kempson et al 2001: 266). Computational rules are defined on the basis of actions. Some computational rules are language-universal; others are language-specific. I introduce actions first because most general computational rules can also be defined in terms of actions.

The action 'make (…)' creates a new node; a modality description appears in the brackets, expressing the node to be made. For example, 'make ($<\downarrow_0>$)' creates an argument daughter node of an arbitrary node. The action 'go (…)' moves the pointer to a node. The action 'go ($<\downarrow_0>$)' moves the pointer to the argument daughter node of an arbitrary node. The action 'gofirst↑ (X)' moves the pointer upward to the nearest node where X holds. The action 'gofirst↓ (X)' moves the pointer downward to the nearest node where X holds. The action 'put (…)' serves the purpose of annotating a node with a formula, type, scope statement or other information. The action 'freshput (a, φ) introduces a fresh logical name, either a constant or some variable, to be used in some formula φ. The action 'abort' is taken where no other actions are taken, the effect of which is the termination of a parsing process. 1 is the first action, which has the effect of 'stay put', that is, the pointer remains at a current node.

Actions are taken under some conditions, which are called triggers. Triggers, actions and alternative actions are expressed in the form of 'IF…THEN…ELSE' statements. The 'IF' clause states a primary trigger of some actions. The 'THEN' clause presents actions that are taken when the trigger given in the IF clause is available.

The 'ELSE' clause gives alternative actions that fire when the trigger is not available.

(4.2) Template of Actions

$$\begin{array}{ll} \text{IF} & \dots \\ \text{THEN} & \dots \\ \text{ELSE} & \dots \end{array}$$

Actions are taken in two circumstances: Some actions are activated in the form of general transitional rules; other actions exist in the form of lexical information and are activated as words are parsed; these actions are also called lexical actions. Transitional rules are optional and they are applied if need be; lexical actions are obligatorily taken as words are parsed.

The example given in (4.3) illustrate some actions that are taken without lexical input and the corresponding tree growth is given in Fig-4.4.

(4.3) Creation of an External Argument Node (a rule)[14]

$$\begin{array}{ll} \text{IF} & Tn(0), ?Ty(t) \\ \text{THEN} & make(<\downarrow_0>); go(<\downarrow_0>); put\ (Tn(00),?Ty(e)) \\ \text{ELSE} & 1 \end{array}$$

$$Tn(0), ?Ty(t)$$
$$|$$
$$Tn(00)\ ?Ty(e),\ \lozenge$$
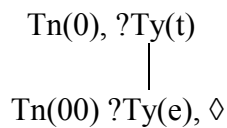
Fig-4.4

Suppose an expression α is parsed as the pointer is at the $Tn(00)\ ?Ty(e)$ node, the following lexical actions fire.

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[14] This rule is only an illustrative rule and it is only used this introductory chapter to show how rules are defined with the basic actions. This rule is discarded after this introduction and will not be invoked in the following chapters.

(4.4)   Lexical actions of the term expression α

IF   ?Ty(e)
THEN   put(Ty(e), Fo (α), [↓]⊥)
ELSE   Abort

The lexical actions state that if ?Ty(e) is available on a current node, the current node gets annotated with Ty(e), Fo (α), , [↓]⊥ as the expression α is parsed. If the trigger does not hold, the parse of the expression α makes the parsing process aborted. The expression '[↓]⊥', known as bottom restriction, is statement that 'below me nothing holds'. A node so decorated is necessarily terminal (c.f. Cann et al 2005: 73). In the current example, since the triggering condition holds, the primary action is taken and the information Ty(e), Fo (α), [↓]⊥ is put onto the current node, which does not have any other nodes below it.

To recapitulate, lexical actions, either primary actions or alternative actions, necessarily fire as a lexical form is parsed. As lexical forms in a linguistic string are scanned one by one, sequences of lexical actions fire one after another, either making a partial semantic tree grow further or leading to the collapse of a parsing process.

4.4.2 Anticipation

The Anticipation rule is defined to move the pointer down to a dominated node. This usually happens when the pointer is located at an arbitrary node but an outstanding requirement still exists at a node below. Through the application of anticipation, the pointer is moved to this latter node, which becomes the current node.

(4.5)   Anticipation

IF   ↓$_i$?X (i ∈ {0, 1, *}, @X is a declarative unit@
THEN   go(<↓$_i$>)
ELSE   1

The trigger states that there is a requirement of some kind at some node dominated by the current node. If the trigger is true, the pointer can move to the dominated node in question. If the trigger is not true, the pointer stays at the current node temporarily. The movement to the pointer to a node implies that the node will be constructed, or will be further constructed if it has already been partially constructed.

4.4.3 Thinning

When a sub-goal at the node under construction is satisfied, the requirement is eliminated. The rule Thinning is defined to produce the effect of removing a requirement.

(4.6)   Thinning[15]

IF	$?Ty(X)$, $Ty(X)$
THEN	delete ($?Ty(X)$)
ELSE	1

As a convention, the effect of applying Thinning is indicated by the strikethrough of the requirement description, e.g. Fig-4.5.

$$Tn(0), ?Ty(t)$$
$$|$$
$$Tn(00), \text{?Ty(e)}, Ty(e), Fo(\alpha), \Diamond$$

Fig-4.5

After the application of Thinning, there is no outstanding requirement on the current node.

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[15] The action 'delete (…)' is provisionally defined as follows: it removes a requirement on some node as the requirement is satisfied. It, in fact, just indicates that a requirement is no longer a valid trigger for lexical input.

4.4.4 Completion

When the requirement at a current node is satisfied, the pointer moves upwards, leaving the current node. Such a pointer movement is realized through applying the rule Completion, which is given in (4.7) with the corresponding tree effect illustrated in Fig-4.6.

(4.7) Completion

IF   Ty(X), Fo(α)
THEN IF $\uparrow\top$ @if the current node has a mother node@
        THEN go($<\uparrow_i>$); [i $\in$ {0, 1, *}]
            put ($<\downarrow_i>$), Ty(X), Fo(α))[i $\in$ {0, 1, *}]
        ELSE 1
ELSE   1

$$Tn(n), ?Ty(t), <\downarrow_0>, Ty(e), Fo(\alpha), \Diamond$$
$$|$$
$$Tn(n0), Ty(e), Fo(\alpha)$$
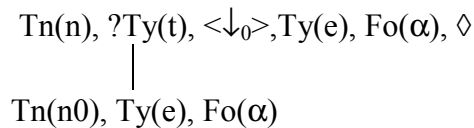
Fig-4.6

The major function of the Completion rule is to push the pointer from a daughter back to a mother node. At the same time, the information collected on the daughter node can be described from the perspective of the mother node.

4.4.5 Elimination Rule

When the requirements at both daughter nodes of a node are satisfied, the type labels on the daughter nodes both occur at the mother node through the application of Completion. At this moment, the two formulae Fo (α) Ty (X) and Fo (β), Ty (X$\rightarrow$Y) get combined through functional application, yielding a new formula on the mother node concerned. These tasks are finished through the application of the rule of Elimination.

(4.8)   Elimination

> IF $<\downarrow_0>$ (Fo(α), Ty(X)), $<\downarrow_1>$(Fo($\lambda x.\beta(x)$), Ty(X→Y))
> THEN   put(Fo($\beta(\alpha)$),Ty(Y))
> ELSE   1

Before Elimination

?Ty (Y), $<\downarrow_0>$Ty(X), Fo(α), $<\downarrow_1>$Ty (X→Y), Fo($\lambda x.\beta(x)$), ◊

Ty (X) Fo (α)   Ty(X→Y), Fo ($\lambda x.\beta(x)$)

Fig-4.7

After Elimination and Thinning

~~?Ty (Y)~~, Ty (Y), Fo ($\beta(\alpha)$), ◊

Ty (X), Fo(α)   Ty(X→Y), Fo($\lambda x.\beta(x)$)
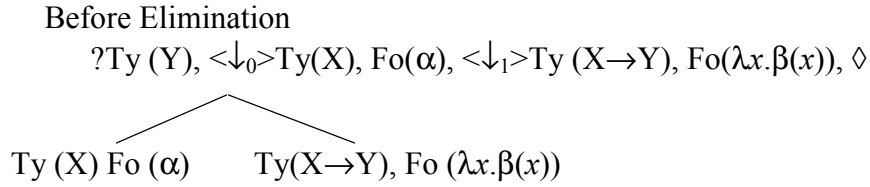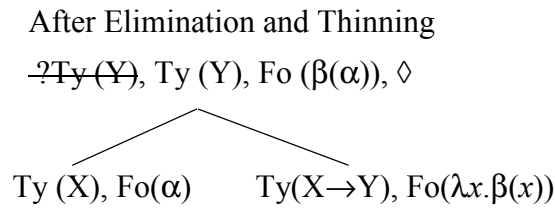
Fig-4.8

When all the subgoals are satisfied, the information on the daughter nodes of different levels in a tree is combined stepwise through functional application, through which the ultimate goal at the topnode of a semantic tree is achieved. A string of words the parse of which results in the achievement of a complete propositional formula is a grammatical sentence. The rule Elimination is different from many previous rules in that it is a rule that implements the hypothesis of semantic compositionality but the rules like Anticipation and Completion and various lexical actions are actions of constructing semantic trees.

4.4.6 Unfixed Node and Merge

Semantic underspecification is an important concept in Dynamic Syntax. A first type of semantic underspecification arises where the semantic status of a formula is unfixed at a particular parsing stage. Across languages, there are many cases of this type of semantic underspecification. A case in point is the English sentence *John, Mary loved*. In parsing this sentence, the semantic status of *John* is underspecified

the moment the word is parsed because it may be either the external argument or the internal argument node of some predicate that has not been established yet.

Dynamic Syntax takes advantage of the notion of unfixed node to represent this preliminarily underspecified semantic status of a concept. The underspecified semantic status of a concept is represented as such that the formula appears at a node dominated by some node but the tree relation between this node and the dominating node is initially unfixed. An unfixed tree modality is represented by $<\downarrow_*>$. Cann et al (2005) (also see Kempson et al 2001) defines a rule of *Adjunction on the basis of underspecified modal relations. This rule creates an unfixed node annotated with a requirement of some type.

(4.9)   *Adjunction[16]

> IF $Tn(n)$, $?Ty(t)$
> THEN   IF $\downarrow_*T$ @ if it is true that the current node dominates some fixed node@
>   THEN 1 @ the pointer stays put and no other actions are taken@
>   ELSE   make ($<\downarrow_*>$); go($<\downarrow_*>$); @make an unfixed node and moves the
>   pointer to that unfixed node@
>   put ($<\uparrow_*>Tn(n)$, $?\exists x.Tn(x)$, $?Ty(X)$, $X \in \{e, t\}$)
> ELSE   1

On the unfixed node created through applying *Adjunction, there are two requirements: one is to specify the position of the current node in the final tree; the other is to obtain a formula of Ty (X). The effect of applying *Adjunction is represented in two alternative ways, either as a dash-box (Fig-4.9a) or a dash-line connecting the unfixed node and the dominating node (Fig-4.9b).

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[16] Note that the constraint given in the second line involves an external modality, which states that a fixed node holds somewhere below the current node.

(4.10)   a. an unfixed node (dashed-box)   b. an unfixed node (dashed-line)[17]

Tn(n), ?Ty (t)   Tn(n), ?Ty(t)
```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
:    <↑*> Tn (n), ?Ty (X),    :
:       ?∃xTn (x), ◊         :            <↑*> Tn (n), ?Ty (X),
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘                  ?∃xTn (x), ◊
```
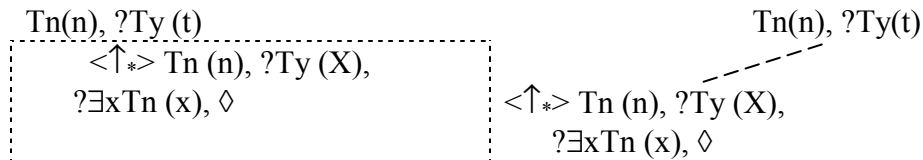
Fig-4.9

What is important with this rule is that it poses a requirement ?∃x.Tn(x), which is a statement of a requirement of a fixed treenode[18]. Since it is a requirement, it must be satisfied; otherwise, the parsing process is unsuccessful. In the current case, the unfixed node is annotated with ?Ty(X), which must be satisfied as well. The formula requirement can be satisfied through lexical input. An unfixed node follows the movement of the pointer and the information on an unfixed node finally settles down on a fixed node that is created latter.

We return to the English sentence like *John*, *Mary hated* for illustration. The first word *John* is not the external argument of the verb *hate* and when it is parsed, its final semantic status is unfixed initially. *Adjunction is applied first to create an unfixed node annotated with ?Ty(e) which induces a lexical input. The parse of *John* just satisfies this requirement. The following four figures represent the different stage of tree growth up to the parse of *John*.

(4.11) a.   Step 1 *Adjunction
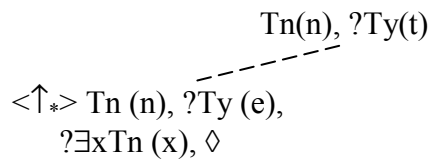
Tn(n), ?Ty(t)

<↑*> Tn (n), ?Ty (e),
      ?∃xTn (x), ◊

Fig-4.10

---

b.   Step 2 Parsing *John*, Thinning

$$Tn(n), ?Ty(t), ◊$$

$$<↑_*> Tn (n), \text{?Ty (e)},$$
$$?∃xTn (x),$$
$$Ty(e), Fo(John')[↓]⊥$$
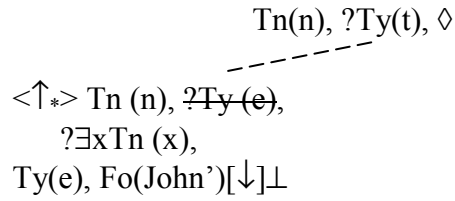
Fig-4.11

After the parse of *John*, the formula requirement on the unfixed node is satisfied; the pointer returns to the topnode. For simplicity, we provisionally assume that the parser of English knows that the external argument on a semantic tree should be created next; this fixed node is annotated with ?Ty(e).

(4.11) c.   Step 3 Creation of the External Argument Node

IF   ?Ty(t)
THEN   make($<↓_0>$); go($<↓_0>$); put (?Ty(e))
ELSE   1

$$Tn(n), ?Ty(t)$$

$$<↑_*> Tn (n),   ?Ty(e) , ◊$$
$$?∃xTn (x),$$
$$Ty(e), Fo(John')[↓]⊥$$
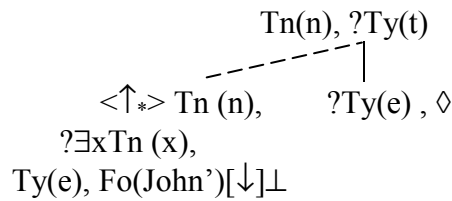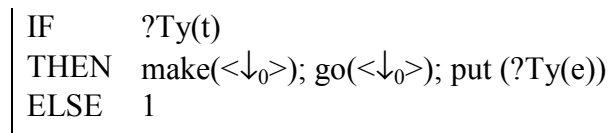
Fig-4.12

(4.11) d.   Step 4 Parsing *John*, *Mary*

$$Tn(n), ?Ty(t) , ◊$$

$$<↑_*> Tn (n), \text{?Ty (e)},   \text{?Ty(e)}$$
$$?∃xTn (x),   Ty(e), Fo(Mary'), [↓]⊥$$
$$Ty(e), Fo(John') [↓]⊥$$
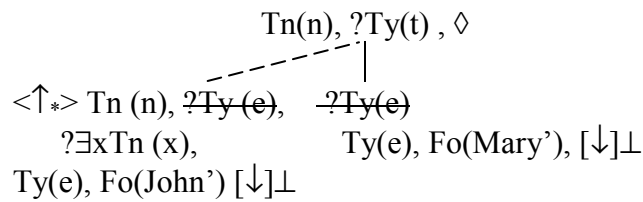
Fig-4.13

After the construction of the unfixed node, the pointer moves back to the topnode again. We assume that the parse of a verb such as *loved* induces a package of lexical

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actions through which a propositional template is constructed (the information of tense is irrelevant for this discussion and is ignored technically).

(4.12) *love*(*d*)

IF	?Ty(t)
THEN	make($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e)); go($<\uparrow_0>$);
	make($<\downarrow_1>$); put(?Ty(e$\rightarrow$t));
	make($<\downarrow_1>$); put (Ty(e$\rightarrow$(e$\rightarrow$t)), Fo($\lambda y\lambda x$.Love'(*x*, *y*), [$\downarrow$]$\perp$)go($<\uparrow_1>$);
	make($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e))
ELSE	Abort

Tn(0), ?Ty(t)

Ty(e),
Fo(Mary')[$\downarrow$]$\perp$?Ty(e$\rightarrow$ t),

?Ty(e), $\lozenge$ Ty(e$\rightarrow$(e$\rightarrow$ t))

$<\uparrow_*>$Tn(n),   Fo($\lambda y\lambda x$.Love'(*x*, *y*)), [$\downarrow$]$\perp$
Ty(e), Fo(John'), [$\downarrow$]$\perp$
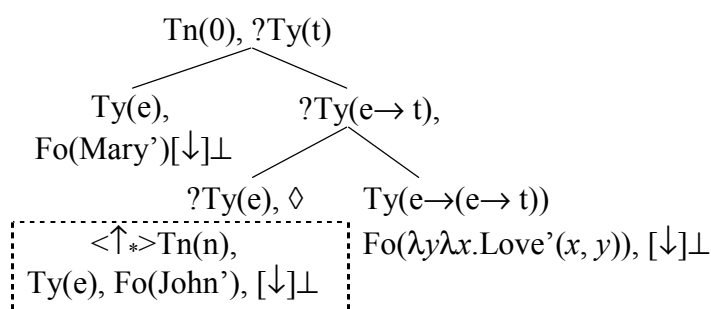
Fig-4.14

On the partial tree given in Fig-4.14, the external argument that has already been created collapses with the external argument on the propositional template projected by the verb since they have the same structural index. The internal argument node of the current tree has an outstanding requirement on it. The unfixed node now settles down on the internal argument node. In consequence, the outstanding type requirement on the internal argument node is satisfied; the structural underspecification of the unfixed node is solved as well.

The settlement of an unfixed node on a fixed node is accomplished through the application of a rule called Merge[19]. Merge is a loosely defined computational rule.

---

[19] Attention should be paid to this term since it is used in generative grammar to refers to a syntactic operation building larger structures out of smaller one (c.f. Adger 2002:62). This is once again an instance of the terminological confusion across different theoretical frameworks.

The spirit of Merge is simple: one group of declarative units and another group of units are unified at some node. I do not formalize this rule in IF…THEN…ELSE format for the following reason: the triggering conditions for the actions to produce the wanted effect involve at least two groups of declarative units. However, declarative units include formulae, types, scope statements, tree modalities, and other information. These declarative units vary from case to case and can hardly be uniformly defined. Therefore, I just adopt the provisional formalization for this rule given in Cann et al (2005).

(4.13) Merge (a quasi-definition)

$$\frac{DU,\ DU'}{DU\ \curlyvee\ DU'}$$

(DU and DU' are two groups of declarative units)

The statement above the line is the condition, which roughly says that there are two sets of declarative units. What is given below the line is the output, which says roughly that the two sets of declarative units unify.

Continuing the parsing process, an unfixed node and a fixed node Merge and the information on the unfixed node is eventually fixed on the fixed node. The result of Merge is reflected on the following partial tree.

(4.14) After Merge

Fig-4.15

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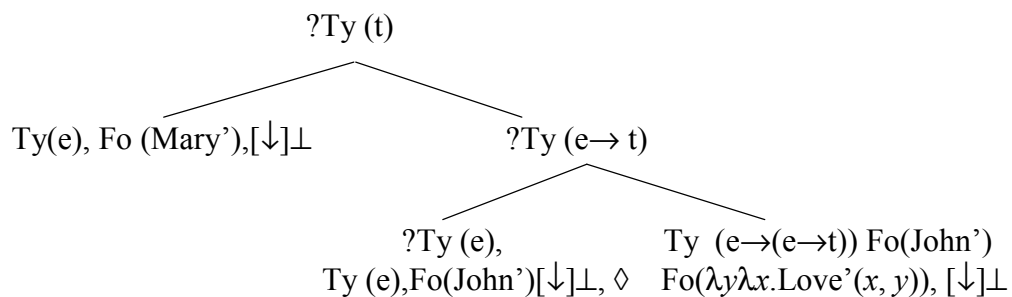
At this parsing stage, all the sub-goals are satisfied. The formulae on the tree nodes get combined through Elimination, yielding a complete propositional formula which satisfies the requirement at the topnode.

*Adjunction, in fact, is one of many definable rules through which unfixed nodes are created. The tree modality involved in the definition of *Adjunction is very general in the sense that it only states 'somewhere below the topnode'. The principle of *Adjunction can be generalized to many other adjunction rules, which involve different tree modalities, such as 'somewhere below a one-place functor node'. What kinds of adjunction rules are needed is a language-specific issue and specific adjunction rules can be defined if need be. Some useful adjunctions rules will be defined or adopted in due course to account for the data in Mandarin.

4.4.7 Metavariable and Substitution

An unfixed node represents a kind of semantic underspecification, i.e. structural underspecification. There is another kind of semantic underspecification in natural language parsing: It is content underspecification. To understand what content underspecification is, we consider the parse of the sentence *He hated Mary*. As a parser hits a pronoun *he*, the pronoun itself does not provide a contentful formula; instead, it picks out a term from discourse context. This property of a pronoun and other semantically impoverished expressions is characterized with the concept of metavariable. A metavariable, usually written as a bold letter, such as **U** or **V** and so on, is a just placeholder for some contentful formula. It is associated with a statement $?\exists x.Fo(x)$, which represents the requirement of finding a value for the tree node that the metavariable occupies. Once a node is annotated with a metavariable, the requirement there is provisionally satisfied and therefore no requirement at that node will induce further lexical input and a substituend used to replace the metavariable must be obtained otherwise. A process of replacing a metavariable with a contentful formula is defined as a general computational rule, called

Substitution, which I will elaborate on soon. The theoretical value of metavariable can be illustrated by the process of parsing *he hated Mary*. We suppose that this sentence is parsed in a context, where it is the word *John* that has been the concern of the interlocutors. The parse of *he* contributes a metavariable to the external argument node on a partial semantic tree.

(4.15) a. Parsing *he*

$$?Ty\,(t)$$

$$Ty(e),\ Fo\ (\mathbf{U}_{male.sg}),\ \exists x.Fo(x),\ \Diamond$$
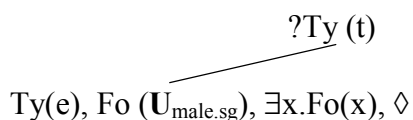
Fig-4.16a

It should be noted that the metavariable on the node under construction carries a compound feature, 'male.sg', which constitutes a constraint over the selection of substituends. Specifically, a contentful formula that is to appear on the node must also have this feature. Let's assume that the contentful term Fo(John'), which is already available in the context, is recognized as a proper substituend for this metavariable.

(4.15) b. Substitution

$$?Ty\,(t)$$

$$Ty(e),\ Fo(\mathbf{U}_{male.sg}),\ \Diamond$$
$$\Uparrow$$
$$Ty(e),\ Fo(John'),\ [\downarrow]\bot$$
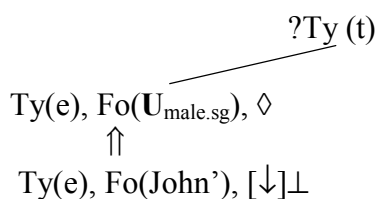
Fig-4.16b

(4.15c) Parsing *he hated*

$$?Ty\,(t)$$

Ty(e), Fo (John'), [↓]⊥   ?Ty (e→ t),

?Ty(e), ◊   Ty (e→ (e→ t))
Fo (λyλxHate'(x, y), ↓[⊥]

Fig-4.16c

(4.15) d. Parsing *he hated Mary*

$$?Ty\,(t)$$

Ty(e), Fo (John'), [↓]⊥   ?Ty (e→ t),

Fo(Mary') Ty (e), ◊   Ty (e→ (e→ t)
Fo (λyλx. Hate'(x, y), ↓[⊥]

Fig-4.16
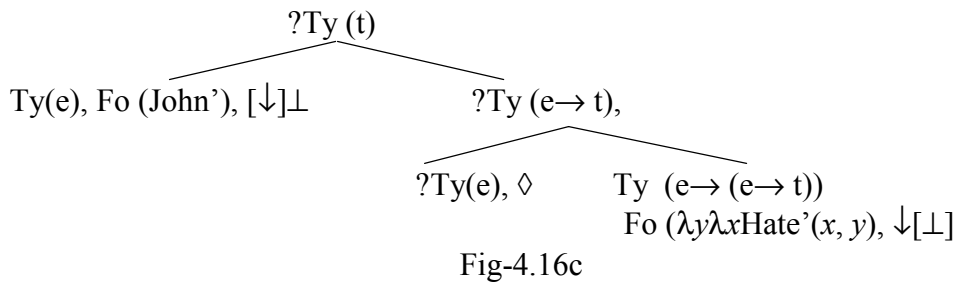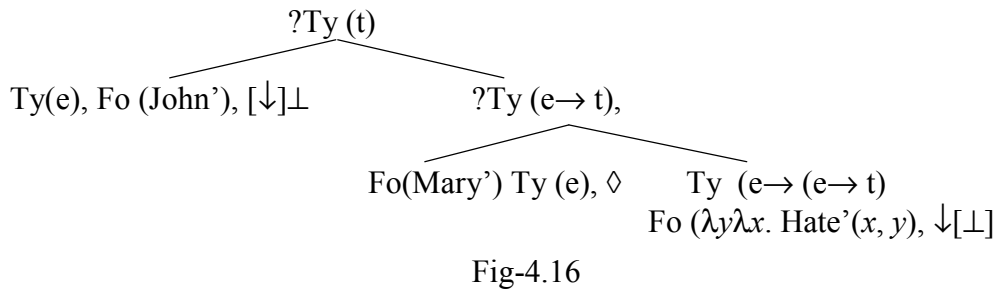
As is noted above, a metavariable is replaced by a contentful formula through Substitution. In this place, I only provide a schematic definition of Substitution because the constraints and conditions on what can be a proper substituend for a metavariable vary from case to case and variants of Substitution should be case-specifically defined[20].

(4.16) Substitution (a schematic definition)

1. IF	Fo(**U**), ?∃x.Fo(x), Ty(X)
2. THEN	@a number of alternative constraints to be checked@
…	
n-1	put (Fo(α)), Ty(X))
n. ELSE	1

---

[20] In Cann et al (2005), the definitions of the lexical actions induced by the parse of *he* and *herself* and a definition of Substitution with respect to a non-reflexive pronoun in English are given. I have not quoted them here because they are all partial definitions empirically. Many obvious constraints on the actions involved in those definitions are not reflected in them. A schematic definition of Substitution suffices to reflect the theoretical essence of Substitution.

The first line states the main trigger condition of Substitution rule: the presence of a metavariable of some type. What follows the first line is a number of constraints over the choice of potential substituends. The action 'put (Fo(α))' in line n-1 is taken if the trigger holds and some constraining condition are also satisfied. If the triggering condition does not hold, the ELSE action 1 is taken (line n), i.e. the pointer stays on the node waiting for other parsing actions.

Pronouns in different languages may carry different presuppositions. The English pronoun *he* only picks out a term whose denotation is a male individual. The third person singular pronoun *ta* 'he/she' in Mandarin does not does carry any gender information; therefore, if a sentence with *ta* 'he/she' is overheard, the overhearing person only knows that the speaker is talking about a single individual but is unsure whether that mentioned individual is male or female. In general, any semantically impoverished linguistic expressions can be assumed to contribute a metavariable, such as *be* in English (c.f. Can et al 2005), or *shi* in Mandarin (see Wu 2005), both of which are assumed to project a predicate-type metavariable. Different improvised linguistic expressions do not simply project a metavariable; they usually impose constraints on the potential substituends just as the English pronoun *he* does. Correspondingly, the rule of Substitution must be defined ad hoc in each case because the properties of the linguistic expressions that project metavariables are different from each other (they can carry different procedural information) and the constraints on the potential substituends for those metavariables vary from case to case. In summary, the concepts of metavariable and substitution are very useful for characterizing semantically impoverished linguistic expressions. But when and how these concepts are applied largely depends on what empirical facts are under consideration.

4.4.8 Link

In many cases, two or more propositions, i.e. tree structures, are built in tandem as the words are parsed within the boundary of a sentence. For example, in a compound/complex sentence, there are at least two clauses, each of which contributes a proposition. These propositions stand in various semantic relationships. A representative instance is a sentence that consists of a matrix clause and a relative clause or a conditional clause. Parsing such a complex sentence yields two propositions each of which consists of a single predicate argument structure. And the two simple propositions finally combine into a compound proposition. Dynamic Syntax uses the concept of Link to characterize the shift from the construction of one (partial) semantic tree to the construction of another semantic tree. Since the two trees are semantically linked, various Link evaluation rules are defined to establish the final semantic relationship between two linked structures. The first (partial) tree (called matrix tree) links to another partial tree (called linked structure) and the relationship between the two (partial) trees is represented by a bold arrowed line. The two modal operators $<L>$ and $<L^{-1}>$ are defined for the description of the Link relationship between two trees. The former operator points to the topnode of the Linked tree (the Link daughter node) from a node on the matrix tree (the Link mother node). The latter operator points to the Link mother node on the matrix tree from the Link daughter node.

There are two situations where Link is used: First, a term is shared between two semantic trees (Fig-4.17). Second, two trees do not share any single term but stand in some underspecified logical relationship (Fig-4.18).

Tn(n), Fo (a) …
Ty (Y)

$<L^{-1}>$Tn(n), ?Ty(t), $<\downarrow_*>$Fo(a), Ty(Y)

…   …

Fig-4.17

Tn(n), Ty(t), Fo(a) $<L^{-1}>$ Tn(n), ?Ty(t)

…   …   …   …
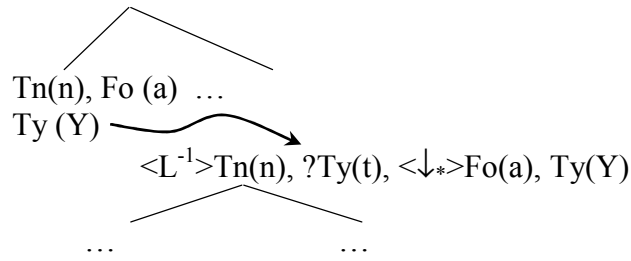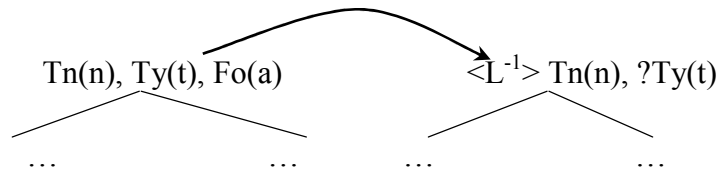
Fig-4.18

We take for example the parse of the English sentence *John*, *who Mary hated*, *left* to show how Link is applied (c.f. Cann et al 2005; Kempson et al 2001). A Link Adjunction rule is defined to deal with the parse of a non-restrictive clause in English (tense information is technically left out again).

(4.17) Link Adjunction

IF   Tn(n), Ty(e), Fo(α)
THEN   make($<L>$); go($<L>$);
          put ($<L^{-1}>$Tn(n), ?Ty(t), $<\downarrow_*>$Fo(α),Ty(e))
ELSE   1

In the Link Adjunction rule given in (4.17), the trigger is the presence of a term formula, Tn(n), Ty(e), at a fixed node on the matrix tree. If the trigger holds, a series of actions are taken to create the topnode of a Linked structure. At the same time the formula in the trigger is copied somewhere below the topnode on the Linked tree.

(4.18) a.   Parsing *John*

$$\text{Tn (0), ?Ty(t)}$$

~~?Ty(e),~~
Ty (e), Fo(John'), $[\downarrow]\bot\Diamond$
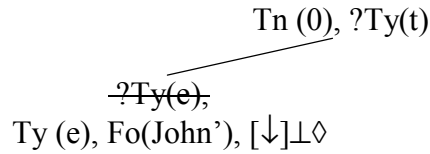
Fig-4.19

(4.18) b.   Applying Link Adjunction

$$\text{Tn (0), ?Ty(t)}$$

Ty (e), Fo(John')

$\langle L^{-1}\rangle\langle\uparrow_0\rangle$Tn (0), ?Ty (t), $\langle\downarrow_*\rangle$Fo (John'), Ty(e), $\Diamond$
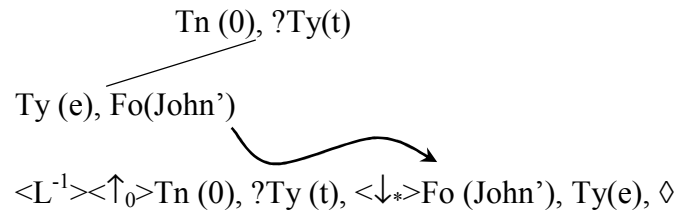
Fig-4.20

The application of Link Adjunction imposes the requirement that Fo (John') must be placed somewhere below the topnode of the Linked structure. On the unfolding Linked tree, however, the node on which the shared term can land is not available yet; therefore there is a need to create such a node to ensure this requirement is satisfied in the following parsing process. The application of *Adjunction can create an unfixed node decorated with modality description that this node requires a formula which is the same to the one that triggers the Linked tree.

(4.18) c.   Applying *Adjunction

$$\text{Tn (0), ?Ty(t)}$$

?Ty(e),
Ty (e), Fo(John')

$\langle L^{-1}\rangle\langle\uparrow_0\rangle$Tn (0),?Ty (t), $\langle\downarrow_*\rangle$Fo (John'), Ty(e)

$\langle\uparrow_*\rangle\langle L^{-1}\rangle\langle\uparrow_0\rangle$Tn (0), ?Ty (e), $\Diamond$
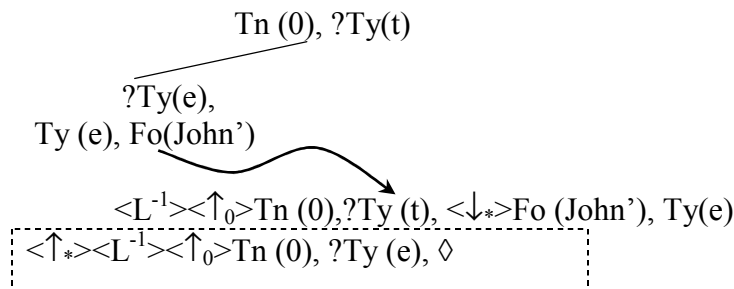
Fig-4.21

It is assumed that the parse of the word *who* induces the following lexical actions.

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(4.18) d.   who_{rel} (Cann et al 2005: 90 (3.9))

IF	$?Ty(e), ?\exists x.Tn(x), <\uparrow_*><L^{-1}>$ Fo $(x), Ty(e)$
THEN	put $(Fo(x), Ty(e), [\downarrow]\bot)$
ELSE	Abort

As the lexical actions fire through parsing the relativizer *who*, the shared formula is copied onto the unfixed node.

(4.18) e.   *John*, *who*

$$Tn(n), ?Ty(t),$$

$$?Ty(e),$$
$$Ty(e), Fo(John')$$

$$<L^{-1}><\uparrow_0>Tn(n), ?Ty(t), <\downarrow_*>Fo(John')$$
$$<\uparrow_*>, Ty(e), Fo(John')\Diamond$$

Fig-4.22a

(4.18) f.   *John*, *who Mary hated*,

$$Tn(0), ?Ty(t)$$

$$?Ty(e),$$
$$Ty(e), Fo(John')$$

$$<L^{-1}><\uparrow_0>Tn(0), Ty(t), Fo(Hate'(Mary', John')$$

$$Ty(e), Fo(Mary') \qquad Ty(e \to t), Fo(\lambda x.Hate'(x, John))$$

$$Ty(e), Fo(John') \qquad Ty(e \to (e \to t)),$$
$$Fo(\lambda y \lambda x.Hate'(x, y))[\downarrow]\bot$$
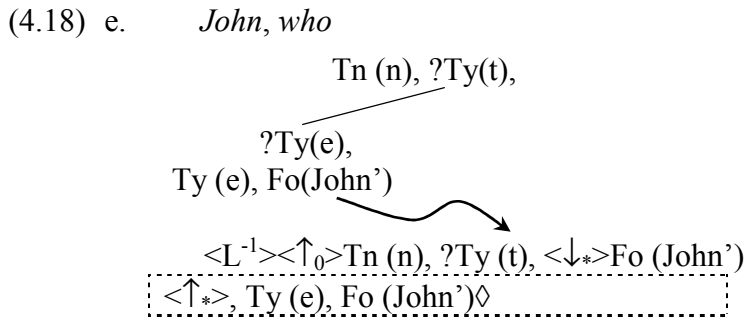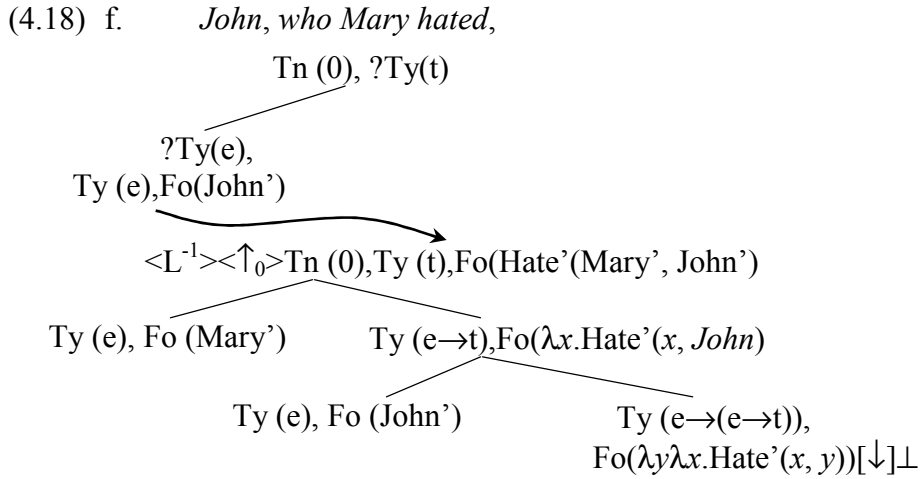
Fig-4.22b

The Link Completion rule has the effect of bringing the pointer back to the Link mother node. This rule is an update of the former Completion rule. In this new rule, the Link modal operators $<L^{-1}>$ and $<L>$ are included in the tree modalities.

(4.18) g.　　Completion (Revised)

IF	μ^{-1}Tn (n), Ty(X), Fo(α) ($\mu^{-1} \in \{\uparrow_0, \uparrow_1, \uparrow_*, L^{-1}\}$, $\mu \in \{\downarrow_0, \downarrow_1, \downarrow_*, L\}$
THEN	go(μ^{-1}); put($<\mu>$Ty(X), Fo(α))
ELSE	1

Applying this rule, the pointer goes back to the Link mother node of the matrix tree; the process of constructing the matrix proposition is resumed.

(4.18) h.　　Parsing *John, who Mary hated, left*.

Tn (0), Ty(t),Fo(Leave'(John'), ◊

　　?Ty(e),　　　　　　　　　　Ty(e→t)
Ty (e),Fo(John')　　　　　　Fo(λz.Leave(z), [↓]⊥

　　$<L^{-1}><\uparrow_0>$Tn (0),Ty (t),Fo(Hate'(Mary', John')

Ty (e), Fo (Mary')　　　Ty (e→t),Fo(λx.Hate(x, John')

　　Ty (e), Fo (John')　　　　　　　　　Ty (e→(e→t)),
　　　　　　　　　　　　　　　　　　Fo($\lambda y \lambda x$.Hate'(x, y))[↓]⊥
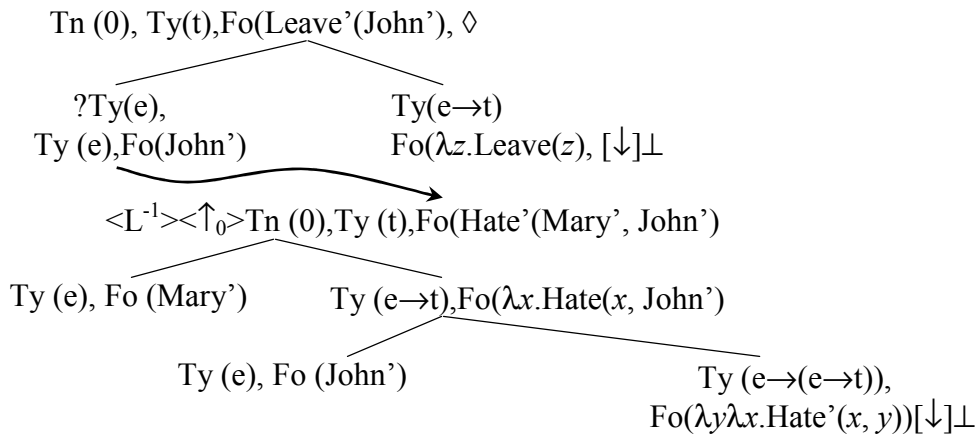
Fig-4.23

Once the matrix tree is also fully constructed, the Link relationship needs to be updated since this relationship only provides an underspecified semantic relationship. This update is accomplished through applying a rule Link Evaluation given in (4.19).

(4.19)　　　　Link Evaluation (Non-restrictive construal in English)

IF	Tn(n), Fo(φ), Ty (t), $<L^{-1}>$MODTn (n), Fo (ψ), Ty (t)
THEN	put(Tn (n), Fo ($\varphi \wedge \psi$) Ty (t), $<L^{-1}>$MOD Tn (n), Fo (ψ), Ty (t))
ELSE	1

$$MOD \in \{<\uparrow_0>,<\uparrow_1>\}^*$$

The triggering condition is that the current node is annotated with a Ty(t) formula and a second Ty(t)-formula is copied from a Linked structure. If this triggering

condition is true, the two formulae on the current node are conjoined. The result of Link Evaluation for the sentence *John*, *who hated Mary*, *left* is given in (4.20).

(4.20) Tn (0), Ty(t), Fo(Leave'(John')) ∧ Hate'(Mary', John'))

4.5 Enlarging Argument Structure in Dynamic Syntax

In this work, I assume, like Gregoromichelaki (2006), that the argument structure of a verb includes a hidden event argument along with individual arguments. The concept of event argument is useful for accounting for many linguistic phenomena in the framework of Dynamic Syntax. The concept of event argument is first proposed by Davidson (1967) and is widely adopted in many later formal semantic works. In this section I will first briefly introduce Davidson's proposal and then shift to explaining the motivation for the introduction of this concept into Dynamic Syntax in Gregoromichelaki (2006).

4.5.1 Davidson's Proposal

Davidson (1967) introduces a hidden event argument into the logical form of an action sentence. He points out that in a sentence like *John did it slowly*, *deliberately*, *in the bathroom*, *with a knife*, *at midnight*, the pronoun *it* seems to refer to a term. It is intuitively clear that the above sentence may mean *John buttered a piece of toast slowly* and *John buttered a piece of toast deliberately* and so on. Davidson points out that if what *it* refers to is represented as *x*, then *x* must be replaced by some term but there is not a single term in the latter sentences that corresponds to *it*. Davidson suggests that the argument structure of an action verb includes a hidden event argument in addition to individual arguments and the event argument represents a situation expressed by the proposition. The event argument can be picked out by an anaphoric expression as an antecedent, just as *it* does in the above example. Davidson also suggests that an event argument can be shared by a verbal predicate and other predicates. He suggests that the logical form of a sentence like *I flew my*

spaceship to the Morning Star as ∃*x* (Flew (I, my spaceship, *x*) & To (the Morning Star, *x*), where *x* is an event argument that is shared by two argument structures. Such a logical form clearly represents the entailment relationship between *I flew my spaceship to the Morning Star* and *I flew my spaceship*. The Davidsonian representation of the semantic interpretation of an action sentence has been widely adopted in current formal semantics literature.

4.5.2 Event Argument in Dynamic Syntax

The concept of event argument is introduced into Dynamic Syntax in Gregoromichelaki (2006). This is done in order to represent the logical relationship between conditional clauses and main clauses. Gregoromichelaki proposes that there is an event argument in the argument structure of an action verb, whose value is a situational term of logical type e_s, which is a special argument type, i.e. event argument type. An event argument term can combine with a predicate just as an individual term does. Importantly, a situational term scopally interacts with individual terms, giving rise to a variety of ambiguities. For example, the sentence *Henry gracefully ate all the crisps* has two readings. The two readings can be respectively represented as two logical forms, where the situational term interacts with an individual term quantified by the universal quantifier in two ways: (i) ∀*y*.Crisp (*y*)→∃*t*. Eat' (Henry', *y*, *t*) ∧Graceful (*t*); (ii) ∃*t*.∀y.Crisp'(*y*) → Eat'(Henry', y, *t*) ∧ Graceful' (*t*). In the two logical forms, *t* is a situational variable and *y* is an individual variable (see Taylor 1985; c.f. Gregoromichelaki 2006).

Taking advantage of the concept of event argument, Gregoromichelaki (2006) assumes that a conditional clause contributes a restrictor to a situation variable. Parsing the sentence *if John cries, Mary laughs* gives rise to the completed semantic tree in Fig-4.24.

$$Ty(t), Fo(Laugh'(Mary, (\tau, s, Cry'(s, John'))))$$

$$Ty(e_s), Fo(\tau, s, Cry'(s, John')) \qquad Ty(e_s{\rightarrow}t), Fo(\lambda t.\ Laugh'(t, Mary))$$

LINK

$$Ty(e_s), Fo(\tau, s, Cry'(John', s))$$

$$Ty(cn_s), \qquad Ty(cn_s{\rightarrow}e_s), Fo(\lambda P.\ \tau, P)$$
$$Fo(s, Cry'(s, John'))$$

$$Ty(t), \qquad Ty(t{\rightarrow}cn_s),$$
$$Fo(Cry'(s, John') \qquad Fo(\lambda R.\ s, R)$$
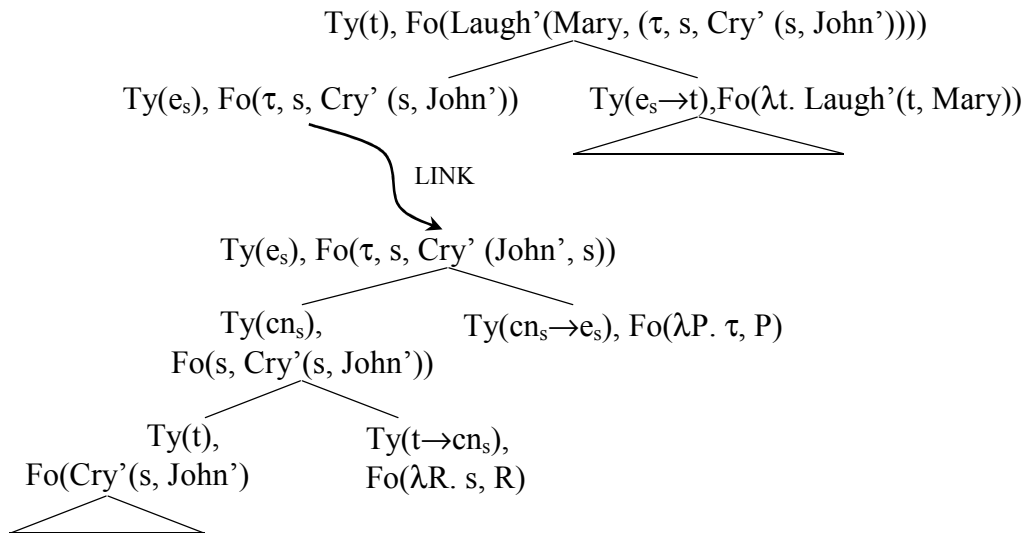
Fig-4.24

On the topnode of this completed semantic tree is Fo(Laugh'(Mary, τ, s, Cry' (John', s))). This formula includes a τ-term, which is the witness of the truth of the containing formula and the witness of the truth of the restrictor as well[21]. Put plainly, in every situation where *John* cries, it also is true that *Mary* laughs.

The details of the parsing process through which the above complete tree are irrelevant to the current research. In Chapter 6, I will take advantage of the concept of event argument to formalize the semantic relationship between two verbs that respectively express two subevents within a complex event, which significantly facilitates the analysis of argument realization in complex prediction constructions in the framework of Dynamic Syntax.

Additionally, I always put the argument node as the highest argument node on a partial semantic tree, similar to that in Fig-4.24, but I put the event argument on the leftmost position in the argument structure of a verb. For example, the semantic

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[21] This formula is converted into more familiar logical forms through Quantification Evaluation rule (see Kempson 2001: 241; Cann et al 2005: 131). A term reconstruction rule will be given in next chapter.

formula that the verb *kick* contributes is Fo($\lambda y\lambda x\lambda t$. Kick'($t$, x, y)). The variable t is the event argument. The variables x and y are two individual arguments. The variable on the left represents a proto-agent/agent-like argument and the one on the right, a proto-patient/patient-like argument. On the other hand, following tradition, I still call the verb *kick* a two-place verb and call x the external argument and y the internal argument.

What deserves mentioning is the current representation of the argument structure of a verb means that the arity of a verb is always fixed. This is apparently different from Marten's (2002) proposal of verbal underspecification. In Marten (2002), it is assumed that verbal subcategorization only partly reflects the arity of a predicate. The semantic representation of a verb is highly underspecified. Marten treats arguments and adjuncts both as arguments and he assumes that the subcategorization of a verb only specifies the minimal arity of the verb but does not fully specify its arity. Since adjuncts are taken to be arguments, the argument structure of a verb can be continuously enlarged, enriched in Marten's words, as more and more adjuncts are parsed. Marten takes advantage of the Kleene star to represent this so-called underspecified verbal arity. For example the logical type of *kick* is Ty($e\rightarrow(e\rightarrow(e^{*}\rightarrow t))$), which means that the predicate has at least two arguments and more arguments (adjuncts) can be added. In contrast, since I assume that a verb has a fixed arity. The lexical semantics of a verb is always represented as a lambda expression involving a fixed number of lambda-bound variables and the lexical semantics of the verb is fixed the moment it is parsed.

On the other hand, Marten explicitly rejects the notion of thematic roles in his work for the reason that they are 'vague'. However, 'features' indicating the semantic roles of those term expressions following prepositions in English slip into Marten's system, such as '+loc(action)' or '+instr(ument)'. This results in theoretical

inconsistency. It should also be noticed that the theoretical significance of tree-representation in Marten's system is rather unclear. The semantic roles of 'core arguments' are represented by their structural positions on a tree but adjunct terms can be freely put on a tree-structure because they are marked with 'features' provided by prepositions. Put straightforwardly, some tree nodes are used to indicate thematic statuses of arguments relative each other; others are taken to be irrelevant to thematic information. In the later case, thematic information is indicated by 'features' on tree nodes. Unlike Marten, the argument structure of a verb in my system is fixed and the tree nodes on a proposition template indicate their relative thematic relation. Adjuncts in my systems are not treated as 'feature-bound' arguments. With the introduction of event argument into Dynamic Syntax, an adjunct is treated as expressions projecting a Linked structure that shares at least an argument with the matrix tree headed by a verbal predicate. Specifically, prepositions are treated as predicates having their own argument structures (c.f. Davidson 1967), which are semantically linked to verbal argument structures through argument sharing. It is worth mentioning that there is no need to invoke type-raising when adjuncts are treated in this way because verbal predicates and non-verbal predicates do not take one another as arguments but share arguments among them. The semantic distinction between arguments and adjuncts are reflected through the constructions of different trees rather than by 'features' on the nodes of a single tree as Marten (2002) does.

4.6 A Parsing Perspective of the Grammatical Subject in Mandarin

I will start this section by giving a preliminary DS account of basic sentences in Mandarin, which naturally involves the discussion of argument realization from a parsing perspective. Viewed from a parsing perspective, a grammar is a package of language-specific constraints over parsing processes through which semantic representations are constructed. First let's reflect upon the characteristics of

Mandarin from a traditional perspective and then we consider how these characteristics can be depicted from a parsing perspective.

A characteristic of the grammar of Mandarin, put in traditional grammatical terms, is that the grammatical subject of a sentence, which is the immediately preverbal argument expression, is not necessarily the semantic argument of its adjacent verb, e.g. (4.21a) and (4.21b); nor does the subject necessarily contribute a formula to the external argument node of the propositional template projected by an adjacent two-place verb, e.g. (4.21c) and (4.21d).

(4.21) a. *Zhangsan-de yanjing shui zhong-le.*

           Zhangsan's   eye   sleep swollen-PFT

           'Zhangsan's eyes got swollen because he slept too much.'

       b. *Di   dou xi   shi-le.*

           ground all wash wet-PFT

           'Even the ground became wet in the washing.'

       c. *Women ganggang chai-le   na-zhuang loufang.*

           we   just.now dismantle-PFT that-CL   building

           'We just dismantled that building.'

       d. *Na-zhuang loufang ganggang chai-le.*

           that-CL   building just.now dismantle-PFT

           'That building was dismantled just now.'

In (4.21a), *Zhangsan-de yanjing* (=Zhangsan's eyes) is the grammatical subject but it is not a semantic argument of the following verb *shui* 'sleep'; instead, it is a semantic argument of the verb *zhong* 'swollen'. In (4.21b), the subject *di* 'ground' is not a semantic argument of *xi* 'wash' but is a semantic argument of *shi* 'wet'. What was washed, obviously, was clothes. In (4.21c), the subject is the more prominent

argument of the verb *chai* 'dismantle' but in (4.21d); the subject is the less prominent argument of the same verb *chai* 'dismantle'.

These facts leave us with the impression that the semantic relationship between the subject and its adjacent verb is highly underspecified. Viewed from a parsing perspective, these facts can be characterized as the result of a dynamic process of semantic construction: a preliminarily unfixed node is created; this node is preliminarily annotated with ?Ty(e), which is to be satisfied by lexical input. This unfixed node can alternatively Merge with various fixed nodes to be constructed later on.

The *Adjunction rule is usable as the mechanism constructing such an unfixed node when only a single unfixed node needs to be created before the construction of some fixed node. When a lexical form is scanned to provide a formula for this unfixed node, this lexical form is taken to be the subject in traditional grammar.

(4.22) *Adjunction

> IF   Tn(n), ?Ty (t)
> THEN   IF ↓*T   @if it is true that there is some fixed node below@
>   THEN 1
>   ELSE   make (<↓*>); go(<↓*>);
>   put (<↑*>Tn(n), ?∃x.Tn(x), ?Ty (X)) X∈ {e, t}
> ELSE   1

Noticeably, in Chinese there are sentences in which two or more argument expressions occur preverbally. Consider the following example.

(4.23)   *Zhangsan zhuren ma-guo*   (Wu 2005: 82 (3.55b)

              Zhangsan director scold-EXP

              'Zhangsan, the director scolded.'

Wu (2005: 86) treats the expression *Zhangsan* in (4.23) as a topicalized focus. This expression is parsed through applying the rule *Adjunction. Wu adopts Kempson et al's (2001) Introduction and Prediction rules[22] through which an external argument node and a one-place functor node are created and ?Ty(e) on the external argument node is annotated by the formula of the second argument expression. In this account, the two preverbal argument expressions are treated unequally: One appears on a unfixed node preliminarily and the other appears on a fixed node, i.e. the external argument node.

However, it should be noticed that a sentence like (4.23), unlike its structural counterpart in English (e.g. *John*, *Mary upset*), is ambiguous, that is, either the first or the second argument expression can be construed as the more prominent argument. This means that the formula of *zhuren* 'director' annotates either the external argument node or the internal argument node of the semantic tree under construction rather than deterministically annotates the external argument node. In view of the structural underspecification of all preverbal expressions, I assume that the second argument expression *zhuren* 'director' also appears at a unfixed argument node. However, if two unfixed nodes of argument type are created through applying the *Adjunction rule twice, they will have exaly the same modality and will collapse into one. To avoid this unwanted consequence, I assume that a second unfixed node is created through applying the rule Local *Adjunction (c.f. Cann et al 2005: 236). The application of which creates an unfixed node below a functor node that is dominated by the topnode.

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[22] The two rules are two sequences of actions. The introduction rule split ?Ty(t) into ?Ty(e) and ?Ty(e→t) and the Prediction rule creates two daughter nodes below the top node and puts the two sub-goal onto the two daughter nodes (c.f. Kempson et al 2001: 81; Cann et al 2005: 43).

(4.24) a. Local *Adjunction

IF	Tn(n), ?Ty(t)
THEN	make ($<\downarrow_1^*>$); go($<\downarrow_1^*>$); @$<\downarrow_1^*>$ means applying $<\downarrow_1>$ at least once@
	make ($<\downarrow_0>$); go($<\downarrow_0>$);
	put ($<\uparrow_0><\uparrow_1^*>$Tn(n), ?Ty(e))
ELSE	1

The unfixed created through applying *Adjunction is directly dominated by the topnode but the node created through applying Local *Adjunction is a fixed node within a local tree domain dominated by an unfixed functor node (see Fig-4.25). Thanks to the difference of modality between the two unfixed nodes of argument type, they do not collapse into one. The sentence in (4.23) can be parsed in the following way.

(4.24) b. Parsing *Zhangsan zhuren*

$$\text{Tn(0), ?Ty(t)}$$

$<\uparrow_*>$,Tn(0), $<\uparrow_1^*>$Tn(0)

Ty(e), Fo(Zhangsan'), [$\downarrow$]$\perp$

$<\uparrow_0><\uparrow_1^*>$Tn(0), Ty(e), Fo(Zhuren'), [$\downarrow$]$\perp$, $\Diamond$
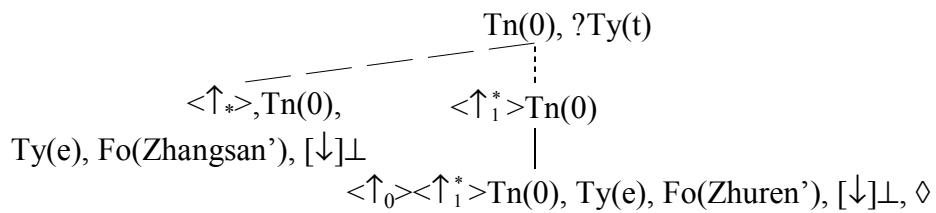
Fig-4.25

I assume that the parse of a two-place verb triggers the construction of a propositional template and the pointer moves to the top node on the propositional template when all the argument nodes and the functor node are created.

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(4.24) c.   *ma*(*-guo*) 'scold-EXP'

IF	?Ty(t)
THEN	make($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e_s)); go($<\uparrow_0>$);
	make($<\downarrow_1>$); go($<\downarrow_1>$); put(?Ty($e_s\rightarrow t$));
	make($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e)); go($<\uparrow_0>$);
	make($<\downarrow_1>$); go($<\downarrow_1>$); put(?Ty(e$\rightarrow$($e_s\rightarrow t$)));
	make($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e)); go($<\uparrow_0>$);
	make($<\downarrow_1>$); go($<\downarrow_1>$);
	put(Ty(e$\rightarrow$(e$\rightarrow$($e_s\rightarrow t$))), Fo($\lambda y\lambda x\lambda t$. Ma'(*t, x, y*), [$\downarrow$]$\perp$);
	gofirst$\uparrow$(?Ty(t));
ELSE	Abort

One of the two unfixed nodes can Merge with the current node, through which the ?Ty(e) requirement at this node is satisfied and then the pointer moves upward to the external argument node. The requirement at the external argument node can be satisfied through the Merge between this node and the other unfixed node. [23] The event variable node receives a free situation variable through pragmatic inference. The two alternative parsing results are represented as (4.24d) and (4.25).

(4.24) d.   Parsing *Zhangsan zhuren ma*(*guo*) (after Merge)

Tn(0)?Ty(t), $\Diamond$

Ty(e_s), Fo(s)   ?Ty($e_s\rightarrow t$)

Ty(e)   ?Ty(e$\rightarrow$($e_s\rightarrow t$))
Ty(e), Fo(Zhuren'), [$\downarrow$]$\perp$

Ty(e)   Ty(e$\rightarrow$e$\rightarrow e_s\rightarrow t$),
Ty (e), Fo(Zhangsan'), [$\downarrow$]$\perp$ Fo($\lambda y\lambda x\lambda t$. Ma'(*t, x, y*), [$\downarrow$]$\perp$
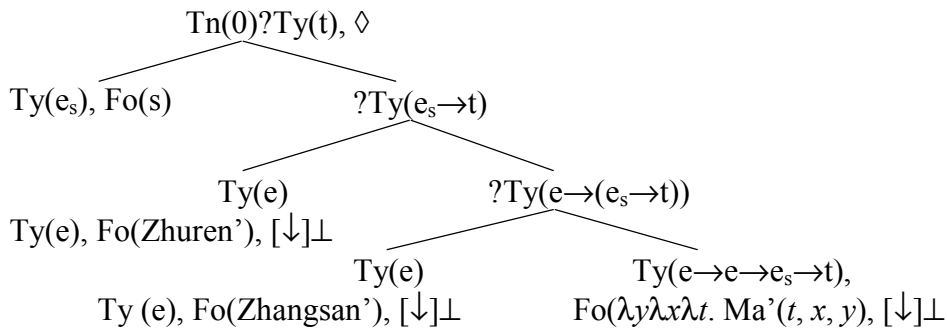
Fig-4.26

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[23] Intuitively, when the second argument expression is understood as the internal argument, the expression usually receives a prosodic stress, but it does not when it is understood as the external argument. Presently I have no theory about prosody-semantic role correspondence; this intuition, therefore, is not seriously considered, but it may turn out to be an important factor for the parser to pin down the semantic status of the expression at issue.

(4.25) Parsing *Zhangsan zhuren ma*(*guo*) (after Merge)

$$Tn(0)?Ty(t) , ◊$$

$$Ty(e_s), Fo(s) \qquad ?Ty(e_s{\rightarrow}t)$$

$$Ty(e)$$
$$Ty(e), Fo(Zhangsan'), [\downarrow]\bot$$

$$Ty(e) \qquad ?Ty(e{\rightarrow}(e_s{\rightarrow}t))$$

$$Ty(e) \qquad\qquad Ty(e{\rightarrow}e{\rightarrow}e_s{\rightarrow}t),$$
$$Ty (e), Fo(Zhuren') [\downarrow]\bot \qquad Fo(\lambda y\lambda x\lambda t\, Ma'(t, x, y), [\downarrow]\bot$$
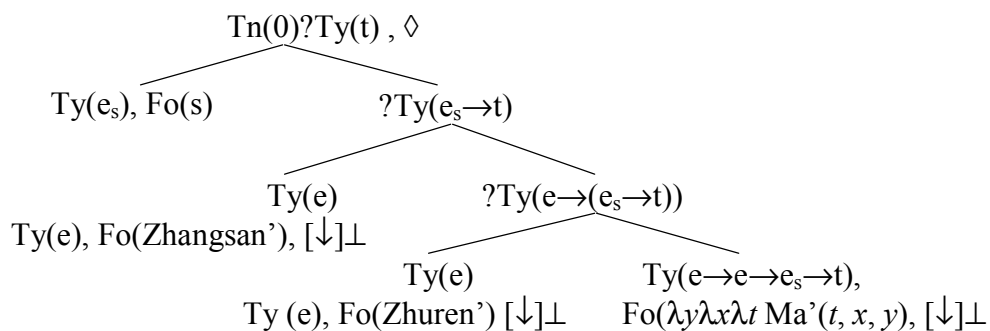
Fig-4.27

In the above discussion, I start from a traditional point of view on the data and examine how the grammatical subject is parsed. In the dynamic account, the parse of a grammatical subject includes the actions of creating and annotating a preliminary unfixed argument node before the construction of a propositional template through the parse of a verb. Through this short account of the parse of the grammatical subject, a connection between Dynamic Syntax and traditional grammar is established: the grammatical subject in Mandarin is the effect of a sequence of actions that construct an unfixed node annotated with the requirement of an argument-type formula and the lexical form that provides a formula for the unfixed node is the subject phrase in traditional grammar.

4.7 A Parsing Perspective of the Grammatical Object in Mandarin

In this section, I consider the dynamic nature of the object in traditional grammar. I still start with a traditional grammatical description. I take the following simple sentence in Mandarin for example.

(4.26) a. *Zhangsan chi-le   yi-wan mifan.*

eat-PFT   that-CL rice

'Zhangsan ate a bowl of rice.'

The sentence (4.29a) is described in traditional grammar as such that it is transitive, having a two-place verb *chi* 'eat'; the two semantic roles entailed by the verb *chi* 'eat' are realized respectively as the subject and the object. In a parsing perspective, the sentence is the following dynamic process.

(4.26) b. Parsing *Zhangsan*

$$Tn(n), ?Ty(t)$$

$$\langle\uparrow_*\rangle Tn(n), \ Ty(e), \ Fo(Zhangsan'), \ \Diamond$$
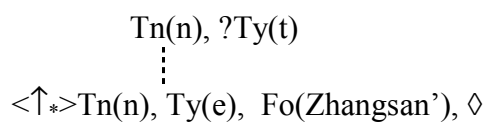
Fig-4.28

The verb *chi* 'eat' projects a propositional template. The partial tree is updated as Fig-4.29.

(4.26) c. Parse *Zhangsan chi(-le)*.

$$Tn(n), ?Ty(t), \Diamond$$

$\langle\uparrow_*\rangle Tn(n),$ $Ty(e_s), Fo(s)$ $?Ty(e_s \to t)$
$Ty(e), Fo(Zhangsan')$

$?Ty(e)$ $?Ty(e \to (e_s \to t))$

$?Ty(e)$ $Ty(e \to (e \to (e_s \to t)))$,
$Fo(\lambda y \lambda x \lambda t.Chi'(t, x, y), [\downarrow]\perp$
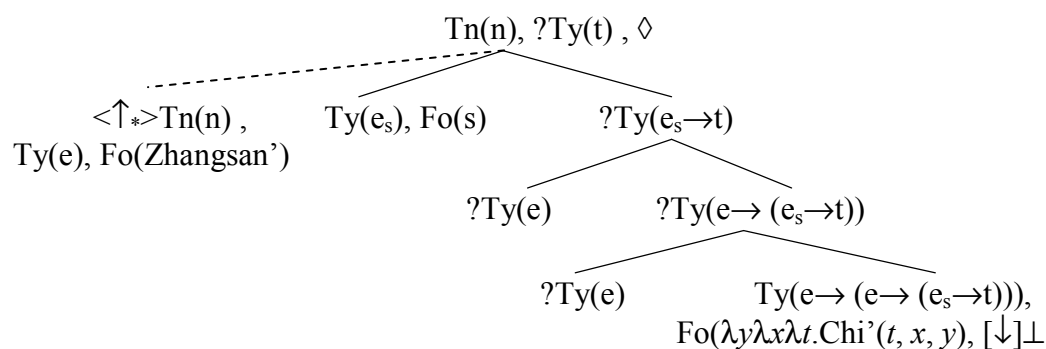
Fig-4.29

The pointer is currently located at the top node as a result of the lexical actions from the verb *chi* 'eat'. Through the application of Anticipation, the pointer moves down to the internal argument node where $?Ty(e)$ holds, a lexical input can directly satisfy this requirement.

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(4.27) *Yi-wan mifan* (=a bowl of rice) [24]

IF	?Ty(e)
THEN	put(Fo(ε, v Mifan'(v)), Ty(e))
ELSE	Abort

Through the above lexical actions, a semantic formula appears at the internal argument node on the propositional template projected by the preceding verb. The annotation of a fixed node directly through lexical actions produces the effect of object in traditional grammar. The dynamic nature of the object is a sequence of lexical actions triggered by ?Ty(e) on a fixed node, through which the triggering node is annotated with a formula of argument type; the lexical form that contributes the formula is the object expression.

What deserves attention is that since we assume that a two-place predicate projects a propositional template and the external argument and the internal argument respectively represent a more agent-like role (or the more prominent role) and a less agent-like prominent role (or the less prominent role), it is possible that an unfixed node Merges with the internal argument and then the pointer moves to the external argument where there is ?Ty(e). The ?Ty(e) at an external argument is a potential trigger for the parse of an argument expression. If the ?Ty(e) on the external argument node induces lexical input, there arises a serious consequence: put in traditional terms, the object is understood as a more prominent role while the subject expresses a less prominent argument. This, obviously, goes against the general principle of argument realization proposed in the literature: a more prominent argument is realized as the subject; a less prominent argument is realized as the object. This possibility must be effectively excluded in some way.

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[24] The semantics of a Chinese noun phrase could be much more complex than this since the classifier does not always express a measurement unit. It expresses some shape in many cases, such as *yi-tiao bianzi* 'one-CL whip' (a [stripe-shaped] whip) where the classifier indicates the shape of the semantic head. In this thesis, I will not look into the internal structure of an argument expression.

To exclude this unwanted result, I assume that ?Ty(e) is always the primary trigger of the parse of an argument expression but it is not a proper trigger for the actions of annotating an external argument node on a propositional template. We call the lexical actions of annotating a node with ?Ty(e) 'α-actions'[25], which are given below.

(4.28) The α-actions (to be revised)

IF	?Ty(e)
THEN	IF ↑T @if it is true there is a node above the current node@
	THEN IF $<\uparrow_0><\uparrow_1><\uparrow_1^*>$?Ty(t) @if the current node is an internal argument node on a propositional template@
	THEN put(Fo(α), Ty(e))
	ELSE Abort
	ELSE put(Fo(α), Ty(e))
ELSE	Abort

I hypothesize that the α-actions apply to the parse of all nominals. The effect of the α-actions is that ?Ty(e) node gets annotated with a Ty(e) formula when the node is an unfixed node or an internal argument node on a propositional template. The α-actions do not allow ?Ty(e) on an external argument, which is a fixed node, to trigger annotating actions. In this way, the undesired effect that a more prominent role is realized as the object is excluded. The α-actions automatically rule out the following string as well.

(4.29)   * *Ku-le   Zhangsan*

            cry-PFT

(4.29) is called an 'illformed sentence' in the literature. This illformed sentence is excluded because there is only one argument node on the propositional template

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[25] 'α' here does not have any special meaning and it is chosen arbitrarily.

projected by a one-place verb *ku* 'cry' but the parse of *Zhangsan* cannot annotate this argument node with a formula but leads to the termination of the parsing process with ?Ty(e) unsatisfied.

To sum up, in the above Dynamic Syntax account of basic sentences in Chinese, the subject in traditional grammar turns out to be the dynamic process of constructing an unfixed node of argument type; the object is the dynamic process of constructing a fixed argument node of argument type. Obviously, there is an asymmetry between the subject and the object as two different procedures: the former actions always create an instance of semantic-structural underspecification; but the latter do not. This semantic underspecification of the grammatical subject has been expressed in the literature on argument realization such that the more prominent argument is realized as the subject and the less prominent argument is realized as the object, but the less prominent argument is realized as the subject when the more prominent argument is suppressed, which collectively imply that the subject can alternatively accommodate different semantic roles. Put in Dynamic Syntax terms, an unfixed argument node created through the application of *Adjunction can potentially Merge with either the external argument node or the internal argument node on a propositional template.

In spite of the dramatic difference between traditional grammar and Dynamic Syntax, the syntactic functions (in Mandarin) in traditional grammar can be re-interpreted in the light of Dynamic Syntax: syntactic functions are not components in any static syntactic structure; they are different sequences of parsing actions, or meaning-constructing actions. The subject is the procedure of creating an unfixed argument and annotating the unfixed argument node; the object is the procedure of annotating an internal argument node with a formula through direct lexical input.

4.8 Pursuing Argument Realization in a Parsing Perspective

In the above discussion of grammatical functions from a parsing perspective, we realize that the subject and the object in Mandarin turn out to be different sequences of parsing actions rather than components of any static syntactic structure. Argument realization, in a parsing perspective, is a set of procedures through which the fixed argument nodes on a propositional template obtain formulae. In Section 4.5 and 4.6, actually, we have seen that the fixed argument nodes on a propositional template can obtain formulae in two different ways: the external argument node (representing the more prominent role) can obtain a formula through Merge, and the internal argument node (representing the less prominent role) can obtain a formula through direct lexical input or Merge. In this section, I consider some other situations of argument realization in simple standard sentences but focus on 'unrealized arguments' and 'arguments realized as null pronouns'. In the following discussion, I still start from a traditional perspective and then shift to a parsing perspective.

The arguments of a predicate can be either realized or unrealized in different circumstances, the distinction between the realized argument and the unrealized argument should be reflected in a semantic representation of a sentence. A realized argument refers to an argument whose referent is speciable in a sentence or in a context.

An unrealized argument is different from a realized argument; its referent is not specifiable in context. An unrealized argument only has the minimal information about a semantic role. The difference between an unrealized argument and an argument realized as a null pronoun is shown in the following examples.

(4.30) a. Context A: *Wangwu*, *Lisi* and *Zhangsan* are flatmates. One day, *Wangwu* couldn't find his apples. When *Wangwu* saw *Lisi*, the following dialogue took place.

Wangwu:　　*Lisi, ni　kanjian wode pingguo le　　ma*?
　　　　　　　　　you see　　my　apple　PFT　PRT
　　　　　　　'Lisi, have you seen my apples?'

Lisi:　　　　*Zhangsan chi-le*.
　　　　　　　　　eat-PFT
　　　　　　　'Zhangsan ate.'

(4.30) b. Context B: *Wangwu* asked *Lisi* why *Zhangsan* just stood aside and did not come to join them to have dinner.

Wangwu:　　*Lisi*, *Zhangsan zenme bu guolai*?
　　　　　　　　　　why　not come.here
　　　　　　　'Lisi, why does Zhangsan not come here?'

Lisi:　　　　*Zhangsan　chi-le*
　　　　　　　　　eat-PFT
　　　　　　　'He (Zhangsan) ate.'

In context A, what *Zhangsan* ate was specifiable although it is not mentioned in the sentence. It is *Wangwu*'s apples. In this case, the patient argument of *chi* 'eat' is realized as a null pronoun. Although there is no linguistic form for *pingguo* 'apple' in *Lisi*'s reply, the referent of the patient argument is specified. In context B, what *Zhangsan* ate is not specifiable. *Lisi*'s reply only means that *Zhangsan*'s eating activity in the past results in his not being hungry. Neither *Wangwu* nor *Lisi* was interested in what *Zhangsan* ate.

Parsing *Zhangsan chi-le* in two different contexts yields two different semantic interpretations. In context A, the internal argument of the verb obtains a value $Fo(\varepsilon, x, Pingguo'(x))$; this value is obtained not from the lexical input but from the context. But in context B, the internal argument of the verb obtains no value from any expression in the sentence or from the context. In the latter case, I assume that the internal argument node only obtains a thematic formula $Fo(\varepsilon, x, Shiwu'(x))$[26] through abduction on the basis of the lexical semantics of the verb. The two different parsing processes are demonstrated as follows.

(4.30) c.   (Context A) Parsing *Zhangsan*

$$?Ty(t), \Diamond$$

$$\langle\uparrow_*\rangle, Fo(Zhangsan'), Ty(e)$$
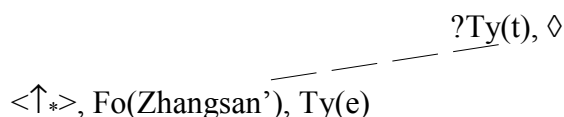
Fig-4.30a

Parsing the verb induces a package of lexical actions, constructing a propositional template.

(4.30) d.   *chi* 'eat'

IF	$?Ty(t)$
THEN	$make(\langle\downarrow_0\rangle); go(\langle\downarrow_0\rangle); put\ (?Ty(e_s));$
	$make(\langle\downarrow_1\rangle); go(\langle\downarrow_1\rangle); put(?Ty(e_s\rightarrow t));$
	$make(\langle\downarrow_0\rangle); go(\langle\downarrow_0\rangle); put(?Ty(e)); go(\langle\uparrow_0\rangle);$
	$make(\langle\downarrow_1\rangle); go(\langle\downarrow_1\rangle); put(?Ty(e\rightarrow(e_s\rightarrow t)));$
	$make(\langle\downarrow_0\rangle); go(\langle\downarrow_0\rangle); put(?Ty(e)); go(\langle\uparrow_0\rangle);$
	$make(\langle\downarrow_1\rangle); go(\langle\downarrow_1\rangle);$
	$put(Ty(e\rightarrow(e\rightarrow(e_s\rightarrow t))), Fo(\lambda y\lambda x\lambda t.Chi'(t, x, y)), [\downarrow]\bot);$
	$go_{first\uparrow}(?Ty(t))$
ELSE	Abort

---

[26] The expression 'Shiwu' means '(the) Eaten' or simply 'food'.

(4.30) e.　　　Parsing *Zhangsan chi-le*

?Ty(t) , ◊

<↑*>,Ty(e), Fo(Zhangsan') - - - - - -

?Ty(e_s)　　　?Ty(e_s→t)

?Ty(e)　　　?Ty(e→(e_s→t))

?Ty(e)　　Ty(e→(e→(e_s→t))),
Fo($\lambda y \lambda x \lambda t$.Chi'(*t*, *x*, *y*)),
[↓]⊥
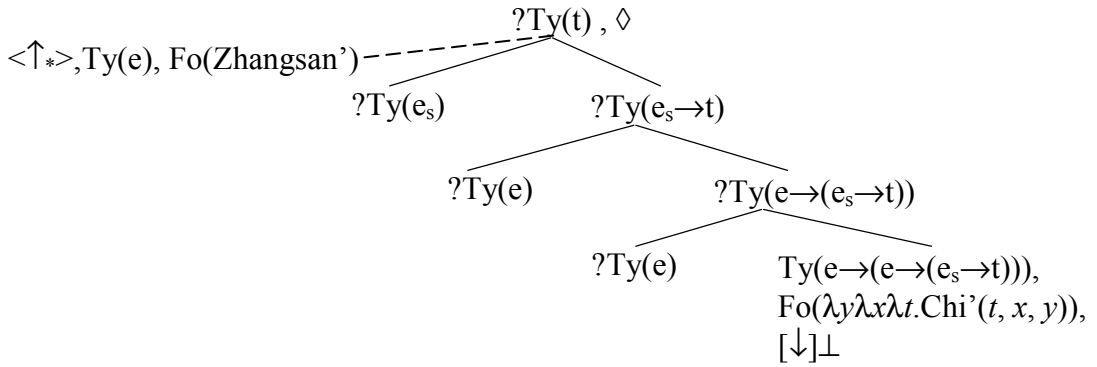
Fig-4.30b

The pointer moves down to the internal argument through applying Anticipation as shown in Fig-4.30c. The requirement on this node must be satisfied.

(4.30) f.　　　Applying Anticipation

?Ty(t)

<↑*>,Ty(e), Fo(Zhangsan') - - - - - -

?Ty(e_s)　　　?Ty(e_s→t)

?Ty(e)　　　?Ty(e→(e_s→t))

?Ty(e) , ◊　　Ty(e→(e→(e_s→t))),
Fo($\lambda y \lambda x \lambda t$.Chi'(*t*, *x*, *y*)),
[↓]⊥
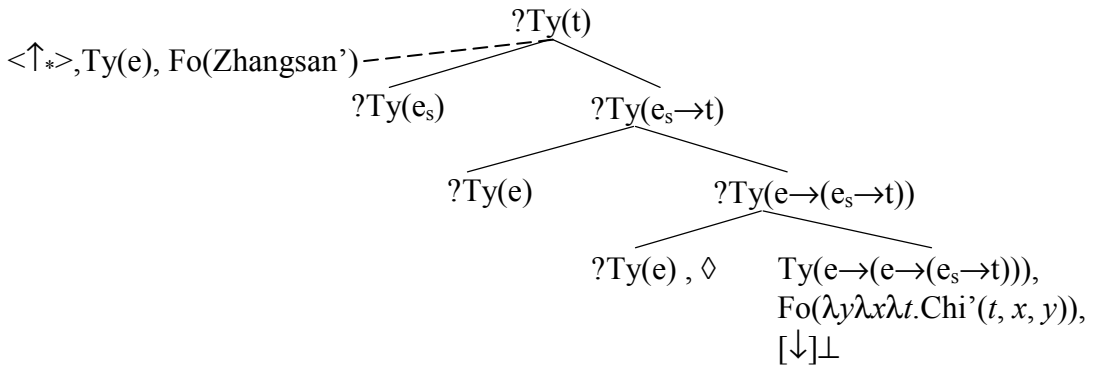
Fig-4.30c

I hypothesize that there are four ways to satisfy this requirement: direct lexical input, Merge, Metavariable Insertion, or Thematic Abduction. Which one of the four ways is chosen is contextually determined. In the current context, Metavariable Insertion meets the need. The spirit of Metavariable Insertion is very simple: the formula that an argument node needs is not directly obtained from direct lexical input but instead from context.

(4.30) g.   Metavariable Insertion

IF   ?Ty(e)
THEN   put (Fo(**V**), ?∃x. Fo(x))
ELSE   1

As a metavariable is put on the internal argument, it is substituted by a most relevant formula Fo(ε, *x*, Pingguo'(*x*)), Ty(e) given in the context. Subsequently, the unfixed node Merges with the external argument node. A situational metavariable **S** is inserted onto the event argument and this metavariable is finally substantiated by a situational variable, say, s.

(4.30) h.   Parsing *Zhangsan chi-le* (after Substitution)

$$?Ty(t) , \Diamond$$

Ty(e$_s$),Fo(s)   ?Ty(e$_s$→t)

Ty(e), Fo(Zhangsan')   ?Ty(e→e$_s$→t)

Ty(e), Fo(**V**)   Ty(e→(e→(e$_s$→t)))
⇑   Fo(λ*y*λ*x*λ*t*.Chi'(*t*, *x*, *y*)),[↓]⊥
Ty(e), Fo(ε, *x*, Pingguo'(*x*))
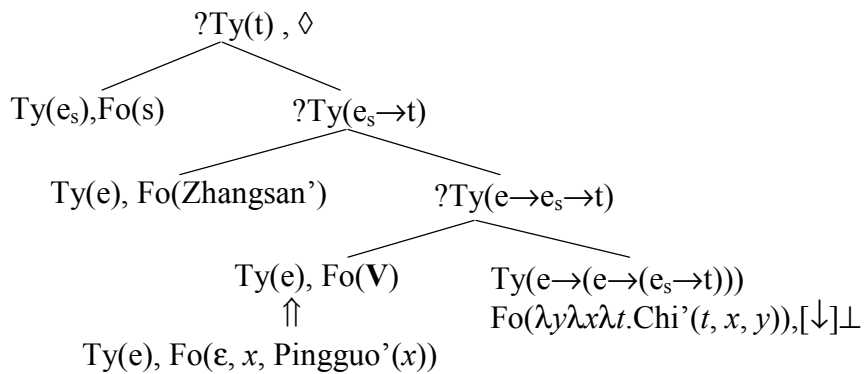
Fig-4.30d

Parsing the same string of words in context B yields a different semantic result. I assume that the thematic role information appears in the proposition semantically headed by the verb and the thematic information is represented as (ε, *x*, θ(*x*)) where θ is a fine-grained semantic role that an unrealized argument receives from the verb. This formula is obtained neither through direct lexical input nor through Substitution. Instead, this formula, which includes only thematic information, is obtained through Thematic Abduction (4.30i). Although an unrealized argument and an argument realized as a null pronoun equally involve no lexical input, there is an important difference between them. Thematic Abduction does not provide any specific referent

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for an argument slot but Metavariable Insertion plus Substitution provide a specific referent for an argument slot. Since a null pronoun functions just like a pronoun, the formula obtained through Metavariable Insertion plus Substitution usually carries a 'definiteness feature'[27] and a scope statement but the formula obtained through Thematic Abduction involves no information from discourse and carries no 'definiteness' feature or scope statement. The value assigned to an argument node through Thematic Abduction comes from the lexical semantics of the verb concerned.

(4.30) i.　　　Thematic Abduction (Internal Argument)

IF　　?Ty(e)
THEN　IF $<\uparrow_0><\downarrow_1>$ Ty(e→(e→(e$_s$→t))), Fo($\lambda y \lambda x \lambda t$.Chi'$(t, x, y)$), $[\downarrow]\bot$
　　　　THEN put(Ty(e), Fo(ε, u, Shiwu'(v), $[\downarrow]\bot$)
　　　　ELSE　1
ELSE　　1

Subsequently, the unfixed node projected by the subject Merges with the external argument node on the propositional template. The parsing result is given in Fig-4.30e.

(4.30) j.　　　Parsing *Zhangsan chi-le* (after Abduction)

?Ty(t), ◊

Ty(e$_s$),Fo(s)　　　?Ty(e$_s$→t)

Ty(e), Fo(Zhangsan') , $[\downarrow]\bot$　　　?Ty(e→e$_s$→t)

Ty(e), Fo(ε, v, Shiwu'(v), $[\downarrow]\bot$　　　Ty(e→(e→(e$_s$→t)))
Fo($\lambda y \lambda x \lambda t$.Chi'$(t, x, y)$)),$[\downarrow]\bot$
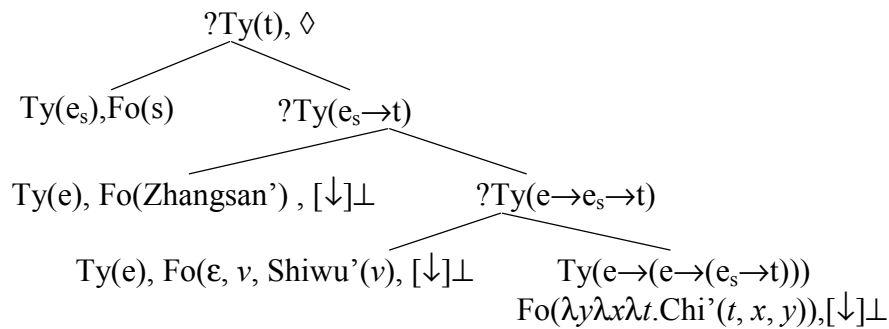
Fig-4.30e

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[27] In this thesis I do not elaborate on the distinction between definiteness and indefiniteness and this distinction is not reflected in the semantic trees.

Next let's consider another case of unrealized argument. In this case, it is the external argument that is unrealized and the subject is understood as the internal argument of the following verb.

(4.31) Context: *Zhangsan* returned to the village where he used to live. He took a walk around the village with his childhood friend *Lisi*, who had never left the village. They came across the site where there used to be an old willow tree. Zhangsan suddenly noticed that the willow tree was no longer there.

          Zhangsan: *Na-ke liushu   ne*?

                     that-CL willow PRT

                     'Where is the willow tree?'

          Lisi: *Na-ge liushu kan-le*.

                     that-CL willow cut-PFT

                     'That willow (was) cut long ago.'

In *Lisi*'s reply, the subject is the patient of the verb *kan* 'cut'. The sentence does not contain an expression for the agent nor does the context provide any information about the referent of the agent. The process of parsing the reply sentence goes as follows. The semantic role of the initial argument expression is still initially underspecified.

(4.32) a.   Parsing *na-ke liushu* (=that willow)

$$\text{Tn}(0), ?\text{Ty}(t)$$

$$\langle\uparrow*\rangle\text{Tn}(0), \text{Ty}(e), \text{Fo}(\varepsilon, x, \text{Liushu'}(x)), \Diamond$$

Fig-4.31a

Following the subject, the verb *kan*(-*le*) 'cut (-PFT) is parsed and a propositional template is projected. If the unfixed node Merges with the internal argument, the external argument node then is left with a requirement to be satisfied. It should be noted that the requirement on the external argument node cannot be satisfied through lexical input according to the α-actions defined above. Metavariable Insertion plus Substitution and Thematic Abduction are two alternative mechanisms to satisfy the requirement on the external argument node in this case. Since the external argument is not specified in the discourse context, Thematic Abduction is the only way to satisfy this requirement.

(4.32) b.   Thematic Abduction (External Argument)[28]

IF   ?Ty(e)
THEN   IF $<\uparrow_0><\downarrow_1><\downarrow_1>$ Ty(e→(e→(e_s→t))), Fo($\lambda y \lambda x \lambda t$.Kan'($t, x, y$)), $[\downarrow]\bot$
          THEN put(Ty(e), Fo(ε, u, Kanzhe'(u)), $[\downarrow]\bot$)
          ELSE 1
ELSE   1

(4.32) c.   Parsing *na-ke liushu kan*-(*le*)

$$?Ty(t), \Diamond$$

Ty(e_s), Fo(s)   ?Ty(e_s→t)

(Ty(e), Fo(ε, u, Kanzhe'(u)), $[\downarrow]\bot$?Ty(e→(e_s→t))

Ty(e), Fo(ε, v, Liushu'(v))   Ty(e→(e→(e_s→t))),
                                                    Fo($\lambda y \lambda x \lambda t$.Kan'($t, x, y$)), $[\downarrow]\bot$
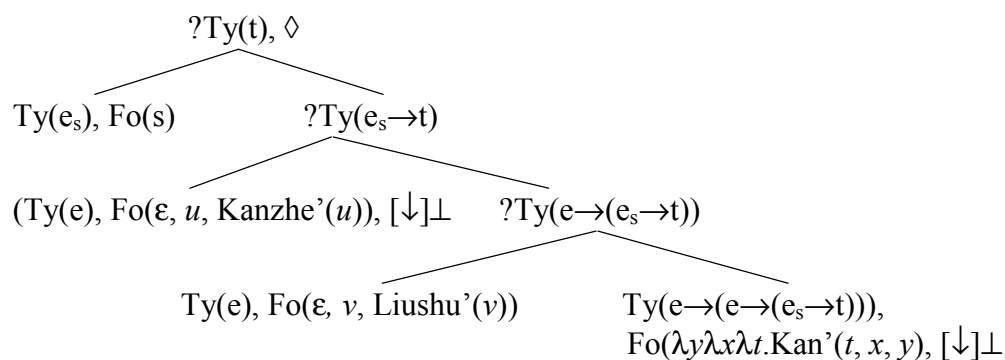
Fig-4.31b

This illustrative account of unrealized argument gives rise to the impression that unrealized arguments can appear freely and Thematic Abduction rule is not tightly constrained. It must be made clear that this is only an idealization about Thematic

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[28] The expression 'Kanzhe' in this rule means 'some person who cuts'.

Abduction. The above discussion of Thematic Abduction is just provisional because, as will be shown in the next two chapters, Thematic Abduction cannot be freely applied to any fixed argument node; necessary constraints will be considered in due course.

Importantly, it is should be noticed that throughout the discussion I have never assumed that the argument nodes on a propositional template projected by a Chinese verb are inherently annotated with metavariables. This treatment of the null pronouns in Chinese is different from the DS treatment of null pronouns in pro-drop languages such as Japanese (see Cann et al 2005) although Chinese is a pro-drop language as well. My assumption is that metavariables are inserted onto argument nodes through Metavariable Insertion. This assumption has its theoretic and empirical motivations.

Theoretically, I insist that unrealized arguments have corresponding argument nodes on propositional templates. If, however, I simultaneously adopt the assumption that the argument nodes on a propositional template are inherently annotated with metavariables, I immediately run into a problem with the issue of 'unrealized argument': An argument node that represents an unrealized argument is supposed to receive no referent from discourse context but an argument node inherently annotated with a metavariable requires a referent from discourse context because the presence of a metavariable means that this node is waiting for a formula from discourse context. This is an obvious inconsistency. Therefore, I do not adopt the assumption that metavariables automatically appear on argument nodes as a propositional template is projected.

Furthermore, Chinese verbs do not undergo morphological change no matter how they are used. If we do not want to have too many homonyms, we have to assume

that the propositional templates that most Chinese verbs project remain unchanged across different uses. If metavariables automatically appear at the argument nodes on the propositional templates projected by Chinese verbs, a prediction can be made that Chinese verbs always require the specification of their semantic arguments across different uses, which, apparently, is not true (see also Kempson 2001: 139 note 34 for a similar consideration).

To sum up, the fixed arguments on a propositional template can obtain formulae in four ways by hypothesis: Merge, direct lexical input, Metavariable Insertion, and Thematic Abduction. Among the four ways, the first three provide specific referents for argument variables (semantic roles) but the last does not. Viewed from a parsing perspective, the issue of argument realization is concerned with the ways semantic roles (argument nodes on a propositional template) obtain referents (formulae) through various dynamic parsing processes. For instance, a predicate entails two arguments, the argument which is thematically more prominent obtains a referent through the joint work of *Adjunction/Local *Adjunction and Merge, or through Metavariable Insertion plus Substitution; the less prominent role obtains a referent through *Adjunction/Local Action plus Merge, or through inducing direct lexical input, or through Metavariable Insertion plus Substitution. In this way, many phenomena of argument alternation can be accounted for with Dynamic Syntax.

4.9 Conclusion

Dynamic Syntax is intended to model the knowledge of language and characterize the way in which linguistic knowledge exerts its power in language comprehension. The process of comprehending a sentence is modelled as a temporal-linear parsing process. The ultimate goal of parsing a sentence is to build a complete propositional formula, which requires a language user to have the knowledge of stepwise processes of constructing semantic representation.

This chapter makes a first attempt to discuss the issue of argument realization in Mandarin from a parsing perspective. Viewed from a parsing perspective, syntactic functions in traditional grammar turn out to be different sequences of parsing actions that happen at different parsing stages; argument realization is an issue of the way in which various fixed argument nodes obtain contents through different actions. This is only a preliminary Dynamic Syntax characterization of argument realization. In the following chapters, more complex cases of argument realization will be described and accounted for from a parsing perspective. The Dynamic Syntax analyses to be implemented are not simply theoretical paraphrases of what has been said in the literature. A number of problems that previous works cannot solve will be solved below.

Chapter Five
Argument Realization in the Resultative Verb Construction

5.1 Introduction

The previous chapter has provided the theoretical framework in which the issue of argument realization can be examined from a parsing perspective and a preliminary Dynamic Syntax account of the basic patterns of argument alternation has already been given, through which the notion of argument realization and the notion of syntactic function are both reinterpreted from a parsing perspective. In this chapter and the next chapter, I will explore argument alternation in the resultative verb construction (RVC) in Mandarin. The argument realization patterns in this construction are interesting because the patterns are diverse and they caused many problems for previous attempts to analysis and because a successful theoretical account of them, as far as I can see, will lay a solid foundation for the theoretical accounts of many other linguistic phenomena that have been puzzling linguists. The work on RVC is presented in two chapters. This chapter is a description of the patterns of argument realization in RVC from a traditional perspective. A Dynamic Syntax account will be provided in the next chapter.

RVC consists of two verbs that stand immediately next to each other. For convenience, the first verb is called V_1 and the second verb is called V_2. A simple example of RVC is *Zhangsan da-dao Lisi* 'Zhangsan hit-fall Lisi' (=Zhangsan hit down Lisi).This sentence expresses a complex event consisting of two subevents; the *da* 'hit' subevent is the first, activity, subevent and the *dao* 'fall' subevent is the resultative subevent.

RVC can be classified into two major types in terms of the grammatical characteristics of V_2. In one type V_2 is a grammaticalized particle, expressing a general result. For example in *mai-zhao* 'buy-PRT', *zhao* is a bound morpheme, glossed with PRT. This particle historically means 'touch' but now expresses a general successful result following the first subevent[29]. In the other type, V_2 is a contentful verb, which expresses a specific type of result. For example in *da-dao* 'hit-fall', *dao* 'fall' (=down) expresses a state of affairs. V_1 in all instances of RVC expresses a specific type of subevent. More examples will be provided in the following sections. This chapter concentrates on the patterns of argument realization in the latter type of RVC. It will be shown that that V_1 and V_2 have different statuses in regulating argument realization patterns. What is worth mentioning in advance is that among all the attested argument realization patterns there are some patterns in which the arguments of V_1 are realized in a way inverse to the way in which the arguments of a verb are realized when that verb is used separately, which will be illustrated below. It should be noted that inverse argument realization also appears elsewhere. A question is whether these different cases of inverse argument realization can be accounted for uniformly. I assert in advance that the answer is yes – and the details will be explained in later chapters.

This chapter contains the following contents. Section 5.2 gives a description of RVC, covering the basic syntactic and semantic characteristics and the aspect and aspectuality characteristics of this construction. Section 5.3 is a presentation of the argument realization patterns in this construction. Section 5.4 proposes the descriptive principle and rules of argument realization in transitive RVC sentences. Section 5.5 is the conclusion of this chapter.

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[29] *Zhao* is one of many other similar particles. But an exhaustive list will not be given here as it is not required for an understanding of the topic of this chapter.

5.2 An Overview of the Resultative Verb Construction

The resultative verb construction has the structure of Subject + V_1-V_2 (+Object), where the subject still refers to the preverbal argument expression, and the object still refers to the postverbal argument expression. The two verbs stand immediately next to each other and do not allow any argument expression or aspect marker to appear between them. Usually a hyphen is put between the two verbs in the transliterations to indicate the tight syntactic relationship between the two verbal components in RVC[30].

(5.1) a.   *Zhangsan da-pao-le   Lisi.*

              hit-run-PFT

         'Zhangsan hit Lisi; Lisi ran away as a result.'

      b.   *Zhangsan chi-bao-le.*

              eat-full-PFT

         'Zhangsan ate (something); he got full as a result.'

(5.1a) is a transitive RVC which has a subject and an object. (5.1b) is an intransitive RVC, which has only a subject. (5.2) illustrates the illformedness because of the appearance of an argument or an aspect marker between the two verbs.

(5.2)   a.   * *Zhangsan da Lisi pao-le*

                 hit   run-PFT

            'Zhangsan hit Lisi and Lisi ran away as a result' (intended)

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[30] In the literature, such a hyphen may also be used to mean that the two verbs constitute a compound. But I do not adopt such an assumption in this work and I will give an explanation of why I do not adopt it in next chapter.

b.   * *Zhangsan da-le pao Lisi.*

   hit-PFT run

However, it is not the case that nothing can appear between the two verbs. The potential forms described in the next section are the cases wherein a syntactic component appears between the two verbs.

5.2.1 Potential Forms

The particles *de* 'PRT' and *bu* 'NEG' can appear between V_1 and V_2. With *de* or *bu* appearing between V_1 and V_2, the new construction is called the potential form (c.f. Chao 1968; Thomson 1973). The *de*-potential form expresses the meaning that the subject can produce or undergo the result expressed by V_2 via the activity expressed by V_1. The *bu*-potential form expresses the negative meaning corresponding to the *de*-potential form. Some examples are given below.

(5.3)   a₁.   *Zhangsan da-bu-si Lisi.*

           hit-NEG-die

      'Zhangsan is not able hit Lisi to death.'

   a₂.   *Zhangsan da-de-si Lisi.*

           hit-PRT-die

      'Zhangsan is able to hit Lisi to death.'

   b₁.   *Zhangsan chi-bu-bao.*

           eat-NEG-full

      'Zhangsan cannot eat himself full.'

   b₂.   *Zhangsan chi-de-bao.*

           eat-PRT-full

      'Zhangsan can eat himself full.'

c₁.   *Maojin xi-bu-ganjing.*

        towel   wash-NEG-clean

        'The towel cannot get clean through washing.'

c₂.   *Maojin xi-de-ganjing.*

        towel   wash-PRT-clean

        'The towel can get clean through washing.'

Thompson (1973) suggests that the potential forms can be used as a diagnostic for RVC. The diagnostic principle is that if a V-V construction can allow the insertion of *bu* or *de* between the two verbs to form a V-*bu/de*-V construction, it is an RVC. In fact, however, not all instances of RVC can be identified through these diagnostics. These diagnostics are not applicable to those fossilized instances of RVC, which I will discuss in the next subsection. What's more, some instances of the potential forms do not have acceptable original forms corresponding to them. For example, *xie-de-lai* 'write-PRT-come' (=can write) and *xie-bu-lai* 'write-NEG-come'(=cannot write) are two potential forms but *xie-lai* 'write-come' is never heard and is acceptable in no context. There are numerous instances of V-*de-lai* and V-*bu-lai* that do not have corresponding V-*lai* forms such as *chou-de/bu-lai yan* 'smoke-PAT/NEG-come cigarette' (can/cannot smoke cigarettes), *he-de/bu-lai jiu* 'drink-PRT/NEG-come alcohol'(=can/cannot drink alcohol) among others. Briefly, there is no strict correspondence between the potential forms and the original forms.

5.2.2 Fossilized RVCs

Fossilized instances of RVC refer to those V_1-V_2 forms where the two verbal components respectively express the first subevent and the resultative subevent but neither *de* 'PRT' nor *bu* 'NEG' can appear between the two verbal components. *Ke-fu* 'conquer-subdue', *gai-liang* 'change-good', *ge-xin* 'change-new' and *dao-hui* 'knock-destroy' (c.f. Chao 1968) are the typical cases. Let's take *gai-liang* 'change-good' for example.

(5.4) a. *Zhangsan gai-liang-le jishu.*

                   change-good-PFT technique

          'Zhangsan improved the technique.'

          b. **Zhangsan gai-bu-liang jishu.*

                   change-NEG-good technique

          c. **Zhangsan gai-de-liang jishu.*

                   change-PRT-good technique

Fossilized instances of RVC are highly lexicalized but it is not the case that all instances of RVC are lexicalized, as is assumed in some previous studies (e.g. Y. Li 1990, 1991, 1993 and 1995; C. Li 2008 among others). In fact, most instances of RVC are syntactically constructed. I will argue against the lexical compound assumption in the next chapter.

5.2.3 Aspect and Aspectuality Characteristics of RVC

This section is a description of the aspect and aspectuality characteristics of RVC. The purpose of this description is show that the aspect and aspectuality properties of RVC are largely determined by V_2, which usually expresses state lexically but expresses an achievement in RVC. The dominant status of V_2 is also observed in the patterns of argument realization in RVC sentences, which will be described in section 5.3.

The aspect characteristics mainly refer to the construction's (in)compatibility with the perfect aspect makers *le* 'PFT' and the progressive aspect marker *zhe* 'PROG'. The aspectuality characteristics refer to the ontological properties of the events that RVC sentences express, which can mainly be demonstrated by testing the (un)acceptability resulting from the co-occurrence of RVC and the preverbal/postverbal duration phrases.

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5.2.3.1 Aspect Marker

RVC cannot take all aspect markers. The wellformed examples in the preceding sections only involve the aspect marker *le*. Chao (1968) indicates that RVC is compatible with *le* and incompatible with *zhe*. More examples are given below, which support Chao's claim.

(5.5)　　a.　　*Zhangsan wan-lei-le*.

　　　　　　　　　play-tired-PFT

　　　　　　'Zhangsan played himself tired.'

　　　b.　　**Zhangsan zheng wan-lei-zhe*.

　　　　　　　　　just　play-tired-PROG

　　　c.　　*Zhangsan zheng wan-zhe　　piqiu*.

　　　　　　　　　just　　play-PROG ball

　　　　　　'Zhangsan was playing a/the ball.'

　　　d.　　*Zhangsan wan-le　　piqiu*.

　　　　　　　　　play-PFT ball

　　　　　　'Zhangsan (has) played a/the ball.'

　　　e.　　*Zhangsan lei-le*.

　　　　　　　　　tired-PFT

　　　　　　'Zhangsan got tired.

　　　f.　　* *Zhangsan lei-zhe*.

　　　　　　　　　tired-PROG

Sentences (5.5a) and (5.5b) show that RVC sentences allow *le* but do not allow *zhe*. (5.5c) and (5.5d) show that V_1, when used alone, can take either *le* or *zhe*. Sentences (5.5e) and (5.5f) show that V_2 *lei* 'tired' is compatible with *le* but not with *zhe*. If we restrict our attention only to the above data, we may easily draw the conclusion that RVC is incompatible with *zhe* in that verbs that function as V_2 are incompatible with

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zhe; however, this is only part of the story. In the following examples, V$_2$ is *hong* 'red'; this verb can take either *zhe* or *le* when it is used alone as the matrix verb of a basic sentence.

(5.6)   a.   *Zhangsan da-hong-le Lisi-de lian.*

   hit-red-PFT Lisi's face

   'Zhangsan hit Lisi's face red'

   b.   * *Zhangsan da-hong-zhe Lisi-de lian.*

   hit-red-PROG Lisi's   face

   c.   *Lisi-de lian shizhong hong-zhe.*

   Lisi's   face always red-PROG

   'Lisi has always been red.'

(5.6a) and (5.6b) still illustrate the contrast between *le* and *zhe* in RVC; that is, *le* can go with RVC but *zhe* cannot. (5.6c) shows that V$_2$ *hong* 'red', if used separately, is compatible with *zhe*, which implies that the lexical semantics of V$_2$ is not incompatible with *zhe*. A few more examples are given below.

(5.7)   a.   *Zhangsan shui-zhong-le   yanjing.*

   sleep-swollen-PFT eye

   'Zhangsan slept his eyes swollen.'

   b.   **Zhangsan shui-zhong-zhe   yanjing.*

   sleep-swollen-PFT eye

   c.   *Zhangsan-de yanjing zhong-zhe.*

   Zhangsan's   eye   swollen-PROG

   'Zhangsan's eyes were swollen.'

The above examples show that the incompatibility of RVC with *zhe* does not arise because of the lexical semantics of V_1 or V_2 since many V_1-verbs or V_2-verbs are compatible with both *le* and *zhe* when they are used separately.

Additionally, RVC cannot take the preverbal progressive marker *zai* 'PROG' but in many cases where V_1 is used alone, it can take *zai*. Compare (5.8a) with (5.8b) and (5.9a) with (5.9b).

(5.8) a. * *Zhangsan zai chi-bao*.

ASP eat-full

'Zhangsan was eating himself full.'

b. *Zhangsan zai chi fan*.

ASP eat meal

'Zhangsan was having meal.'

(5.9) a. * *Zhangsan zai da-pao Lisi*

ASP hit-run

'Zhangsan was hitting Lisi away.'

d. *Zhangsan zai da Lisi*.

ASP hit

'Zhangsan was hitting Lisi.'

In summary, the restriction of aspect marker selection on RVC is not determined by V_1 or V_2 as independent verbs but rather by the overall construction.

5.2.3.2 Aspectuality

The aspect marker restriction on RVC sentences is related to the aspectual properties of the construction. As stated earlier, the preverbal duration phrase and postverbal duration phrase are used as the diagnostics for aspectuality. The preverbal duration

phrase applies to a sentence that expresses a telic event, e.g. (5.10a); the postverbal duration phrase applies to a sentence that expresses an atelic event, e.g. (5.10b).

(5.10) a.   *Zhangsan san fenzhong   chi-le yi-wan fan*.

                    three minute eat-PFT one-CL rice

        'Zhangsan eats one bowl of rice in one minute.'

     b.   *Zhangsan zou-le   san   tian*.

                  walk-PFT three day

        'Zhangsan walked for three days.' [31]

In (5.10a), the preverbal duration phrase indicates the time within which an eating event is completed. The postverbal duration phrase in (5.10b) indicates the duration that walking event has lasted since its inception.

RVC is incompatible with the postverbal duration phrase but is compatible with the preverbal duration phrase. Let's compare (5.12a) with (5.12b) and (5.13a) with (5.13b).

(5.11) a.   *Zhangsan dasuan liang fenzhong da-dao Lisi*.

                  plan   two   minute hit-fall

        'Zhangsan planned to hit Lisi down in two minutes.'

     b.   **Zhangsan dasuan da-dao Lisi liang fenzhong*.

                  plan   hit-fall   two   minute

(5.12) a.   *Zhangsan dasuan liang fengzhong chui-gan toufa*

                  plan   two   minute   blow-dry hair

        'Zhangsan planned to blow (with a drier) his hair dry in two minutes.'

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[31] Another familiar reading of this sentence is 'Zhangsan (has) left for three days.'

b.　*Zhangsan dasuan chui-gan　toufa liang fenzhong.

　　　plan　　blow-dry hair　two　minute

In (5.11a) and (5.12a), the preverbal duration phrases express a period between the inception of the first subevent and the inception of the resultative subevent. Sentences (5.11b) and (5.12b) show that RVC is incompatible with the postverbal duration phrase but compatible with the preverbal duration phrase. The examples in (5.11) and (5.12) reveal that the time between the inception of the first subevent and the inception of the resultative subevent can be linguistically indicated; but the duration of the resultative subevent itself cannot.

What deserves our attention is that sentences that involve V_1 or V_2 as separate verbs can take a postverbal duration phrase, in contrast to RVC, which cannot.

(5.13)　a.　*Zhangsan da-ku-le　Lisi　yi　tian.

　　　　　hit-cry-PFT　　one　day

　　b.　Zhangsan da-le Lisi yi tian.

　　　　　hit-PFT　　one day

　　　'Zhangsan hit Lisi for a day.'

　　c.　Lisi ku-le　yi　tian.

　　　　cry-PFT one day

　　　'Lisi cried for a day.'

The above examples show that the aspectuality of an RVC sentence is different from the aspectualities of the sentences that contain a single verb. Ontologically, the event that RVC expresses is similar to an accomplishment event that Vendler (1967) recognises since it expresses a telic event that consists of an activity and an achievement. However, it must be noted that the event that an RVC sentence

expresses is not identical to that expressed by an accomplishment verb in some languages, such as English, because an accomplishment verb in English can be used in the progressive aspect, for example *John was felling a tree*, but RVC does not accept any progressive aspect marker. Chen (1988) notices this difference between accomplishments and RVC events and he proposes that an RVC event is recognized as a 'complex change' rather than an accomplishment. Following Chen's line of thought, I suggest that the event that an RVC in Chinese expresses and that which an accomplishment verb in English expresses are the same in terms of their componential events: they both consist of an activity and an achievement (result). But an accomplishment verb in English expresses a complex event either subevent of which can be the focus of attention, which is seen in the fact that an accomplishment verb can be used either in a progressive form or a perfect form. RVC expresses a complex event in which the resultative subevent is always the focus of attention and determines the overall aspect and aspectual properties of the construction. Moreover, the resultative subevent is an achievement rather than a simple state; it is momentary rather than durative. With such a subevent as the foreground in the complex event, it is not surprising that the construction as a whole cannot take the progressive marker *zhe/zai*, which encodes the meaning of durativity.

To recapitulate, the ontological characteristic of the event expressed by RVC is that it is an accomplishment event but the achievement subevent (the resultative subevent) in this complex event overshadows the activity subevent (the first subevent) in determining the aspectuality property of the complex event. The dominant status of the resultative subevent is reflected in many other ways. It is the resultative subevent that many intensional operators are sensitive to. This is illustrated by the sentence *Zhangsan cha-dianer da-dao Lisi* 'Zhangsan almost hit-fall Lisi' (*Zhangsan almost hit Lisi down*), where *cha-dian'er* 'almost' is sensitive to

V_2 and it combines with V_2 to express an 'almost-falling' resultative state rather than combines with V_1 to express an 'almost-hitting' activity[32].

The dominant status of V_2 in the overall constructional semantics is also reflected in the diverse patterns of argument realization in this construction, which is the very focus of this chapter.

5.3 A Description of the Argument Realization Patterns in RVC

This section describes the patterns of argument realization in transitive RVC sentences. In a transitive RVC sentence, there are an NP in the subject position (NP_L) and an NP in the object position (NP_R). There are various argument-predicate relationships between NP_L and NP_R on the one hand, and V_1 and V_2 on the other.

In this description, the patterns of the semantic association between verbs and the two NPs are represented in the form of first order logical formula. If a verb is a two-place verb, its argument structure is written as *P (X, Y)*. *P* is the predicate; *X* and *Y* respectively represent a more prominent argument and a less prominent argument. They receive semantic contents from NP_L and NP_R or from contexts. When the arguments receive contents from NP_L and NP_R, I simply put NP_L and NP_R in the positions of *X* and *Y*:

If *X* and *Y* receive contents from context or remain void, I replace them with the Greek letters φ and ψ. For example V_1 [φ, NP_R] & V_2 [NP_L] says that NP_L (the preverbal NP) is understood as the single argument of V_2, NP_R (the postverbal NP) is understood as the internal argument (the less prominent semantic role) of V_1, and the external argument of V_1 does not receive a value from NP_L or NP_R. The representational language can be made clear by the following figure.

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[32] This fact, actually, is also a piece of evidence that an RVC is not a lexical unit (see Chapter 6 for more discussions about this issue).

$$\text{V}_1 \text{[NP}_\text{L,}\text{ NP}_\text{R}\text{] \& V}_2 \text{[NP}_\text{L}\text{]}$$

first predicate

more prominent /external argument

second predicate

less prominent /internal argument

connective

only argument
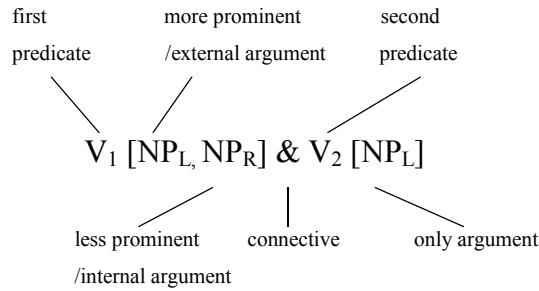
Fig-5.1

There are diverse patterns of argument realization in RVC sentences in that the two verbs can have different arities, and the subject and the object are associated with verbs of different arities in many different ways. In the following subsection, I will mainly concentrate on the attested patterns of argument realization of transitive RVC sentences where the componential verbs entail at most two arguments. The unattested patterns are not instantiated one by one; they are given along with the attested patterns in a table toward the end of this chapter.

5.3.1 Attested Argument Realization Patterns

The presentation of each attested pattern includes an instance-specific formula in addition to the general pattern. An example of RVC that fits the pattern is provided along with two additional sentences that show the patterns of argument realization of the componential verbs when they are used as independent verbs. The numbering of these patterns is arbitrary.

PATTERN-1: $\text{V}_1[\text{NP}_\text{L}, \text{NPR}]$ &$\text{V}_2[\text{NP}_\text{L}]$

He (Zhangsan, Jiu) & Zui (Zhangsan)

(5.14) a.   *Zhangsan he-zui- le   jiu.*

drink-drunk-PFT alcohol

'Zhangsan drank alcohol and got drunk.'

b.   *Zhangsan he   jiu.*

   drink alcohol

 'Zhangsan drank alcohol.'

c.   *Zhangsan zui-le.*

   drunk-PFT

 'Zhangsan got drunk'.

d.   * *Jiu   zui-le.*

  alcohol drunk-PFT

In Pattern-1, e.g. (5.14a), V_1 is a two-place predicate; the subject and the object are two arguments of V_1. V_2 is a one-place predicate and the subject is the argument of V_2.

A peculiar characteristic of this pattern is that the object cannot be quantified, a restriction which has not been studied to any great extent in the literature. This is shown in (5.14e).

(5.14) e.   * *Zhangsan he-zui-le   yi-ping jiu.*

    drink-drunk-PFT one-CL alcohol

  'Zhangsan drank a bottle of alcohol and got drunk.' (intended).

PATTERN-2: $V_1[NP_L, NP_R]$ & $V_2[NP_R]$

    Chi (Zhangsan, Mifan) & Guang (Mifan)

(5.15) a.   *Zhangsan chi-guang-le mifan.*

    eat-bare-PFT   rice

  'Zhangsan ate the rice and the rice was exhausted.'

b.   *Zhangsan chi mifan.*

                eat rice

'Zhangsan ate rice.'

c.   *Mifan guang-le.*

rice   bare-PFT

'The rice was out.'

In Pattern-2, e.g. (5.15a), V_1 is a two-place predicate; the subject and the object are the arguments of V_1. V_2 is a one-place verb and the object is the only argument of V_2.

PATTERN-3: $V_1[NP_L, NP_R]$ & $V_2 [NPL, NP_R]$

                  Zhan (Zhangsan, Lisi) & Sheng (Zhangsan, Lisi)

(5.16) a.   *Zhangsan zhan-sheng-le   Lisi.*

                fight-win-PFT

'Zhangsan fought Lisi and beat Lisi.

b   *Zhangsan zhan Lisi.*

                fight

'Zhangsan fought Lisi.'

c.   *Zhangsan sheng-le Lisi.*

                win-PFT Lisi

'Zhangsan beat Lisi.'

In Pattern-3, e.g. (5.16a), V_1 is a two-place predicate; the subject and the object are the arguments of V_1. V_2 is also a two-place predicate and the subject and the object are the arguments of V_2 as well.

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PATTERN-4 $V_1[NP_L, \varphi]$ & $V_2 [NP_L, NP_R]$

Da(Zhangsan, x) & Ying (Zhangsan, Lisi)

(5.17) a.   *Zhangsan da-ying-le Lisi*

                       hit-win-PFT

               'Zhangsan hit (something) and beat Lisi.

        b.   *Zhangsan da pingpang qiu.*

                       hit table-tennis

               'Zhangsan played table tennis.'

        c.   *Zhangsan ying-le Lisi.*

                       beat-PFT

               'Zhangsan beat Lisi.'

In Pattern-4, e.g. (5.17a), V_1 is a two-place predicate. The internal argument of V_1 is not expressed, which is indicated by φ. The subject is understood as the external argument of V_1. V_2 is a two-place predicate; both of its arguments are expressed. The subject is the external argument of V_2; the object is the internal argument of V_2.

PATTERN-5: $V_1[NP_L]$ & $V_2[NP_L, NP_R]$

Zou (Zhangsan) & Jin (Zhangsan, Woshi)

(5.18) a.   *Zhangsan zou-jin- le   woshi.*

                       walk-enter-PFT bedroom

               'Zhangsan walked into the bedroom.'

        b.   *Zhangsan zou-le.*

                       walk-PFT

               'Zhangsan walked.'

        c.   *Zhangsan jin- le   woshi.*

                       enter-PFT bedroom

               'Zhangsan entered the bedroom.'

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In Pattern-5, e.g. (5.18a), V_1 is a one-place predicate; the subject is the only argument of V_1. V_2 is a two-place predicate; the subject and the object are the arguments of V_2.

PATTERN-6: $V_1[NP_R]$ & $V_2[NP_L, NP_R]$

               Pao (Lü) & Diu (Zhangsan Jia, Lü)

(5.19) a.   *Zhangsan jia   pao-diu- le   yi-tou lü*

                     household run-lose-PFT one-CL donkey

              'Zhangsan's household lost a donkey which ran (randomly).'

       b   *Lü   pao-le*.

              donkey run-PFT

              'The donkey has run away.'

       c.   *Zhangsan jia   diu-le   yi-tou   lü*.

                     household lose-PFT one-CL donkey

              'Zhangsan's lost a donkey.'

In Pattern-6, e.g. (5.19a), V_1 is a one-place predicate. Notably, the subject is NOT the argument of V_1 and the object is the argument of V_1. V_2 is a two-place predicate; the subject and the object are the two arguments of V_2.

PATTERN-7 $V_1[NP_R]$ & $V_2[NP_L]$

              Liu (Zangshui) & Man (Keting)

(5.20) a.   *Keting   liu-man-le   zangshui* .

              living-room   flow-full-PFT dirty.water

              'The living-room was full of dirty water which flowed.'

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b.   *Keting   man-le.*

living-room full-PFT

'The living room was full.'

c.   *Zangshui   liu-le.*

dirty.water flow-PFT

'The dirty water flowed.'

In the current pattern, e.g. (5.20a), V_1 is a one-place predicate; its only argument is expressed as the object. V_2 is also a one-place predicate; and its only argument is realized as the subject.

PATTERN-8: $V_1 [NP_L]$ & $V_2 [NP_R]$

Shui (Zhangsan) & Zhong (Yanjing)

(5.21) a.   *Zhangsan shui-zhong- le   yanjing.*

sleep-swollen-PFT eye

'Zhangsan slept (too much) and his eyes got swollen.'

b.   *Zhangsan shui- le.*

sleep-PFT

'Zhangsan slept.'

c.   *Yanjing zhong-le.*

eye   swollen-PFT

'The eyes got swollen.'

In Pattern-8, e.g. (5.21a), V_1 is a one-place predicate and the subject is the only argument of V_1. V_2 is also a one-place predicate and the object is the only argument of V_2.

PATTERN-9 $V_1[NP_L, \varphi]$ & $V_2[NP_R]$

Chi (Zhangsan, x) & Zang(Zuiba)

(5.22) a.   *Zhangsan chi-sang-le zuiba.*

eat-dirty-PFT mouth

'Zhangsan ate (something) and his mouth got dirty.'

b.   *Zhangsan chi-le   dongxi.*

eat-PFT thing

'Zhangsan ate something.'

c.   *Zuiba zang-le.*

mouth dirty-PFT

'The mouth got dirty.'

In Pattern-9, e.g. (5.22a), V_1 is a two-place predicate; the subject is the external argument of V_1; the internal argument of V_1 is not expressed. V_2 is a one-place predicate and the object is the only argument of V_2.

PATTERN-10 $V_1[\varphi, NP_L]$ & $V_2[NP_R]$

Xi (x, Yifu) & Zhong (Shouwanzi)

(5.23) a.   *Zhei-jian yifu   xi-zhong-le   wode shouwanzi.*

this-CL   clothes wash-swollen-PFT my   wrist

'This item of clothes was washed and my wrist got swollen.'

b.   *Wo xi-le   zhei-jian yifu.*

I   wash-PFT this-CL   clothes

'I washed this item of clothes.'

c.   *Wo-de shouwanzi zhong-le.*

my   writst   swollen-PFT

'My wrist got swollen.'

In Pattern-10, e.g. (5.23a), V_1 is a two-place predicate; the internal argument of V_1 is expressed by the subject; the external argument of V_1 is not expressed. V_2 is a one-place predicate and its only argument is expressed by the object.

PATTERN 11 $V_1[NP_R, NP_L]$ & $V_2[NP_R]$

                         Zhui(Lisi, Zhangsan) & Lei(Lisi)

(5.24) a.   *Zhangsan zhui-lei-le Lisi*.

                               chase-tired-PFT

               'Lisi chased Zhangsan and Lisi got tired.' [33]

        b.   *Lisi zhui Zhangsan*.

                     chase

               'Lisi chased Zhangsan.'

        c.   *Lisi lei-le*.

                     tired-PFT

               'Lisi got tired.'

Pattern-11, e.g. (5.24a), deserves special attention. In this pattern, V_1 is a two-place predicate; the subject is understood as the less prominent argument of *zhui* 'chase' and the object as the more prominent argument (the agent) of *zhui* 'chase'. When the same verb is used in single-verb sentence, e.g. (5.24b), the subject is understood as the agent and the object is understood as the patient. This is a case of inverse argument realization concerning V_1 in RVC.

PATTERN-12 $V_1[NP_R, NP_L]$ & $V_2 [NP_L, NP_R]$

                         Xi (Haimian, Shui) & Jin (Shui, Haimian)

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[33] This sentence is ambiguous as it has three readings. The reading given above is only one of the three readings. The ambiguity has been thoroughly discussed in the literature (c.f. Y. Li 1990, 1991, 1993 and 1995). We will look at this example again in more detail in the next chapter.

(5.25) a.   *Shui xi-jin-le   haimian.*

water absorb-enter-PFT sponge

'The water was absorbed into the sponge.'

b.   *Haimian xi-le   shui.*

sponge   absorb-PFT water

'The sponge absorbed some water.'

c.   *Shui jin-le   haimian.*

water enter-PFT sponge

'The water entered the sponge.'

This pattern, e.g. (5.25a), is a second case of inverse argument realization concerning V_1. In this RVC sentence, the absorbee is the subject and the absorber is the object. When V_1 *xi* 'absorb' is used separately, the absorber argument is realized as the subject and the absorbee is realized as the object (e.g. (5.25b).

PATTERN-13 $V_1[\psi, \varphi]$ & V_2 [NP_L, NP_R]

Chi[x, y] & Cheng [Xiaomanyao, Shuitongyao]

(5.26) a.   *Xiaomanyao chi-cheng-le   shuitongyao.*

thin.waist   eat-become-PFT thick.waist

'A thin and sexy waist became a thick and ugly waist because of eating.'

b   *Wo chi rou.*

I   eat meat

'I eat meat'

c.   *Xiaomanyao cheng-le   shuitongyao.*

thin.waist   become-PFT thick waist

'A thin and sexy waist becomes a thick and ugly waist.'

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In Pattern-13, e.g. 5.26, V_1 is a two-place predicate; neither the subject nor the object is the argument of V_1. V_2 is a two-place predicate, which takes the subject and the objects as its arguments.

PATTERN-14 $V_1[\varphi]$ & V_2 [NP_L, NP_R]

                  Xiao(x) & Cheng[Dayajing, Xiaomimiyan]

(5.27) a.   *Dayanjing xiao-cheng-le   xiaomimiyan.*

           big.eye   smile-become-PFT small.eye

           'Big eyes became small eyes because of smiling.'

     b.   *Zhangsan xiao-le.*

                  smile-PFT

           'Zhangsan smiled.'

     c.   *Dayajing cheng-le xiaomimiyan.*

           big.eye   become-PFT small.eye

           'Big eyes became small eyes.'

In Pattern-14, e.g. (5.27a), the first verb is a one-place predicate, the only argument of which is not expressed in the sentence. The subject and the object are the two semantic arguments of the two-place V_2.

Pattern-15 $V_1[\varphi, NP_L]$ & V_2 [NP_L, NP_R]

                Mo[x,Tiebang] & Cheng[Tiebang, Xiuhuazhen]

(5.28) a.   *Tiebang   mo-cheng-le   xiuhuazhen.*

           iron.piece grind-become-PFT needle

           'The iron is ground and became a needle.'

b.   *Zhangsan mo   tiebang.*

                    grind iron.piece

        'Zhangsan ground the iron piece.'

c.   *Tiebang   cheng-le   xiuhuazhen.*

        iron piece become-PFT needle

        'The iron piece became a needle.'

In Pattern-15, e.g. (5.28a), V_1 is a two-place predicate; its external argument is not expressed but its internal argument is expressed by the subject. V_2 is a two-place predicate and its two arguments are expressed as the subject and the object.

Pattern-16 $V_1[\varphi, NP_R]$ & $V_2[NP_L]$

                    Dao(x, Laji) & Man (Guangchang)

(5.29) a.   *Guangchang dao-man-le   laji.*

        square   dump-full-PFT garbage

        'A lot of garbage was dumped and the square was full.'

b.   *Zhangsan dao-le   laji.*

                    dump-PFT garbage

        'Zhangsan dumped the garbage.'

c.   *Guangchang yijing man-le.*

        square   already full-PFT

        'The square was already full.'

In Pattern-16, e.g. (5.29a), V_1 is a two-place predicate, the external argument of V_1 is not realized and its internal argument expressed by the object. V_2 is a one-place predicate; its argument is realized as the subject.

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Pattern-17   V$_1$[φ, NP$_R$] & V$_2$ [NP$_L$,NP$_R$]

                           Gai(x, Fangzi) & Cheng (Tudi, Fangzi)

(5.30) a.   *Suoyou-de tudi dou gai-cheng-le fangzi.*

             all   land all   build-become-PFT house

             'All land became houses through building.'

       b.   *Zhangsan gai   fangzi.*

                   build   house

             'Zhangsan built houses.'

       c.   *Tudi cheng-le   fangzi.*

             land become-PFT house

             'Land became houses.'

In this pattern, e.g. (5.30), the first verb is a two-place predicate; its external argument is not expressed; its internal argument is expressed as the object. The second verb is a two-place predicate; its external argument is expressed as the subject and its internal argument is expressed as the object.

Pattern-18   V$_1$[NP$_R$, φ] & V$_2$ [NP$_L$, NP$_R$]

                           Kao[daxuesheng, x] & Chu' (Jiating, daxuesheng)

(5.31) a.   *Pinkun jiating kao-chu san-ge   daxuesheng.*

             poor   family test-issue three-CL college.student

             'The poor family contributed three college student through the student's attending examination.'

       b.   *Zhangsan kao shuxue.*

                   test maths

             'Zhangsan attended the test of maths.'

      c.   *Pinkun jiating chu-le   san-ge   daxuesheng.*

            poor   family issue-PFT three-CL college.student

            'The poor family contributed three college students.'

In (5.31a), the internal argument of V_1 *kao* 'test' is not expressed; the external argument is expressed as the object. The two arguments of V_2 *chu* 'issue' are both expressed, respectively as the subject and the object. There is a need to add some annotations to this sentence. The first verb is *kao*; this verb is literally glossed with 'test' but this is bit misleading. The verb actually means 'attend examination of some subjects, such as physics, chemistry; this semantics-syntactic characteristic of *kao* 'test' is shown in (5.31b). The second verb *chu* 'issue' may also be glossed with 'produce'; it actually expresses the relationship between a place of origin and the entity from that place of origin. For example, *Aidingbao Daxue chu-le henduo mingren* 'Edinburgh University issue/produce-PFT many famous people' (=The University of Edinburgh is the place where many famous people have worked or studied[34]).

The eighteen patterns of argument realization in RVC are all the patterns that have been attested in my observation. Some of them have not been mentioned in the literature, which seriously affects the soundness of previous theoretical accounts of argument realization in RVC. Next I will give a schematic description of the unattested patterns.

5.3.2 Unattested Patterns of Argument Realization

In contrast to the attested patterns given above, most logically possible patterns are not attested. The number of the unattested patterns is large; and so I only give two

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[34] A native speaker tells me that this translation is unnatural but I think it is the exactly literal meaning of the corresponding Chinese sentence.

examples below. The two exemplary sentences are ill-formed for the intended meanings although they are well-formed for other readings.

(5.32) *V_1[NP_L] & V_2 [NP_R, NP_L]

　　　　Zhangsan pao-ying-le Lisi

　　　　　　　run-beat-PFT

　　　# 'Zhangsan ran and Lisi beat Zhangsan.'

According to the intended reading in (5.33), the subject should be the less prominent argument of V_2 *ying* 'beat' and the object should be the more prominent argument of V_2 *ying* 'beat'; but this reading is not available. The sentence can only express the meaning *Zhangsan ran and he beat Lisi*, which is of V_1[NP_L] & V_2 [NP_L, NP_R].

(5.33) *V_1[NP_L, NP_R]　& V_2[NP_L]

　　　　Zhangsan zhui-lei-le　　Lisi.

　　　　　　　chase-tired-PFT

　　　# 'Lisi chased Zhangsan and Zhangsan got tired.'

The intended reading given in (5.33) is that the subject and the object are respectively understood as the internal argument and the external argument of V_1 *zhui* 'chase' and the subject is intended to express the only argument of the second verb *lei* 'tired'. This reading is not obtainable. Attention should be paid to the fact it is not impossible for inverse argument realization to happen to V_1 (recall Pattern-11: V_1[NP_R, NP_L] & V_2[NP_R]).

At this moment, I have to conclude the exemplification of the unattested patterns because there are too many patterns to exemplify. A full list of all the attested

patterns and unattested patterns argument realization is given below. As before Greek letters still represent arguments that are not expressed by NP_L and NP_R.

NO.	ATB	PATTERN	NO.	ATB	PATTERN
1	P-8	$V_1[NP_L]$ & $V_2[NP_R]$	29	*	$V_1[NP_L, NP_R]$ & $V_2[\varphi, \psi]$
2	P-7	$V_1[NP_R]$ & $V_2[NP_L]$	30	*	$V_1[NP_R, NP_L]$ & $V_2[NP_R, NP_L]$
3	P-5	$V_1[NP_L]$ & $V_2[NP_L, NP_R]$	31	P-12	$V_1[NP_R, NP_L]$ & $V_2[NP_L, NP_R]$
4	*	$V_1[NP_L]$ & $V_2[NP_R, NP_L]$	32	*	$V_1[NP_R, NP_L]$ & $V_2[NP_L, \varphi]$
5	P-6	$V_1[NP_R]$ & $V_2[NP_L, NP_R]$	33	*	$V_1[NP_R, NP_L]$ & $V_2[\varphi, NP_L]$
6	*	$V_1[NP_R]$ & $V_1[NP_R, NP_L]$	34	*	$V_1[NP_R, NP_L]$ & $V_2[NP_R, \varphi]$
7	*	$V_1[NP_L]$ & $V_2[\varphi, NP_R]$	35	*	$V_1[NP_R, NP_L]$ & $V_2[\varphi, NP_R]$
8	*	$V_1[NP_L]$ & $V_2[NP_R, \varphi]$	36	*	$V_1[NP_R, NP_L]$ & $V_2[\psi, \varphi]$
9	*	$V_1[NP_R]$ & $V_2[NP_L, \varphi]$	37	P-4	$V_1[NP_L, \varphi]$ & $V_2[NP_L, NP_R]$
10	*	$V_1[NP_R]$ & $V_2[\varphi, NP_L]$	38	*	$V_1[NP_L, \varphi]$ & $V_2[NP_R, NP_L]$
11	P-14	$V_1[\varphi]$ & $V_2[NP_L, NP_R]$	39	*	$V_1[NP_L, \varphi]$ & $V_2[NP_R, \psi]$
12	*	$V_1[\varphi]$ & $V_2[NP_R, NP_L]$	40	*	$V_1[NP_L, \varphi]$ & $V_2[\psi, NP_R]$
13	P-2	$V_1[NP_L, NP_R]$ & $V_2[NP_R]$	41	P-15	$V_1[\varphi, NP_L]$ & $V_2[NP_L, NP_R]$
14	P-11	$V_1[NP_R, NP_L]$ & $V_2[NP_R]$	42	*	$V_1[\varphi, NP_L]$ & $V_2[NP_R, NP_L]$
15	P-1	$V_1[NP_L, NP_R]$ & $V_2[NP_L]$	43	P-13	$V_1[\varphi, \psi]$ & $V_2[NP_L, NP_R]$
16	*	$V_1[NP_R, NP_L]$ & $V_2[NP_L]$	44	*	$V_1[\varphi, \psi]$ & $V_2[NP_R, NP_L]$
17	*	$V_1[NP_L, NP_R]$ & $V_2[\varphi]$	45	*	$V_1[\varphi, NP_L]$ & $V_2[NP_R, \psi]$
18	*	$V_1[NP_R, NP_L]$ & $V_2[\varphi]$	46	*	$V_1[\varphi, NP_L]$ & $V_2[\varphi, NP_R]$
19	P-9	$V_1[NP_L, \varphi]$ & $V_2[NP_R]$	47	P-18	$V_1[NP_R, \varphi]$ & $V_2[NP_L, NP_R]$
20	P-10	$V_1[\varphi, NP_L]$ & $V_2[NP_R]$	48	*	$V_1[NP_R, \varphi]$ & $V_2[NP_R, NP_L]$
21	*	$V_1[NP_R, \varphi]$ & $V_2[NP_L]$	49	*	$V_1[NP_R, \varphi]$ & $V_2[NP_L, \psi]$
22	P-16	$V_1[\varphi, NP_R]$ & $V_2[NP_L]$	50	*	$V_1[NP_R, \varphi]$ & $V_2[\psi, NP_L]$
23	P-3	$V_1[NP_L, NP_R]$ & $V_2[NP_L, NP_R]$	51	P-17	$V_1[\varphi, NP_R]$ & $V_2[NP_L, NP_R]$
24	*	$V_1[NP_L, NP_R]$ & $V_2[NP_R, NP_L]$	52	*	$V_1[\varphi, NP_R]$ & $V_2[NP_R, NP_L]$
25	*	$V_1[NP_L, NP_R]$ & $V_2[NP_L, \varphi]$	53	*	$V_1[\varphi, NP_R]$ & $V_2[\psi, NP_L]$
26	*	$V_1[NP_L, NP_R]$ & $V_2[\varphi, NP_L]$	54	*	$V_1[\psi, NP_R]$ & $V_2[NP_L, \varphi]$
27	*	$V_1[NP_L, NP_R]$ & $V_2[\varphi, NP_R]$			
28	*	$V_1[NP_L, NP_R]$ & $V_2[NP_R, \varphi]$			

Table-5.1 (* indicates 'unattested'; P-x [where x is a number] indicates the numeration of an attested pattern used in the previous description).

5.4 Principle and Rules of Argument Realization in Transitive RVC

This section proposes a principle and rules of argument realization in the transitive RVC based on the attested patterns and the unattested patterns. The principle and rules are generalized description rather than theoretical assumptions.

5.4.1 A Principle of Argument Realization in RVC

For all the attested patterns, the argument(s) of V_2 must be expressed. The patterns that involve at least an unexpressed argument of V_2 are all unattested. In contrast, in some attested patterns, the arguments of V_1 are not expressed (whether realized as null pronouns or unrealized). On this basis, the following principle of argument realization in RVC is proposed.

(5.34) GENERAL PRINCIPLE OF MINIMAL ARGUMENT REALIZATION (MAR) IN
        TRANSITIVE RVC
        The arguments of V_2 in the transitive RVC must be expressed
        syntactically, no matter what arity V_2 has; but the arguments of V_1 are
        not obligatorily realized.

5.4.2 Rules of Argument Realization in the Transitive RVC

MAR only specifies what arguments are necessarily expressed or not but it does not indicate the specific ways in which those arguments are expressed. The specific mapping rules are given below.

Since the arguments of V_2 in all attested cases are expressed but in some cases V_1 can have an unexpressed argument, priority is given to V_2 in the statement of the rule of argument realization.

(5.35) ARGUMENT REALIZATION RULES OF V_2

    a. If V_2 is a two-place predicate, the more prominent argument is realized as the subject (NP_L) and the less prominent argument is realized as the object (NP_R).

    b. If V_2 is a one-place predicate, its argument is realized either as the subject or as the object in RVC.

Next, let's consider how the arguments of V_1 are realized.

(5.36) ARGUMENT REALIZATION RULES OF V_1

    a.   If V_1 is a one-place predicate, its single argument can be realized as the subject or the object.

    b.   If V_1 is a two-place predicate and does not share an argument with V_2, then at most one argument of V_1 can be realized, which can be either the internal argument or the external argument. If the realized argument of V_1 is the internal argument, it can be realized either as the subject or the object. If the realized argument of V_1 is the external argument, it cannot be realized as the object.

The principle and the basic rules have two corollaries concerning inverse argument realization in RVC.

(5.37) INVERSE ARGUMENT REALIZATION IN RVC:

    a.   Inverse argument realization only happens on V_1.

    b.   Inverse argument realization cannot happen to V_1 unless the more prominent argument of V_1 shares a referent with an argument of V_2.

The description and summarization above shows that the semantic relationships in RVC are quite diverse although the linear structure of this construction is fixed. On the other hand, diverse as the semantic patterns are, there are constraints on what semantic relationships can appear and what cannot appear, which are reflected in the rules of argument realization and the rules of inverse argument realization.

5.5 Conclusion

This chapter presents a thorough description of transitive RVC, revealing its linear-syntactic and semantic characteristics. The focus is on the patterns of argument realization in transitive RVC sentences. It is shown that the first subevent and the resultative subevent in the complex event expressed by RVC have asymmetrical status in determining the aspect and aspectuality characteristics of RVC. The two subevents are also asymmetrical in terms of the syntactic expression of their participants. The participants of the resultative subevent must be expressed in transitive RVC sentences. These two asymmetries converge on the dominant status of V_2 in the overall semantic content of an RVC sentence. Another specialty of V_2 is that inverse argument realization does not happen to a two-place V_2 but can happen to a two-place V_1. This contrast between V_1 and V_2 has largely escaped attention in the literature on RVC, whether descriptive or theoretical. In the next chapter, I will formulate a theoretical account of the construction of RVC from a parsing perspective. This account is aimed to show how the diverse patterns of argument realization, i.e. semantic relationships between term expressions and predicate expressions, are established through dynamic parsing processes, where lexical information and pragmatic inference both play a part in the construction of semantic representation.

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Chapter Six
A Dynamic Syntax Account of the Argument Realization in RVC

6.1 Introduction

RVC in Chinese has long been studied in detail. Many theories have been proposed to explain how the construction is generated and how the various patterns of argument realization are achieved. Most of these theories claim to be able to answer the above two questions. Some representatives of these existing theories will be reviewed and it will be shown that these works all suffer from the problem of undergeneration as well as various other problems. Therefore, a new theoretical account is called for. Some relevant previous works are reviewed in section 6.2. A Dynamic Syntax account of the various patterns of argument realization is given in sections 6.3, 6.4 and 6.5. I will show that this new account can accommodate not only the old data described in the literature but also the data that the existing theories cannot accommodate. Section 6.6 is the conclusion.

6.2 An Overview of the Previous Studies on RVC

In this section, I review two types of theories on the generation of RVC. The theories of the first type are lexical accounts of the formation of RVC, such as Chang (2003), Chao (1968), Cheng et al (1997), Li and Thompson (1981), Thompson (1973), Y. Li (1990, 1991, 1993 and 1995), and C. Li (2008 and 2009). Those of the second kind are syntactic accounts, such as Gao (1997), Zou (1994), Sybesma (1999) among others.

Among the lexical accounts, the most representative works come from Y. Li (1990, 1991, 1993 and 1995). C. Li's (2008) work is also worthy of attention. The lexical

accounts of the formation of RVC hypothesize that RVC is a lexical compound and the two verbal components combine at the pre-syntactic or lexical level and the semantic roles that the two verbs respectively entail combine on the lexical level. The works presented below suffer from the problem of descriptive inadequacy and the theories in them fail to explain the new data, on the other hand the lexical approach is challenged by the compelling evidence against the lexical compound assumption.

All the syntactic accounts that have ever been proposed are formulated within the framework of transformational grammar. These works have the problem of descriptive inadequacy as well. Additionally, the assumption that one of the two verbs in RVC is the syntactic head that these works adopt is short of compelling empirical evidence.

6.2.1 Y. Li's Theta-Identification Account

Y. Li (1990, 1991, 1993 and 1995) formulates a theta-role linking theory about RVC in the Government and Binding framework. Y. Li in these similar works mentioned above hypothesizes that the theta-roles that the two verbs respectively assign get combined when V_1 and V_2 are combined into a lexical compound. The thematic roles of the two verbs combine according to the principle of semantic prominence. This review concentrates on Y. Li's account of some particular attested and unattested patterns of argument realization in RVC. This suffices to reveal the problem of undergeneration which these works suffer.

Y. Li claims that if V_1 is a one-place predicate and V_2 is a two-place predicate, there are four patterns of theta identification, which are given in (6.1). In these patterns, 1 represents the only argument of V_1. 1' and 2' represent the external (more prominent) and internal (less prominent) arguments of V_2.

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(6.1) a. $<1\text{-}1', 2'>$

       b. $\underline{<2', 1\text{-}1'>}$

       c. $\underline{<1\text{-}2', 1'>}$

       d. $\underline{<1', 1\text{-}2'>}$

(6.1a) is the pattern in which V_1 is a one-place predicate and V_2 is a two-place predicate. The only argument of V_1 and the external argument of V_2 are combined together and realized as the subject. The internal argument of V_2 is expressed by the object. This corresponds to Pattern-4 ($V_1[NP_L]$ & $V_2[NP_L, NP_R]$).

In (6.1b), the internal argument of V_2 is expressed by the subject. The only argument of V_1 and the external argument of V_2 are combined and collectively expressed by the object. This is the unattested pattern $V_1[NP_R]$ & $V_2[NP_R, NP_L]$. In (6.1c), the single argument of V_1 and the internal argument of V_2 are combined and expressed by the subject and the external argument of V_2 is expressed by the object. This is the unattested pattern $V_1[NP_L]$ & $V_2 [NP_R, NP_L]$.

In (6.1d), the external argument of V_2 is expressed by the subject. The single argument of V_1 and the internal argument of V_2 are combined and expressed by the object. This corresponds to the attested Pattern-6 $V_1[NP_R]$ & $V_1[NP_L, NP_R]$.

(6.1b), (6.1c) and (6.1d) are taken to be unattested in Y. Li's work, which is why they are marked with underlining. Y. Li's explanation of the unattestability of (6.1b)-(6.1d) goes as follows.

According to Y. Li's hypothesis, the relative status of prominence of the theta roles of each verb should not be damaged as the theta-roles combine, and the most prominent theta-role of V_1 is always the most prominent theta-role both before and

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after theta combination. Pattern (6.1a) is well-formed in that the external argument of V_2 and the only argument of V_1 are combined into the external argument of RVC and the status of the theta role of V_1 as the most prominent theta role is retained. By contrast, in (6.1b)-(6.1d), the principle is violated in different ways according to Y. Li. In (6.1b) and (6.1c), the less prominent theta-role of V_2 becomes more prominent than its co-argument after theta combination. Therefore, these patterns are excluded. In (6.1d), the only argument of V_1 finally becomes less prominent than the external argument of V_2, which goes against the principle of prominence as well.

Obviously, the pattern <1', 1-2'> in (6.1d) is wrongly excluded by Y. Li's theory because this pattern is attested and is equivalent to Pattern-6 (No. 5 in Table 5.1) in my description. The example for this pattern is repeated below.

(6.2) a. *Zhangsan jia   pao-diu- le   yi-tou lü.*

              home run-lose-PFT one-CL donkey

            'Zhangsan's lost a donkey that ran (randomly).'

    b *Yi-tou lü   pao-le.*

      one-CL donkey run-PFT

      'The donkey has run (away).'

    c. *Zhangsan jia   diu-le   yi-tou lü*

             home lose-PFT one-CL donkey

      'Zhangsan's lost a donkey.'

In Pattern-6, the first verb *pao* 'run' assigns only one theta role and V_2 *diu* 'lose' assigns two theta roles. According to the reading given in (6.2), this is equivalent to <1', 1-2'>: the subject *Zhangsan jia* 'Zhangsan's' is 1' and the object *lü* 'donkey' is 1 and 2'. The attestability of this pattern undermines Y. Li's theory.

Y. Li claims that his theoretical exclusion of Pattern-6 is empirically born out and he provides the following sentence as evidence.

(6.2)　d'.　* *Daiyu wan-wang-le Baoyu.*　(Y.F. Li 1990: 188 (22c))

　　　　　　　play-forget-PFT

　　　　'Baoyu played (for such a long time) that Daiyu forgot him.

In (6.2d'), the subject expresses the external argument of V$_2$ *wang* 'forget'. The object expresses the only argument of V$_1$ and the internal argument of V$_2$. This sentence is unacceptable. However, this example is not ill-formed because of the argument linking pattern being illicit but rather because of the difficulty in establishing such a scenario as the English translation describes. The English translation given by Y. Li is *Baoyu played for such a long time that Daiyu forgot him*. This sentence sounds weird in that the scenario it describes is rather unfamiliar to native speakers: usually it is difficult, though not impossible, to imagine that a person's playing results in his being forgotten by another person. In contrast, the example that I give for Pattern-6, or <1', 1-2'> presents a scenario that is easy to visualize: *Zhangsan*'s lost a donkey because the donkey ran randomly. Briefly, the unacceptable example Y. Li comes up with to illustrate Pattern-6, i.e. <1', 1-2'>, is pragmatically ruled out rather than is impossible in terms of semantics-syntax mapping. One more example for Pattern-6 is given below to strengthen my claim that the pattern at issue is attested.

(6.3)　　　*Zhangsan pao-diu le　haizi.*

　　　　　　　run-lose-PFT child

　　　　'Zhangsan lost a child who ran randomly.'

In (6.3), the object is understood as the more prominent argument (the runner) of V_1 as well as the less prominent argument (the lost) of V_2.

A second empirical problem of Y. Li's theory comes from Pattern-7 (No. 2 in Table-5.1) V_1 [NP_R] & V_2 [NP_L].

(6.4)   *Keting   liu-man-le zangshui.*
          living.room flow-full-PFT dirty.water
          'The living room was full in that the dirty water flowed.'

In this pattern, the only argument of V_1 is realized as the object and the only argument of V_2 is realized as the subject, which can be written as <1', 1> in Y. Li's representational language. According to Y. Li's theory, the argument of V_1 is always more prominent than the argument of V_2, which excludes <1', 1>. Obviously, the exclusion is empirically undermined. Through the above analysis we recognize Y. Li's system as undergenerating the attested data.

6.2.2 C. Li's Event Structure Account

Another lexical account of RVC is contributed by C. Li (2008 and 2009). In this work, RVC is taken to be a lexical compound. C. Li proposes a theory of argument realization on the basis of Levin and Rappaport-Hovav's (1998) event-structure template framework. C. Li assumes that an RVC sentence expresses a causative event, which involves at least a Causer role and a Causee role. The Causer must be realized as the subject and the Causee as the object. When the Causer and the Causee are assigned to two different participants in such an event, then the two participants are respectively realized as the subject and the object. But once the two roles are assigned to one and the same participant, the participant can only be realized as the subject.

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According to this theory, Pattern-1, the example of which is repeated in (6.5a), has the event structure represented in (6.5b) and the sentence comes into being through the operation expressed by (6.5c).

(6.5)   a.   *Zhangsan chi-bao-le fan.*

                       eat-full-PFT meal

         'Zhangsan ate himself full.'

         b.   [[Zhangsan ACT$_{<MANNER>}$ on MEAL] CAUSE [BECOME Zhangsan <FULL>]]]

Zhangsan   chi-bao-le fan   c.

Causer   Causee

Zhangsan$_i$ fan   Zhangsan$_i$ (composite thematic tier)

  <1   2>   <a>   (individual thematic tier)

       chi   bao
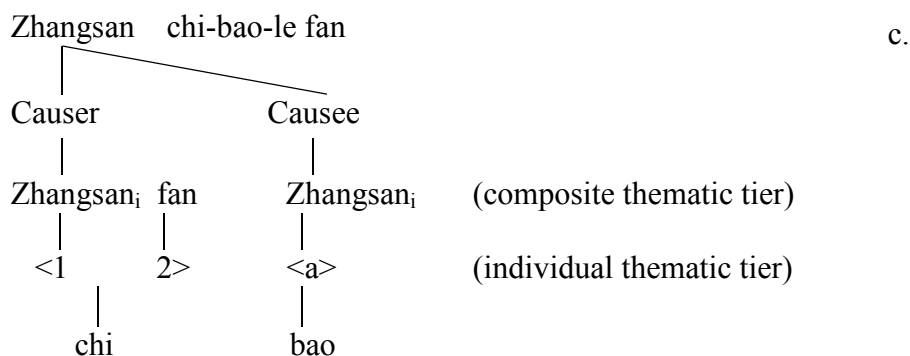
(6.5c) demonstrates how the participants in the event structure given in (6.5b) are mapped onto the subject and the object. The Causer and the Causee share the same participant in this case and they are realized as the subject. The object position is occupied by a participant that is neither the Causer nor the Causee.

C. Li's theory is faced with the challenge from Pattern-6 $V_1[NP_R]$ & $V_1[NP_L, NP_R]$ and Pattern-7 $V_1[NP_R]$ & $V_2[NP_L]$. In these two patterns, the subject is not an argument of V_1 and therefore it cannot be a Causer. Nor can the object, which is the argument exclusively of V_1, be the Causee.

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Besides, Pattern-12 $V_1[NP_R, NP_L]$ & $V_2 [NP_L, NP_R]$, Pattern-13 $V_1[\psi, \varphi]$ & $V_2 [NP_L, NP_R]$, and Pattern-14 $V_1[\varphi]$ & $V_2 [NP_L, NP_R]$ and Pattern-15 $V_1[\varphi, NP_L]$ & $V_2 [NP_L, NP_R]$ also impose problems upon C. Li's theory. Since all these patterns involve a two-place V_2, I just need to take Pattern-15 for example to indicate what is wrong with C. Li's theory. The example for this pattern is repeated below.

(6.6)   *Tiebang   mo-cheng-le   xiuhuazhen.*
           iron.stick grind-become-PFT needle
           'The iron stick is ground into a needle.'

In (6.6), the subject *tiebang* 'iron piece' is the patient of V_1 *mo* 'grind'. In no way can the claim be convincing that that the subject in this sentence is a Causer. The subject is the patient of the first verb since it is affected in the first subevent. The second verb expresses a resultative change from iron material to an iron product and the object is the post-change entity. Neither the subject nor the object has to do with the Causer role. Instead, they are both Causees. In short, the Causer-Causee theory cannot account for the formation of at least six attested patterns of argument realization in RVC.

6.2.3 Challenging the Lexical Compound Hypothesis

Besides the specific empirical problems that Y. Li's (1990, 1991, 1993 and 1995) and C. Li's (2008 and 2009) accounts suffer from, their common hypothesis that RVC is a lexical compound and that the combination of V_1 and V_2 happens as a pre-syntactic operation is doubtful as well. There is evidence that RVC is not a lexical compound but rather a syntactic construction. I provide five pieces of evidence of different kinds against the lexical compound hypothesis.

6.2.3.1 Evidence: Focalization

The two verbs in RVC can be focused independently, and the focalization can be realized through prosodic stress (capital letters are used to indicate the stressed parts).

(6.7)   a.   *Zhangsan* PAO-*lei-le*.

                    run-tired-PFT

         'Zhangsan RUN so much that he was tired.'

         b.   *Zhangsan pao*-LEI -*le*.

                    run tired-PFT

         'Zhangsan run so much that he got TIRED'

In (6.7a), V_1 is the focus; in (6.7b), V_2 is the focus.

Laying focus on a syntactic component can also be achieved through the *shi…de* (be…PRT) construction. This grammatical means of focalization is directly applicable to RVC if the focus is on V_1; for example (6.8a). When the focus is on V_2, the particle *de* does not appear, for example (6.8b).

(6.8)   a.   *Zhangsan shi* PAO-*lei de*.

                    be run-tired PRT

         'It was because of running that Zhangsan got tired.'

         b.   *Zhangsan shi pao*-LEI -*le*.

                    be run-tired-PFT

         'Zhangsan got TIRED because of running.

In contrast to RVC, a disyllabic word in Chinese cannot have one of its components focused. For example, the verbal components in a fossilized RVC cannot be focused

although the two components may be both used as free morphemes elsewhere. Consider (6.9):

(6.9)   a.   *Zhangsan gai-LIANG gongyi.
                       change-good technique
               'Zhangsan improved the technique.'

        b.   *Zhangsan GAI-liang   gongyi.
                       change-good technique
               'Zhangsan improved the technique.'

Equally, the verbal components in *gai-liang* 'change-good' cannot be focused through *shi…de* construction; (6.10a) and (6.10b) are illustrations.

(6.10) a.   *Zhangsan shi GAI-liang   le   Lisi .
                       be change-good PFT Lisi

        b.   *Zhangsan shi gai-LIANG-le gongyi.
                       be hurt-harm-PFT technique

Similarly, the verbal components of a parallel V-V compound (c.f. Li and Thompson 1981) cannot be focused merely through prosodic stress either, which is shown in (6.11):

(6.11) a.   *Zhangsan shang-HAI-le   Lisi.
                       hurt-harm-PFT
               'Zhangsan hurt Lisi.

        b.   *Zhangsan SHANG-hai-le Lisi.
                       hurt-harm-PFT
               'Zhangsan hurt Lisi.'

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This sharp difference between the real lexical compound and RVC in terms of the focalization of component is the evidence that the two verbal components in RVC are not combined lexically.

6.2.3.2 Evidence: Nonsensical RVC

A second piece of evidence that RVC is a syntactic construction is that a lot of instances of V_1-V_2 do not make sense on their own.

(6.12) a.   *Zhangsan nian shu   nian-ru-le   shen.*

　　　　　　　　read book read-enter-PFT spirit

　　　　　'Zhangsan was absorbed in reading books.'

　　　b.   *Zhangsan chou yan   chou-huang-le   shouyazi.*

　　　　　　　　small cigarette smoke-yellow-PFT fingers

　　　　　'Zhangsan smoked (cigarettes) and smoked so much that his fingers got yellow.

In (6.12a) *nian-ru* 'read-enter' does not make any sense, nor does *chou-huang* 'smoke-yellow' in (6.12b). If the two verbs in RVC are always lexically combined into a compound, the word should be context-independently meaningful. This is not true. Those instances of RVC which are taken to be as meaningful as lexical compounds are the ones which have a very high frequency of use, such as *da-dao* 'hit-fall' and *da-shang* 'hit-injured'. RVC is very productive and many instances cannot be properly understood out of sentences, just as the examples in (6.12) show. Therefore, I conclude that RVC must be understood on the sentential level rather than on the lexical level. It is undeniable that an instance of RVC can be lexicalized

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as they are used frequently[35] but this does not mean that compounding necessarily happens in the formation of all instances of RVC.

6.2.3.3 Evidence: Negative Particle Is Sensitive to V_2

A third piece of evidence that RVC is a syntactic construction rather than a lexical compound is that V_2 alone can fall into the semantic scope of the negative operator *bu* 'NEG' or *mei* 'NEG.PFT'.

(6.13) a. *Zhangsan weishenme bu   chi-guang na-wan mifan*?

why   NEG eat-bare   that-CL rice

'Why did Zhangsan not eat up that bowl of rice?'

(Not: Why did Zhangsan not eat that bowl of rice?')

b. *Zhangsan weishenme mei   chi-guang na-wan mifan*?

why   NEG.PFT eat-bare   that-CL rice

'Why did Zhangsan not eat up that bowl of rice?'

(Not: Why did Zhangsan not eat that bowl of rice?)

(6.14) a. *Zhangsan bu pao-lei   shi bu hui   ting-xialai de.*

NEG run-tired BE NEG will stop-down   PRT

'Zhangsan won't stop running if he does not get tired because of the running.' (Not: 'Zhangsan did not run.')

b. *Zhangsan mei   pao-lei, suoyi hai   jixu   pao.*

NEG.PFT run-tired, so   still continue run

'Zhangsan did not get tired so he went on running.'

(Not: 'Zhangsan did not run.')

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[35] The factors that affect the lexicalization of RVC are not restricted to frequency of use. Fossilized RVCs usually have the characteristic that the first verb strongly entails the second verb. Further work needs to be done to give a full account of the conditions on the lexicalization of some instances RVC.

In all the sentences in (6.13), what is negated is not the first subevent but the resultative subevent. This is also true of the sentences in (6.14). If RVC is a word, it is impossible to negate a morpheme in it. In addition, many other adverbial elements are sensitive to V_2 alone. For example the preverbal adverbial *chadian'er* 'almost' in the sentence *Zhangsan chadian'er da-si Lisi* 'Zhangsan almost hit-dead Lisi' (=Zhangsan almost hit Lisi to death) indicates that *Lisi was almost dead* rather than *Zhangsan almost hit Lisi*. Since the operators such as *not* and *almost* are sensitive to V_2 alone, it is reasonable not to take RVC as lexical compound.

6.2.3.4 Potential Forms: a Different Theoretical Interpretation

The potential forms of RVC refer to the following forms of RVC: the particles *bu* 'NEG' or *de* 'PRT' appears between the two verbs (see the description of the 'potential forms' in section 5.2.1 in Chapter 5). Some examples are repeated for illustration: *zhang-bu-da* 'grow-NEG-big'(=cannot grow up), *shuo-bu-lei* 'speak-NEG-tired' (=cannot say oneself tired), *ti-de-kai* 'kick-PRT-open' (=can kick open) and *sao-de-ganjing* 'sweep-PFT-clean' (can sweep clean). This can also be taken to be the evidence that the two verbs are not combined on the lexical level since they are separable by a syntactic component.

C. Li (2008 and 2009) hypothesizes that RVC is a lexical compound and takes *bu* and *de* in the potential forms to be infix within a word. However, *bu*, in particular, as a negative particle is frequently inserted between syntactic components and it can be added to or taken away from an RVC without damaging the basic meaning of RVC. This strongly supports the argument that the relationship between V_1 and V_2 is syntactic in nature. In contrast a real lexical infix cannot be added or removed without affecting the lexical meaning of a compound. For example *gai-liang* 'change-good' (=reform) is a real lexical compound and it does not allow infixation of any kind. Neither g*ai-de-liang* 'change-PRT-good' nor *gai-bu-liang* 'change-NEG-good' is a well-formed word. Removing a morpheme from a word is disallowed.

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For example *pao-de-kuai* 'run-PRT-fast' is a compound word when it is used as the name of a card game in China. It includes a verbal morpheme *pao* 'run', a functional morpheme *de* 'PRT' and a second verbal morpheme *kuai* 'fast'. If *de* is removed from this word, we get an expression *pao-kuai* 'run-fast', which is no longer the name of the game mentioned above. Crosslinguistically, removing an infix from a lexical compound results in a non-word. For example, the English word *spokesman* involves an infix -s-. Taking away the infix from the word results in a meaningless form '*spokeman*'. Hence, I can conclude that *de* and *bu* in the potential forms are not lexical infixes but rather syntactic components.

To sum up, the lexical accounts of the patterns of argument realization suffer the problem of undergeneration. The hypothesis on which these accounts are implemented is challenged by empirical evidence. Putting these two facts together, I conclude that the lexical accounts cannot handle these data.

6.2.4 Derivational Accounts

In parallel to the lexical accounts, there are syntactic-derivational accounts, wherein RVC is assumed to form at the syntactic level and the various patterns of argument realizations are explained through syntactic derivations. Three representative works are examined below.

6.2.4.1 Sybesma's Small Clause Account

Sybesma (1999), adopting the Small Clause theory (Hoekstra 1988 and 1990) and Simpson's Law (Simpson 1983), claims that RVC is a syntactic construction, in which V_1 is the matrix verb which takes a clausal complement headed by V_2. Sybesma classifies RVC into three types, having three different underlying structures.

(6.15) a.   TRANSITIVE RESULT STRUCTURE

NP $[_{VP}$ V$_1$ $[_{SC}$ NP   V$_2$]]

      b.   CAUSATIVE RESULT STRUCTURE

NP CAUS $[_{VP}$ V$_1$ $[_{SC}$ NP   V$_2$]]

      c.   INTRANSITIVE RESULT STRUCTURE

e $[_{VP}$ V$_1$ $[_{SC}$ NP V$_2$]]

The transitive (6.15a) and causative (6.15b) RVCs have different D-structures although they have the same surface form 'NP$_L$ V$_1$-V$_2$ NP$_R$'. The intransitive RVC is assumed to involve an unaccusative V$_1$ which has a small clause complement and it is the argument of V$_2$ that emerges as the subject on the surface structure.

Sybesma also assumes that in the transitive structure, V$_1$ only assigns a theta-role to NP$_L$ and V$_2$ only assigns a theta-role to NP$_2$ within the small clause. In an intransitive RVC sentence, the subject receives a theta-role only from V$_2$ within the small clause where it is base-generated but it receives no theta-role from V$_1$ since V$_1$ never assigns any theta-role directly to the argument in the embedded small clause[36]. The thematic relationship between V$_1$ and the NP in the small clause headed by V$_2$ is established as an effect of 'shadow interpretation' or pragmatics (Kayne 1985).

Sybesma adopts the direct object restriction (DOR) on the postverbal NP in English resultative construction (c.f. Levin and Rappaport-Hovav 1995), i.e. the resultative XPs are invariably predicated of the object. Sybesma claims that the object of RVC is always the argument of V$_2$ and cannot be the argument of V$_1$. This claim is

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[36] Hornstein (1999: 79) suggests that theta-roles are features of verbs and have to be checked. According to this theory, the only NP in the small clause moves to the Spec position of VP projected by V$_1$ to check the theta-role features of the higher verb and, as a result, assumes an additional theta-role. In this sense both V$_1$ and V$_2$ can assign theta roles to the subject of an intransitive RVC sentence.

directly challenged by Pattern-1 $V_1[NP_L, NP_R]$ & $V_2[NP_L]$, which can be illustrated by the example *Zhangsan chi-bao-le fan* 'Zhangsan eat-full-PFT meal', in which V_2 *bao* is not predicated of the object *fan* 'meal'.

Sybesma argues that Pattern-1 is not a real challenge to his theory because *bao* 'full' is a two-place predicate, which takes both *Zhangsan* and *fan* 'meal' to be its two arguments in the small clause in D-structure and *Zhangsan* moves out of the small clause to the surface subject position. However, this argument is untenable since there is no evidence that *bao* 'full' can be used as a two-place predicate. A string like *Zhangsan bao-(le/guo) fan* 'Zhangsan full(-PFT/EXP) meal' is totally unacceptable. Short of independent evidence, the assumption that *bao* is a two-place predicate is nothing but a convenient fiction.

Besides, the principle of DOR, originally proposed on the basis of English data, has recently been shown to be problematic even in English. Rappaport-Hovav and Levin (2001) raise two kinds of evidence against DOR: First, the resultative predicate is not necessarily predicated of an object even if there is one. For example, *John danced marzukas across the room* (Rappaport-Hovav and Levin 2001: 770, (11a)). In this sentence, *across the room* is not about the dance but rather about the subject *John*. Second, a resultative construction does not have to have an object. For example, the sentence *one of his race cars wiggled loose inside the transporter and caused damage to both of his cars* (ibid: 774, (23a)) involves a resultative construction but does not have an object, and the resultative predicate *loose* is predicated of the subject *one of his race cars*. These facts go against the assumption of DOR in English. In summary, the assumption of DOR seems to be able to explain many familiar facts about resultative constructions but actually it leaves unaccounted for many other facts where the resultative predicate is not predicated of a direct object.

A second problem with Sybesma's account of RVC is that he assumes that V_1 in the intransitive verb structure is an unaccusative verb, which only takes a clausal complement and does not license an external argument by itself. The problem with this assumption is that the unaccusativity of V_1 cannot be tested independently of RVC. Sybesma (1999) does not provide any empirical tests which can show that the verbs like *pao* 'run', *wan zou* 'walk', *xiao* 'laugh' among others are unaccusative verbs although he claims that these verbs are. Unlike Romance languages where intransitive verbs are distinguishable in terms of auxiliary verb selection when they are used in perfect aspect, Chinese lacks this kind of evidence for unaccusativity. Some efforts have been made by other authors to identify unaccusative verbs in Chinese. Kao (1993) (c.f. Chief 1998), for example, proposes a few diagnostics for unaccusativity. Nevertheless, these diagnostics are easily shown to be problematic. Kao (1993) claims that only unaccusative verbs can occur in presentative constructions but and that they cannot take the durative marker *zhe*. A single verb suffices to invalidate these two diagnostics. Let's take the verb *zuo* 'sit' for instance. This verb can appear in presentative constructions so it should be an unaccusative verb. However, this verb takes the durative marker *zhe* even when it appears in a presentative construction, which is exemplified by the sentence *yuanchu zuo-zhe yi-ge ren* 'distance sit-PROG one-CL person' (=in the distance was sitting a person.). In addition, Kao (1993) proposes that *only* unaccusative verbs (and passive verbs) can be converted into adjective forms, which are exemplified by *chen chuan* 'sink boat' (=a boat which sank), *pao zhe* 'run person' (=runner) among others. I find the example *pao zhe* 'run person' (=runner) unacceptable to my ears. Besides, this diagnostics is easily invalidated as well. For example the verb *sha* 'kill', can appear in *sha shou* 'kill hand' (=killer) and the verb *da* 'hit' can appear in *da shou* 'hit hand' (=bodyguard). The two verbs are adjectival but they have never been taken to be unaccusative verbs in the literature. The reason for this is very simple: they are

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two-place predicates but unaccusative verbs should be one-place predicates. These facts show that the diagnostics at issue are invalid. Furthermore, the two verbs cannot appear in presentative constructions. For example, *yuanchu da/sha-le yi-ge ren* 'distance hit/kill-PFT one-CL person' is unacceptable. Once again, various diagnostics about unaccusativity go against each other.

A further diagnostic has been proposed by Chang and Huang (1995), who suggest that unaccusative verbs can co-occur with the construction of postposing of numeral phrases but unergative verbs cannot. For example *pao* 'run' can appear in *fanren pao-le er-fen-zhi-yi* 'prisoner run-PFT one-second' (=half of the prisoners ran away), then *pao* 'run' is an unaccusative verb. This diagnostic is unreliable as well. For example the verb *zuo* 'sit' can be recognized as an unaccusative verb according to the diagnostics of presentative construction proposed in Kao (1993) but this verb cannot be taken to be an unaccusative verb according to Chang and Huang's (1995) diagnostics because *fanren zuo-le er-fen-zhi-yi* 'prisoner sit-PFT one-second' (=[intended] half of the prisoners sat) is bad. There are many other suggestions on the recognition of unaccusative verbs in Chinese, which I will not repeat one by one. These tests all suffer the same problem that a verb is recognized as an unaccusative according to one test but is not according to another. Therefore I argue that unaccusativity, interesting as it is as a theoretical notion, has no reliable empirical foundation in Chinese and any theoretical account of linguistic facts in Chinese invoking this notion is open to serious challenge.

A third problem is related to the above one. Sybesma's theory cannot account for Pattern-6 $V_1[NP_R]$ & $V_2[NP_L, NP_R]$ illustrated by *Zhangsanjia pao-diu-le yi-tou lü* 'Zhangsan's run-lose one-CL donkey' (=Zhangsan's lost a donkey which ran [randomly]). This pattern is a transitive RVC. However, the deep structure of the transitive structure cannot explain the semantic interpretation of this pattern.

Directly assuming that NP_L is base-generated as the subject of V_1 (the matrix verb in Sybesma's theory) and NP_R is base-generated as the NP in the small clause, we obtain such a deep structure as is illustrated by [[$_{NPL}$Zhangsan's] [$_{V1}$ run] [$_{SC}$ e [$_{V2}$ lose] [$_{NPR}$ a donkey]]. In this deep structure, *Zhangsan's* (NP_L) appears on a theta-position, which means that *Zhangsan's* is interpreted as the runner. This, however, is not the intended reading. If, instead, we assume that Pattern-6 has the deep structure of an intransitive RVC, i.e. [e run [$_{SC}$ Zhangsan's lose a donkey] and *Zhangsan's* raises to the matrix subject position, we can ensure that the surface structure obtains the intended reading. Everything looks fine with this assumption. Nevertheless, we should not forget that if we adopt this latter assumption, we must adopt the assumption that a verb like *pao* 'run' in Mandarin is an unaccusative verb, which obviously leads us back to the problematic notion of unaccusativity, which has been shown above.

Pattern-7 V_1[NP_R] & V_2[NP_L] is another empirical problem for Sybesma's theory. The illustrative sentence is *keting liu-man-le zangshui* 'the living room flow-full-PFT dirty water' (=The dirty water flowed and the living room was full). If the NPs are base-generated in their theta-positions, this pattern has the underlying structure NP_R V_1 [$_{SC}$ NP_L V_2], which seems be a transitive resultative structure in Sybesma's theory. However, in fact, there is a significant difference between this underlying structure and Sybesma's transitive resultative structure: In Sybesma's structure, the NP in the matrix clause is the surface subject (NP_L) and the NP inside the small clause is the surface object (NP_R). In contrast, in the current structure, the NP in the matrix clause will finally turn up as the surface object (NP_R) and the NP inside the small clause will finally turn up as the surface subject (NP_L). No simple movement can result in such a surface structure. Although there is a superficial similarity between Sybesma's transitive RVC structure and the current transitive structure, they are inherently different in terms of thematic relations. Briefly, Sybesma's

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theory cannot generate an RVC with a reading represented as Pattern-7 unless other assumptions are added.

6.2.4.2 Zou's Derivation Account

Sybesma's small clause account of RVC is one of many derivation-based syntactic accounts of RVC. In this section, I will review Zou's (1994) derivational account, concentrating on his account of an ambiguous RVC sentence. To facilitate the review, I repeat the example below.

(6.16) a.   *Zhangsan zhui-lei-le   Lisi*.

                      chase-tire-PFT

    i.   'Zhangsan chased Lisi and Zhangsan got tired.'

    ii.   'Zhangsan chased Lisi and Lisi got tired.'

    iii.   'Lisi chased Zhangsan and Lisi got tired.'

    iv.   'Lisi chased Zhangsan and Zhangsan got tired.' (unavailable)

Zou (1994) assumes that the subject is base-generated within VP and proposes that the three readings have the following corresponding deep structures.

(6.16) b.　i.　Zhangsan chased Lisi and Zhangsan got tired.

IP
I'
I
-le
VP₂
NP
Zhangsanᵢ
V₂'
V₂
lei 'tired'
VP₁
NP
proᵢ
V₁'
V
zhui 'chase'
NP
Lisi

(6.16) b.　ii.　Zhangsan chased Lisi and Lisi got tired.
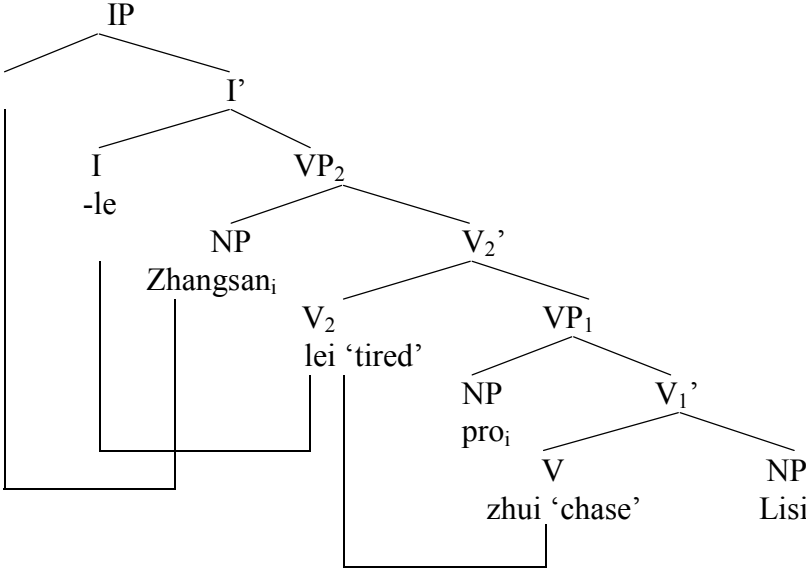
IP
I'
I
-le
VP₁
NP₁
Zhangsan
V₁'
V₁
zhui'chase'
VP₂
NP₂
Lisi
V₂'
V₂
lei 'tired'

(6.16) b.   iii.   Lisi chased Zhangsan and Lisi got tired.

```
                    CP
                   /  \
                  |    C'
                  |   /  \
                  |  C    IP
                  |      /  \
                  |     |    I'
                  |     |   /  \
                  |     |  I    VP₂
                  |     |  -le  /  \
                  |     |     NP    V₂'
                  |     |    Lisiᵢ  /  \
                  |     |        V₁    VP₁
                  |     |      lei 'tired'  / \
                  |     |            NP      V₁'
                  |     |           proᵢ    /  \
                  |     |               V₁    NP
                  |     |           zhui 'chase'  Zhangsan
```
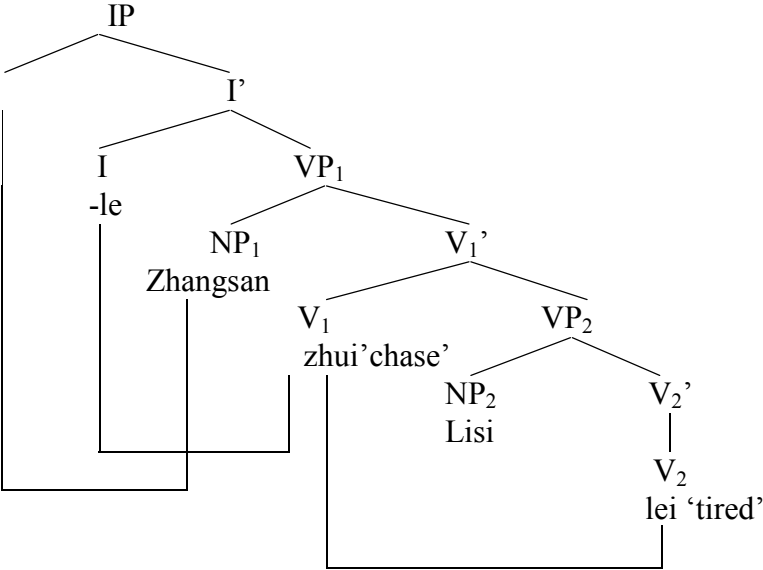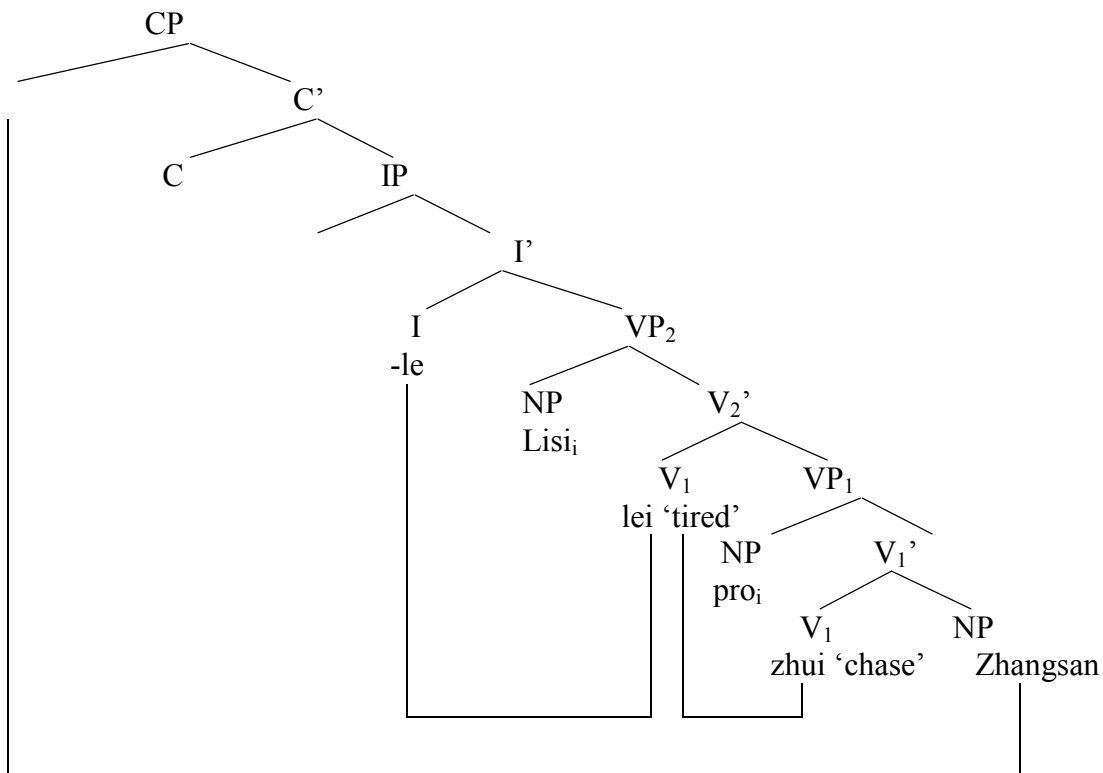
Comparing the three trees, we can easily notice that Zou assumes that the two verbs take different base-generation positions in the deep structures. For reading-i and reading-iii, V_1 *zhui* 'chase' is base-generated as a lower verb and V_2 is base-generated as a higher verb. For reading-ii, the two verbs are base-generated the other way round. The argument-predicate relationships are reflected structurally. In reading-i, *Zhangsan* is the controller of the *pro* and is understood both as the chaser and the tired person. *Lisi* appears in the complement position of *zhui* 'chase' and is understood as the chased. In reading-ii, the thematic roles that *Zhangsan* and *Lisi* receive are directly structurally reflected. In reading-iii, *Zhangsan* is base-generated as the complement of *zhui* 'chase' and raises to a very high surface-structure position while *Lisi* is base-generated in a position that c-commands a *pro* which appears in the specifier position of the VP projected by *zhui* 'chase'. Since the *pro* receives the chaser's role, *Lisi* also receives the chaser's role.

Reading-iv is an unavailable reading. To exclude this reading, Zou assumes the following deep structure for the sentence and argues on the basis of Rizzi's (1990) Relativized Minimality Condition[37], that *Zhangsan* cannot raise to the specifier position of IP since this raising crosses *Lisi* for *Lisi* is a potential governor for the trace of *Zhangsan*. The illicit movement is represented as a dashed line below.

(6.17)   iv.   *Lisi chased Zhangsan and Zhangsan got tired.
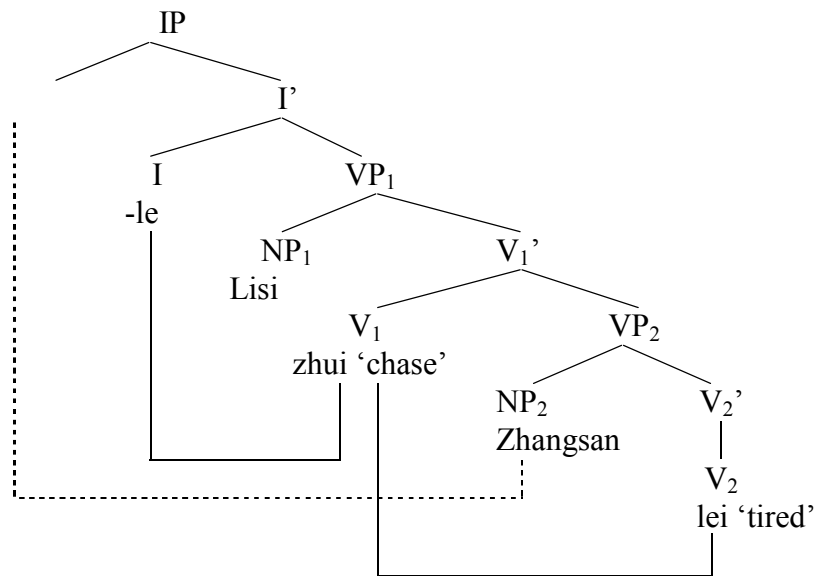
There is a serious inconsistency in Zou's account of the third reading and the fourth reading, as C. Li (2008) notes: if the fourth reading is excluded by Rizzi's Relativized Minimality condition, the third reading is equally excluded by the same condition since it is equally impossible for *Zhangsan* to cross *Lisi* to achieve the

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[37] The condition goes as follows (c.f. C. Li 2008: 38: note 22):

    (i) Relativized Minimality (Rizzi 1990: 7).

    X α-governs Y only if there is no Z such that

    (a) Z is a typical potential α-governor for Y.

    (b) Z- commands Y and does not c-command X.

intended reading. If this is right, Zou's theory cannot give rise to the third reading and it turns out to undergenerate the attested data.

6.2.4.3 Gao's Derivation Account

Gao (1997) also formulates a derivational account of RVC. Gao's work concentrates on an ambiguous RVC sentence, which is given in (6.18).

(6.18) a.   *Ta qi-lei-le   ma*.

       he ride-tired-PFT horse

        i. 'He rode the horse and the horse got tired.'

        ii. 'He rode the horse and he got tired.'

Gao assumes that the sentence in (6.18a) has the deep structure given below.

(6.18) b.   The deep structure of (6.18a)

```
                        IP
                     /      \
                  Spec       I'
                  ta 'he'   /   \
                           I    VP0
                              /     \
                           VP1      IP(=RC)
                          /   \     /      \
                        V1    NP  Spec     I'
                        |     |    |      /   \
                     qi 'ride' ma  Pro   I    VP2
                              'horse'          |
                                              V2'
                                               |
                                              V2
                                               |
                                              lei
                                             'tired'
```
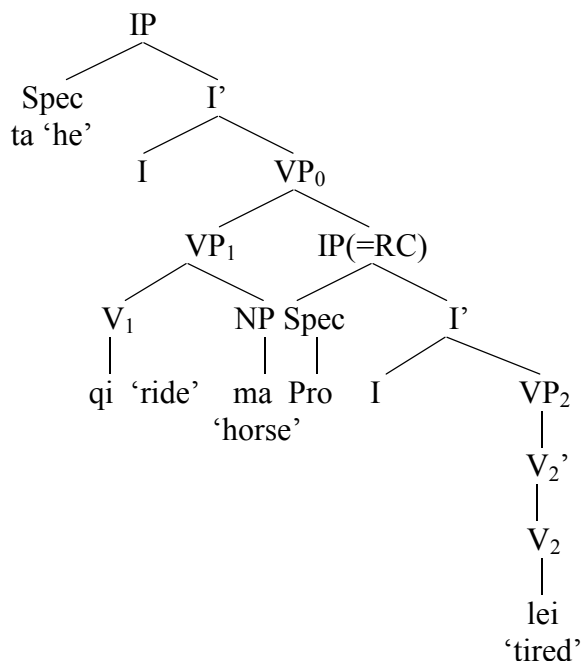

In the deep structure, V_1 projects VP_1 which has a sister node IP, which represents a resultative clausal structure in which V_2 projects VP_2. V_1 and V_2 are not adjacent to

each other. Therefore, movement must be invoked in order to achieve the surface structure of an RVC sentence. Gao assumes that V_2 moves out of its base-generated position to a higher position that is next to the position where V_1 is base-generated. Unlike Zou who assumes that V_2 directly moves to the position of V_1, Gao assumes that the landing site of V_2 is different from that of V_1 and that the new position of V_2 and the position of V_1 are two sister nodes which are dominated by VP_1. This is shown in (6.18c) and (6.18d).

(6.18) c.   Reading i: He rode the horse and the horse got tired

```
                              IP
                       ┌──────┴──────┐
                     Spec            I'
                     ta 'he'    ┌────┴────┐
                                I        VP0
                                   ┌──────┴──────┐
                                 VP1          IP(=RC)
                             ┌────┴────┐   ┌────┼────────┐
                            V1        NP Spec           I'
                        ┌────┴────┐    │   │        ┌────┴────┐
                       V1        V2   mai Proi  I           VP2
                        │         │  'horse'                 │
                    qi 'ride'  lei 'tired'                    V'
                                                             │
                                                            V2
                                                             │
                                                            tj
```

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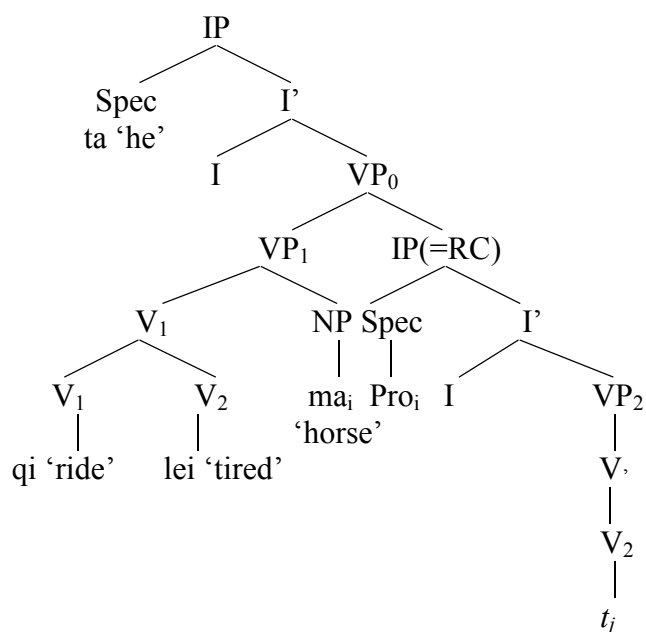
(6.18) d.   Reading ii.   He rode the horse and he got tired.

```
                          IP
                 ┌─────────┴─────────┐
               Spec                  I'
              ta_i 'he'        ┌──────┴──────┐
                               I            VP_0
                                      ┌───────┴────────┐
                                    VP_1            IP(=RC)
                                ┌─────┴─────┐   ┌──────┴──────┐
                              V_1          NP Spec           I'
                          ┌────┴────┐       |   |       ┌─────┴─────┐
                        V_1        V_2     ma Pro_i     I          VP_2
                         |          |    horse                      |
                      qi 'ride'  lei 'tired'                       V_2'
                                                                    |
                                                                   V_2
                                                                    |
                                                                   t_j
```
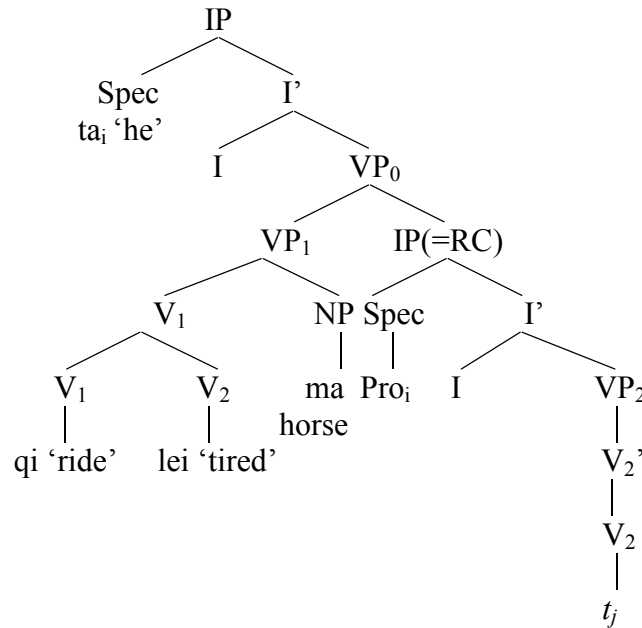
Gao's account suffers a theory-internal problem. The lower verb *lei* 'tired' raises and lands in the higher position as is shown in (6.18c) and (6.18d) but the higher position of *lei* 'tired', i.e. V_2, does not c-command its trace t_j in the base-generated position, which violates the trace theory that is a standard assumption. Note that this problem does not occur to Zou's assumption that V_2 directly raises to V_1's position.

What's more, assuming a rigid deep-structural relationship between the two verbs implies that Gao's work must be highly undergenerating. For example, Pattern-6 causes problems for these derivational accounts of RVC. In Pattern-6, the object is understood as the internal argument of V_2 as well as the single argument of V_1. We can test Gao's assumption to see if Pattern-6 of RVC can be generated. The following tree is the deep structure of Pattern-6. The object is base-generated as the complement of V_2.

(6.19)   *Zhangsan'jia pao-diu-le yi-tou lü*

'Zhangsan's lost a donkey which ran (randomly).'

```
                    IP
                  /    \
               Spec     I'
                       /   \
                      I    VP₀
                    /    \
                 VP₁      IP
                  |      /   \
                 V₁'  Spec    I'
                  |    |     /   \
                  V    Z'   I    VP₂
                  |              |
               pao 'run'        V₂'
                               /    \
                             V₂      NP
                              |      |
                            diu    yi-tou lü
                           'lose'  'one-CL donkey'
```
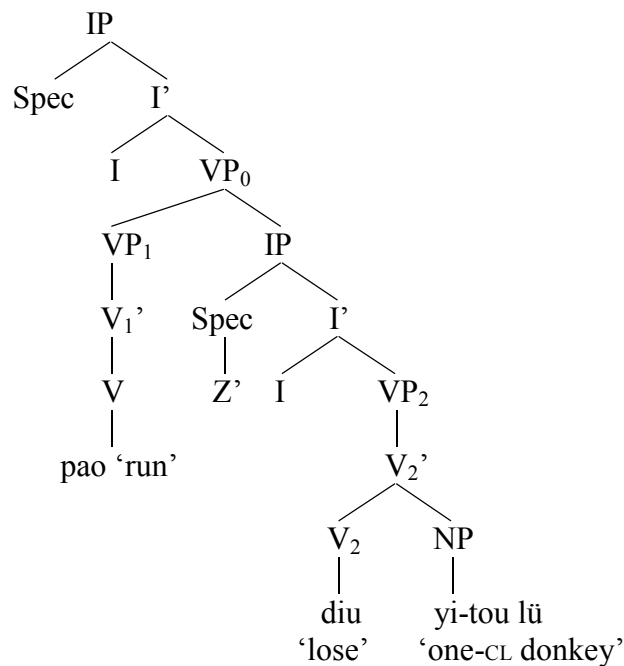
The problem with this deep structure is that *Z'*(*Zhangsan's*) which is base-generated in the Spec position of the lower IP must move to the Spec position to achieve the surface structure. However, it should be noticed that once *Z'*(*Zhangsan'*) raises to the higher IP Spec position, this expression, as Gao's analysis implies, will be understood as a thematic role of the higher verb *pao* 'run'. As a result, the reading *Zhangsan jia* (=Zhangsan's) *ran and lost a donkey* arises, which is not the intended reading. To achieve the intended reading, *yi-tou lü* 'one-CL donkey' must move, disregarding any constraint, to the higher IP Spec position of the higher IP. Such a movement, unfortunately, results in a surface structure different from the intended form.

Gao's theory also has difficulty in accounting for why the sentence *Zhangsan zhui-lei-le Lisi* 'Zhangsan chase-tired Lisi' can mean *Lisi chased Zhangsan and Lisi got tired*. To make this clear, I provisionally assume with Gao that V_1 is base-generated

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in a higher position than V_2. For now I do not specify where *Zhangsan* and *Lisi* appear in the deep structure. Instead, I just put α and β in the two candidate positions and the two Greek letters represent *Zhangsan* and *Lisi* in one way or the other way round.

(6.20) α *zhui-lei-le* β

```
                        IP
              ┌──────────┴──────────┐
             NP                     I’
              │              ┌───────┴───────┐
              α              I              VP0
                                   ┌─────────┴─────────┐
                                  VP1               IP(=RC)
                              ┌────┴────┐        ┌──────┴──────┐
                             V1      NP Spec    I’
                              │        │  │   ┌──┴───┐
                        zhui ‘chase’  β  Pro  I     VP2
                                                     │
                                                    V2’
                                                     │
                                                    V2
                                                     │
                                                    lei
                                                  ‘tired’
```
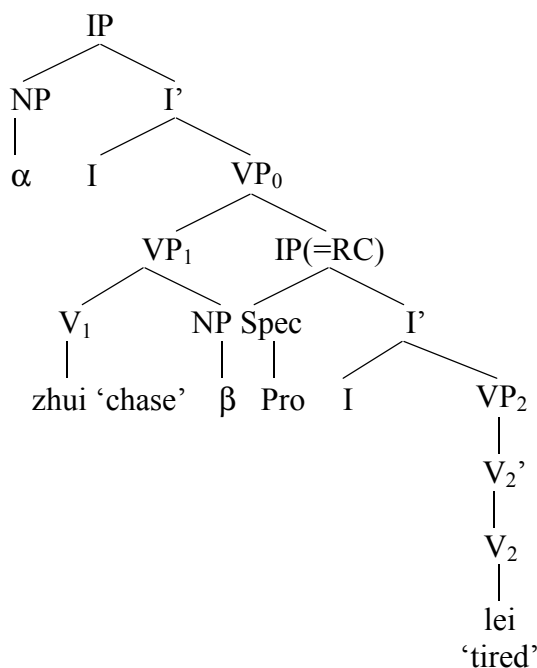
We can obtain the reading *Zhangsan chased Lisi and Zhangsan got tired* if α=*Zhangsan*, β=*Lisi* and α is taken to be controller of Pro. We can obtain the reading *Zhangsan chased Lisi and Lisi got tired* if α=*Zhangsan*, β=*Lisi* and β is taken to be controller of Pro. But in no way can we obtain the available reading *Lisi chased Zhangsan and Lisi got tired* within this theory because this requires α to be *Lisi* since the chaser must appear in the higher IP Spec position as is shown in Gao's work but this gives a wrong surface structure where *Lisi* appears in the surface subject position, which is not what we see in the sentence at issue. Clearly, Gao's system is too limited in generative power to accommodate the diverse patterns of argument realization that I have described in Chapter 5.

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6.2.4.4 Challenging the Syntactic Headhood Hypothesis

The assumption that one of the two verbal components is the syntactic head of RVC has been common in structuralist linguistics. Chao (1968) takes it for granted that an RVC is a verb plus a complement; V_1 is the head of an RVC clause and V_2 is the complement. Other linguists look for the linguistic evidence for the syntactic headhood of one out of the two verbs in RVC. However, it is doubtful that these facts are valid evidence for syntactic headhood.

L.D. Li (1984) argues that V_2 heads an RVC. He adopts the Bloomfieldian notion of endocentric construction: if a component of a construction is functionally equivalent to the construction as whole, then the component is the head of the construction. L.D. Li compares the functions of the two verbs in RVC. The examples given in (6.21) (L.D. Li 1984; c.f. Shen 2003).

(6.21) a.   *Wo yijing   chi-bao- le.*

         I   already eat-full-PFT

         'I have eaten and I am full.'

       b.   *Wo yijing   bao-le.*

         I   already full-PFT

         'I am already full.'

       c.   * *Wo yijing chi.*

         I   already eat

According to L.D. Li, in (6.21b) *bao* 'full'(V_2) is the matrix verb of the sentence just as *chi-bao* 'eat-full' in (6.21a) does; but *chi* 'eat' (V_1) in (6.21c) cannot function in the same way so *bao* 'full' is taken to be the head of *chi-bao* 'eat-full'. L.D. Li's conclusion is problematic. The problem lies in the way he illustrates functional equivalence between RVC and its verbal components. In (6.21b) the verb *bao* 'full'

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takes the perfect marker *le* and the sentence is acceptable while in (6.21c) the verb *chi* 'eat' does not take the perfect marker and it is not fully acceptable. Behind L.D. Li's diagnosis there is an unannounced assumption that *le* and V_2 are syntactically combined as a constituent. If *le* is added to the postverbal position in (6.21c) to yield *wo yijing chi-le* 'I have eaten' the sentence becomes fully acceptable, which makes the validity of the evidence in question very doubtful.

Ma (1987) supports L.D. Li. He raises some examples which overcome the problem with L.D. Li's diagnosis. Ma's examples are given below

(6.22)   a.   *Maozi chui-diao-le*.

            cap   blow-drop-PFT

            'The cap was blown off.'

      b.   *Maozi diao-le.*

            cap   drop-PFT

            'The cap dropped.'

     c.   * *Maozi chui-le.*

            cap   blow-PFT

In Ma's examples, i.e. (6.22), both diagnostic sentences involve *le*; thus the two verbs are put on the same testing ground. The result is that V_1 cannot freely appear with the subject by itself but V_2 can. Then Ma concludes that V_2 *diao* 'drop' in (6.22a) is the syntactic head of *chui-diao* 'blow-drop'.

Yuan (2001) indicates that Ma's diagnosis is invalid in the case where the subject is the agent of V_1, for example (6.23):

(6.23) a.   *Da-feng chui-diao-le   maozi.*

                big-wind blow-drop-PFT cap

                'The strong wind blew the cap off.'

      b.   **Da-feng diao-le.*

                big-wind drop-PFT

      c.   *Da-feng chui-le.*

                big-wind blow-PFT

                'The strong wind blew.'

In (6.23b) V_2 appears as the matrix verb just like the RVC in (6.23a) and the sentence is unacceptable whereas V_1 functions as the matrix verb in (6.23c) and the sentence is fully acceptable. With this observation, Yuan argues that V_2 *diao* 'drop' is not functionally equivalent to *chui-diao* 'blow-drop' and therefore is not the syntactic head. In summary the functional equivalence test for identifying the syntactic head of RVC falls into an empirical dilemma.

There are attempts to make out the syntactic headhood in RVC from other perspectives. Shen (2003) claims that there is a difference between V_1 and V_2: the position of V_1 can allow an open set of verbs while the position of V_2 selects a closed set of verbs. Then Shen, following Talmy's (2000) suggestion that the head of a construction usually selects an open set of lexical entries, argues that V_1 in RVC is the syntactic head since this position selects an open set of lexical entries but V_2 does not.

Shen's conclusion is not tenable even if Talmy's criteria are adopted because the premise of the conclusion is problematic. There is no evidence that V_2 selects a closed set of lexical entries. Shen's premise comes from Zhu's (1982) work where it

is claimed that the verbs that can appear as V_2 are restricted. However, it must be clarified that Zhu's notion of 'verb' is defined in a narrow sense, that is, a word such as *hong* 'red' is not taken to be a verb but rather an adjective. In other words, Zhu has not claimed that the words that can appear as V_2 constitutes a closed set. Since adjectives and verbs are not clearly distinguishable in Chinese and adjectives can commonly appears as V_2, it is inappropriate to say that the words that can enter the position of V_2 constitute a closed set.

Additionally, Shen (2003) comes up with a few other diagnostics for identifying the head of RVC. Shen points out that RVC can be extended into V_1 *mei* V_1-V_2 to form a disjunctive question but cannot be extended to V_1-V_2-*mei*-V_2. Compare the three sentences in (6.24).

(6.24) a.   *Maozi chui-diao- le*.

cap   blow-drop-PFT

'The cap was blown off'

b.   *Maozi chui-mei-chui-diao*?

cap   blow-NEG.PFT-blow-drop

'Was the cap blown off or not?'

c.   * *Maozi chui-diao-mei-diao*?

cap   blow-drop-NEG.PFT-drop

(6.24a) is the RVC sentence to be tested. (6.24b) is the first test. In this sentence V_1 is reduplicated and the negative operator *mei* 'NEG.PFT' appears between the two copies of V_1. The sentence is well-formed. By contrast, in (6.24c) V_2 is reduplicated and the same negative operator appears between the two copies of V_2. The sentence is ill-formed. Based on this behavioural asymmetry between V_1 and V_2, Shen concludes that V_1 is the syntactic head of RVC.

However, I argue that Shen's diagnostics does not have to do with the syntactic status of V_1 because even the first bound morpheme in a disyllabic word can be reduplicated to form a disjunctive question. Consider the examples in (6.25):

(6.25) a.　　*Zhangsan gaoxing bu   gaoxing*?

　　　　　　　　glad　　NEG glad

　　　　　'Is Zhangsan glad or not?'

　　　b.　　*Zhangsan gao bu gaoxing*?

　　　　　　　　　NEG glad

　　　　　'Is Zhangsan glad or not?'

Gaoxing 'glad' in (6.25) is a disyllabic word. Neither the first syllable *gao* nor the second syllable *xing* can be used independently to denote 'glad' in Mandarin. The meaning of *gao* 'high' as an independent word has nothing to do with the meaning 'glad' in contemporary Chinese. The example given in (6.25b) shows that that the the reduplication of a linguistic form does not have to with the syntactic status of the linguistic form because a bound morpheme in a lexical compound cannot be a syntactic head on its own.

To sum up, many attempts have been made to show that one of the two verbal components in RVC is the syntactic head of the construction but none of these attempts have been really convincing and some of them event contradict each other, which weakens the attractiveness of the structuralism approach.

6.2.5 Summary

In the above two sections, some existing works on RVC were reviewed. The lexical accounts and the derivational accounts are formulated on the basis of different hypotheses. These theories, though established on different hypotheses, have the

common problem of undergeneration and therefore do not give rise to a right grammar of RVC. Additionally, it is shown that the empirical evidence for their hypotheses is unconvincing. In view of the problems with the previous accounts of RVC, a new theoretical account is called for.

6.3 A Dynamic Account of Argument Realization in Transitive RVC Sentences

In this section, I give a dynamic account of transitive RVC sentences. For Dynamic Syntax, the argument realization patterns of RVC arise epiphenomenally as RVC sentences are parsed. In this account, no such concepts as syntactic head-hood or 'unaccusativity' of verbs are invoked. A sentence does not have an inherent static syntactic structure. A sentence is simply is a string of lexical forms the parse of which yields a full propositional formula. The lexical properties of each lexical form and pragmatic inference collectively give rise to the diverse readings as RVC sentences are parsed from left to right. The inverse argument realization and the canonical argument realization patterns can be uniformly accounted for and the problems with the existing works that I have reviewed do not appear.

6.3.1 Semantic Representation of RVC

There are two layers of semantic relationships expressed within the boundary of an RVC sentence. They are the argument-predicate relationship and the relationship between two propositions, which is the logical representation of two subevents. For example *Zhangsan da-ku-le Lisi* 'Zhangsan hit-cry-PFT Lisi' (Zhangsan hit Lisi and Lisi cried as a result) expresses a hitting subevent and a crying subevent and the two subevents are combined together as a single complex event. The conceptual relationship between two subevents can be stated in logical words as follows:

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There exists a situation and in this situation a first proposition representing the first subevent and a second proposition representing a second subevent both hold true. The first subevent constitutes a condition for the second subevent. But the second subevent is the foreground part in the whole meaning of a RVC sentence.

Taking advantage of the Davidsonian concept of event argument introduced in Chapter 4 and assuming that RVCs involve only a single event argument, I represent the conceptual relationship between the two propositions with the logical form $\exists s.$ $ps \wedge qs$. Unfortunately, this potentially gives rise to conflicting information. Consider the sentence in (5.6), repeated below.

(5.6) a.   *Zhangsan da-hong-le Lisi-de lian.*

                     hit-red-PFT   Lisi's face

          'Zhangsan hit Lisi's face red'.

Here we have an activity verb *da* 'hit' and a state *hong* 'red' so any single event of *da-hong* 'hit-red' might be construed as simultaneously an activity and a state. This can only be the case without contradiction (assuming that activities and states are semantic opposites) if the event over which they predicate is complex i.e. $s=\langle e_1, e_2\rangle$. That is, s consists of two subevents e_1 and e_2 and the interpretation of $\exists s.$ $ps \wedge qs$ is in fact enriched to $\exists s \exists e_1 \exists e_2.$ $s=\langle e_1, e_2\rangle \wedge pe_1 \wedge qe_2$.

Assuming that the two verbs project two different propositional templates as they are parsed one after another, we then need to consider what tree-relationship the two propositional templates have. Semantically, neither V_1 nor V_2 takes the other to be its individual argument, and so the possibility is excluded that one propositional template appears below an individual argument node on the other propositional template.

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Next we consider other possibilities. One is to have two Linked structures: one for V_1 and the other for V_2. But there are significant problems with such an approach to do with argument sharing: It is not obvious how the two propositional trees would share the same event argument (and if they didn't we would lose the concept of a complex event being denoted by the V_1-V_2 complex) and, more importantly, it would make the sharing of predicate arguments across the two structures both problematic and mysterious. Another possibility is to treat one of the two propositions as embedded within the other but without there being a lexical 'selection' restriction between them so one is not a predicate argument of the other. Instead, one of the propositions is treated as providing a restrictor for the *event* argument node of the other.

A question is which verb plays the role of restrictor and which plays the role of main predicate. The description of RVC in Chapter 5 shows that the two subevents do not have equal status in the sense that the resultative subevent has the status of main assertion, which is reflected in the principle of argument realization: The arguments of V_2 must be expressed and the aspect and aspectual characteristics of RVC are mainly determined by V_2. On this empirical basis, I take V_2 as providing the main predicate and V_1 as providing the restrictor for the event argument of the main predicate, following assumptions put forward in Cann and Wu (2009).

Next, we need to consider how the formula $\exists s.\ ps \wedge qs$ is constructed through a parsing process. It should be noted that this predicate-logic formula cannot directly arise out of the semantic composition of the terms established through step-wise parsing processes because the quantifier in this logical form applies to the whole proposition but a quantifier is treated in Dynamic Syntax as a binder within a term such as an epsilon operator or a tau operator (see Chapter 4). To obtain the

predicate-logic formula at issue, we have to invoke the algorithm of predicate-logic epsilon calculus equivalence. By definition, $\exists s.\ ps \wedge qs \equiv_{def} p\,(a) \wedge q(a)$, where $a = \varepsilon$, s, $ps \wedge qs$. This latter logical form results from applying some term reconstruction rules to the logical form $p\,(\varepsilon,\ s,\ qs)$ that can be obtained through the semantic composition between the formulae established in a parsing process. The term reconstruction rules are loosely described below (Cann et al 2005: 130):

(i)   a *first* conjunct made up of the restrictor of the term under evaluation;

(ii)   this restrictor is predicated of a term which is defined to represent a witness for the containing propositional formula;

(iii)   a *second* conjunct made up of the predicate of the logical form just parsed applied to that same term;

(iv)   a connective reflecting the particular quantificational construal of the operator in the term is put between the two conjuncts.

The formal definitions of the rules are given in (6.26).

(6.26)   Term Reconstruction Rules

Given a formula $\varphi[v,\ x,\ \psi\ /x]$ where $v \in \{\varepsilon,\ \tau,\ Q\}$ and the variable x occurs freely,

$f_{\varepsilon\,x\,\psi}(\varphi) = \psi\,(b/x) \wedge \varphi\,(b/x)$,

where $b = \varepsilon\,x\,(\psi \wedge \varphi)$;

$f_{\tau\,x\,\psi}(\varphi) = \psi\,(b/x) \rightarrow \varphi\,(b/x)$,

where $b = \tau\,x\,(\psi \rightarrow \varphi)$;

$f_{Q,\,x\,\psi}(\varphi) = \psi\,(c/x) \rightarrow \varphi\,(c/x)$,

where $c = v_Q\,x\,((\varphi)(\psi))$.

With these logical form conversion rules defined, we can go on to work out how the logical form p (ε, s, qs) is constructed through a step-wise parsing process. This is easy to do. As has been introduced in Chapter 4, an epsilon term is constructed through a sequence of combination of different component formulae. The combinatorial process is schematically represented as the following tree-fragment.

$$\text{Ty}(e_s),\ \text{Fo}(\varepsilon,\ \mathbf{S},\ q\mathbf{S})$$

$$\text{Ty}(t),\ \text{Fo}(q\mathbf{S}) \qquad \text{Ty}(t\to e_s),$$
$$\text{Fo}(\lambda P.[\varepsilon,\ \mathbf{S},\ P])$$

$$\text{Ty}(e_s),\ \text{Fo}(\mathbf{S}) \qquad \text{Ty}(e_s\to t),\ \text{Fo}(\lambda t\ q(t)$$
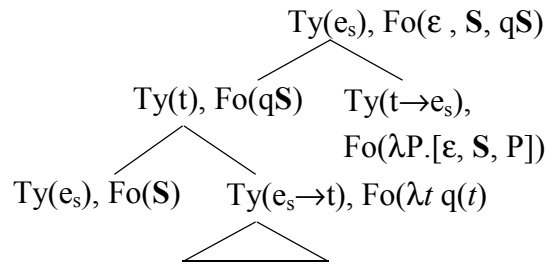
Fig-6.1

In Fig-6.1, a Ty(t) formula appears within the domain of a Ty(e_s) term, functioning as the restrictor of the situation variable. The metavariable **S** is just a placeholder and it should be finally instantiated by a situation variable, s for example.

Such an epsilon term can fit into the event argument slot in the argument structure of another predicate p, yielding the resultant form p (ε, s, qs) as the situation metavariable is instantiated by a situation variable. The relevant combinatorial process can be schematically represented as the following partial tree.

$$\text{Ty}(t),\ \text{Fo}(p(\varepsilon,\ \mathbf{S},\ q\mathbf{S})$$

$$\text{Ty}(e_s),\ \text{Fo}(\varepsilon,\ \mathbf{S},\ q\mathbf{S}) \qquad \text{Ty}(e_s\to t),\ \text{Fo}(\lambda t,\ pt)$$

$$\text{Ty}(t),\ \text{Fo}(q\mathbf{S}) \qquad \text{Ty}(t\to e_s),$$
$$\text{Fo}(\lambda P.[\varepsilon,\ \mathbf{S},\ P])$$

$$\text{Ty}(e_s)\ \text{Fo}(\mathbf{S}) \qquad \text{Ty}(e_s\to t),\ \text{Fo}((\lambda t,\ qt)$$
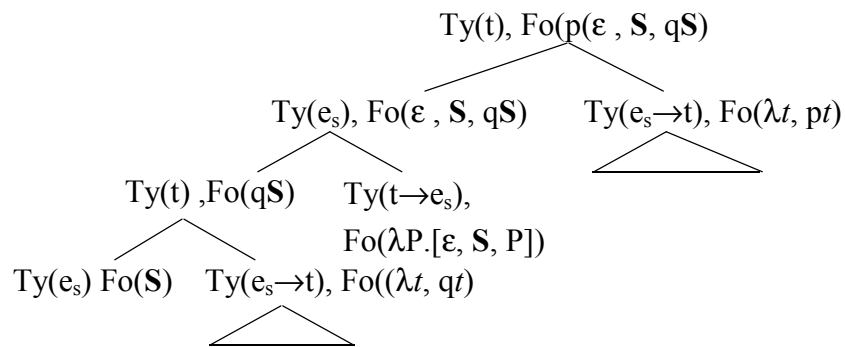
Fig-6.2

It should be noted that *p* and *q* do not just have an event argument; they also have individual arguments. Individual arguments are not represented in the above tree for simplification but they will be the major concern in the following discussion.

Next, I can present a schematic model of the parse of RVC. In this parsing process, an unfixed node annotated with $?Ty(e)$ is created first through applying *Adjunction. The unfixed node obtains an argument type formula via direct lexical input. I assume that the General Adjunction rule is applied before the parse of V_1, which sets up an unfixed node annotated with $?Ty(t)$ which triggers the parse of V_1. There is strong motivation for this assumption because the status of the first proposition is unfixed initially.

(6.27) a. Generalized Adjunction (Rule) (c.f. Cann et al 2005: 242)[38]

$$
\begin{array}{ll}
\text{IF} & Tn(n), ?Ty(t) \\
\text{THEN} & \text{make}(<D>); \text{go}(<D>); \text{put}(<U>Tn(n), ?Ty(t)) \\
\text{ELSE} & 1
\end{array}
$$

  b. Applying Generalized Adjunction

$$Tn(n), ?Ty(t)$$

$$<\uparrow_*>Tn(n), \qquad <U>Tn(n),$$
$$Ty(e), Fo(\alpha) \qquad ?Ty(t)$$
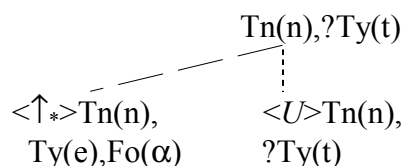
Fig-6.3

As the pointer is at the $<U>Tn(n), ?Ty(t)$ node, V_1 is parsed, projecting the first propositional template and the pointer returns to the local topnode. The lexical actions triggered by the parse of V_1 are not given here since the arity of V_1 varies from case to case. Instead, I directly state the partial tree that is updated after the parse of V_1.

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[38] In DS, $<D>$ is defined as the reflexive transitive closure of the union of the LINK ($<L>$) and the mother ($<\downarrow>$) relations, so $<D>$ X holds at some node *n* if somewhere along a sequence of relations, including either $<\downarrow>$ or $<L>$, X holds; $<U>$ is the inverse modality of $<D>$ (c.f. Cann et al 2005: 242).

c. Parsing NP_L V_1, constructing the first propositional template.

$$Tn(n),?Ty(t)$$

$<\uparrow_*>Tn(n),$ $<U>Tn(n),$

$Ty(e), Fo(\alpha)$ $?Ty(t), \Diamond$

$?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

…

more nodes below
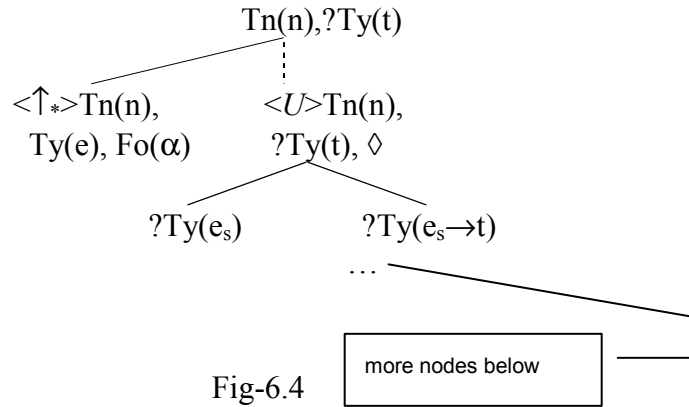
Fig-6.4

V_2 is parsed under the trigger $?Ty(t)$ and $?Ty(e_s)$ in the first proposition. I assume that the parse of a verb under $?Ty(t)$ triggers complex lexical actions, constructing a number of nodes that accommodate the information for constructing an epsilon term of situation and the resultative propositional template. The actions activated by the parse of V_2 are schematically given below.

(6.27) d.   General Lexical Actions of V_2

1.IF $?Ty(t)$
2.THEN   IF $<\downarrow_0>?Ty(e_s)$ @if there already exists an event argument node below the topnode @
3.   THEN go($<\downarrow_0>$); put(Ty(e_s)), Fo(**S**), $?\exists x.Fo(x)$); go ($<\uparrow_0>$) @annotate the event argument node with a metavariable formula @
4.   make($<\uparrow_0>$); go($<\uparrow_0>$); put($?Ty(e_s)$); @creat an event argument above the current node, i.e. the node with $?Ty(t)$, and move the pointer to the event argument node @
5.   make($<\downarrow_1>$); go($<\downarrow_1>$); @creat a functor node below the event argument node created in line-4 @
6.   put(Ty($t \rightarrow e_s$), Fo($\lambda P[\varepsilon$, **S**, P])); go($<\uparrow_1>$); @annoate the functor node created in line-5 with an impoverished epsilon formula@
7.   make($<\uparrow_0>$); go($<\uparrow_0>$); put(Tn(n), $?Ty(t)$);
8.   make($<\downarrow_1>$);go($<\downarrow_1>$); put($?Ty(e_s \rightarrow t)$));
     …@the actions constructing the rest of the resultative propositional template@
9   ELSE Abort
10.ELSE   Abort

Line-2 of (6.27d) is a further condition: If below the current node there is a node with an open requirement of an event argument. If this requirement exists, a

situation metavariable is put onto the event argument node. In line-6, the same situation metavariable is put as the nominal variable within a skeletal epsilon term formula. These two sequences of actions ensure that a well-formed epsilon term will be constructed through semantic composition. Line-7 is important in that the action given in this line construct a node whose modality collapse with the axiomatic topnode; this action ensure that the e_s-type node created above the topnode of the propositional template constructed through parsing V_1 is the event argument daughter node of the axiomatic topnode.

(6.27) e. Parsing NP_L V_1-V_2

$$Tn(n), \ ?Ty(t)$$

$<\uparrow_*>Tn(n),$ $Ty(e_s)$ $?Ty(e_s{\rightarrow}t)$
$Ty(e),Fo(\alpha)$

$Ty(t), Fo(q)$ $Ty(t{\rightarrow}e_s),$ $\ldots \ \ldots, \Diamond$
$Fo(\lambda P.[\varepsilon, \mathbf{S}, P])$

$Ty(e_s), Fo(\mathbf{S})$ $Ty(e_s{\rightarrow}t), Fo(\lambda t.(qt)$

The pointer appears at the lowest argument node.
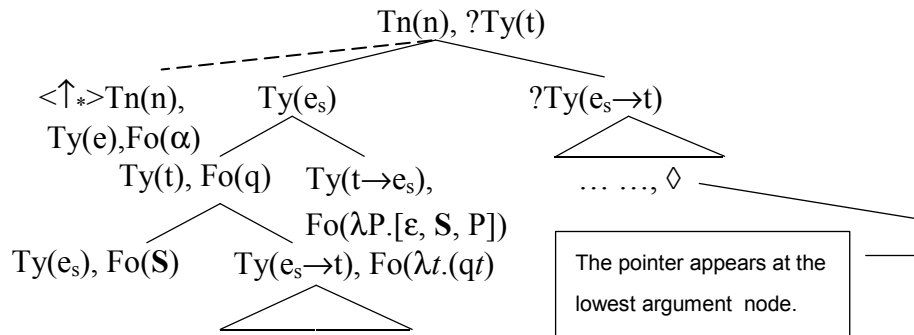
Fig-6.6

As the resultative propositional template is constructed, the pointer arrives eventually at the lowest argument node on this propositional template, as is shown in Fig-6. The pointer will move up step by step as the requirements on this template are satisfied one by one. Note that there is an important difference between V_1 and V_2 in terms of pointer position: The pointer appears finally at the topnode of the first propositional template as V_1 is parsed; but the pointer appears at the lowest argument node on the resultative propositional template as V_2 is parsed. This procedural difference between V_1 and V_2 is empirically motivated, which will be shown below. As V_2 is parsed, the partial tree is updated as follows.

Additionally, I assume that the structure given in Fig-6.6 is peculiar to RVC. Using this assumption, I update the α-actions into the standard α-actions triggered by the parse of an e-type expression. The actions are given in (6.27f).

(6.27) f.   the standard α-actions induced by the parse of e-type expressions

1. IF $?Ty(e)$
2. THEN   IF $\uparrow\top$ @If it is true that the current node is dominated by a mother node@
3.   THEN IF $<\uparrow_0><\downarrow_1>$, $Ty(e{\to}(e_s{\to}t))$, $[\downarrow]\bot \wedge <\uparrow_0><\uparrow_1>?Ty(t)$ @if the current node is the only individual argument on the 1st propositional template @
4.   THEN put $(Fo(\alpha), Ty(e))$ @annotate the current node with a e-type formula @
5.   ELSE IF $<\uparrow_0><\downarrow_1>$, $Ty(e{\to}(e_s{\to}t)$ $[\downarrow]\bot \wedge <\uparrow_0><\uparrow_1><\downarrow_0><\downarrow_0>?Ty(t)$ @if the current node is the only individual argument node on the resultative propositional template @
6.   THEN put $(Fo(\alpha), Ty(e))$
7.   ELSE IF $<\uparrow_0><\uparrow_1><\uparrow_1><\uparrow_1^*>?Ty(t)$ @if the current node is an internal argument node on any propositional template @
8.   THEN put $(Fo(\alpha), Ty(e))$
9.   ELSE Abort
10.   ELSE put $(Fo(\alpha), Ty(e))$ @the action is taken if the current node is a e-type topnode@
11. ELSE   Abort

According to the standard α-actions, the parse of argument expression always happens under the trigger $?Ty(e)$. The meanings of the triggering conditions and constraints on the lexical actions are repeated in the following bulleted list.

If $?Ty(e)$ appears at a fixed node (line-2), one of three situations can occur:

♦   If the current node is the only individual argument node on the first propositional template (line-3.), then it triggers lexical input actions (line-4.);

♦   If the current node is the only individual argument node on the resultative propositional template (line-5), then it can trigger lexical input actions (line-6);

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- ◆ If the node is an internal argument node on any propositional template (line-7), then it triggers lexical input actions (line-8); otherwise ?Ty(e) cannot trigger lexical input (line-9).

- ◆ Alternatively, if ?Ty(e) is at an unfixed node or a topnode (i.e. line-2 is false), it can always trigger lexical input (line-10).

I hypothesize that the standard α-actions are peculiar to Chinese and are applicable to the parse of an argument expression in all cases in this language.

Furthermore, the rule of Thematic Abduction (see Chapter 4) should be further constrained. Specifically, this rule can be triggered only by ?Ty(e) on the propositional template that is dominated by an event argument node. This update of the Thematic Abduction rule is given below.

(6.27) g.   Thematic Abduction (update)

IF	?Ty(e)
THEN	IF $\uparrow^*$?Ty(e_s)
	THEN IF … @...is a statement of the structural position of the current node relative to a functor node@
	THEN … @... is the actions of annotating the currentnode with a formula@
	ELSE 1
ELSE	1

The primary trigger of this rule is strictly an open requirement. This excludes the possibility that an argument node annotated with metavariable triggers the Thematic Abduction rule. An implication of this constraint on the Thematic Abduction rule is that any argument node that can undergo Thematic Abduction must be one within

the domain of an event term[39]. The concluding chapter of the thesis will have more to say about this implication.

6.3.2 Diverse Argument Realization Patterns as Diverse Parsing Processes

In this section, I will look into how each attested argument realization pattern in RVC is constructed through parsing. I give the parsing process of constructing Pattern-1 in detail, including every parsing step. Other patterns are treated as briefly as possible. For those patterns that involve the so-called inverse argument realization, I will elaborate on them since they are the very puzzles that are to be tackled. What's more, I will not repeat the standard α-actions, Thematic Abduction and Metavariable Insertion and Substitution everywhere. The effects of these operations are reflected in the annotations of partial trees.

6.3.2.1 Constructing Pattern-1

Pattern-1 is special in comparison with all other attested patterns in the sense that the object in this pattern cannot be numerically quantified. As well as accounting for how this pattern is constructed through parsing, I will also explain this restriction on the object.

Pattern 1: $V_1[NP_L, NP_R] \& V_2[NP_L]$

Zhangsan he-zui-le jiu.

    drink-drunk-PFT alcohol

'Zhangsan drank alcohol and got drunk.'

(6.28) a. Parsing *Zhangsan* (*Adjunction and the standard α-actions)

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[39] The rule of Thematic Abduction can be easily generalized to all 'nominalized verbs'. For example *He -jiu dui shenti bu hao* 'drink-alcohol to body not good (=Drinking alcohol is harmful to health.) in which the verb *he* 'drink' has an unexpressed argument. This verb, I assume, projects a propositional template below an event argument tree node, which is taken to be an individual argument by the matrix predicate *bu hao* 'not good'.

$$\text{Tn(0)?Ty(t)}$$

$$\langle\uparrow_*\rangle\text{Tn(0),Ty(e), Fo(Zhangsan'), }\lozenge$$
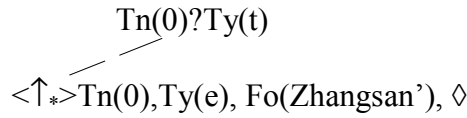
<div align="center">Fig-6.7</div>

When the unfixed node receives a formula the pointer moves back to the topnode. Next, the rule of Generalized Adjunction is applied and an unfixed node annotated with ?Ty(t) is created.

(6.28) b.　　Applying Generalized Adjunction

$$\text{Tn(0), ?Ty(t)}$$

$$\langle\uparrow_*\rangle\text{Tn(0),}$$
$$\text{Ty(e), Fo(Zhangsan')}$$
$$\langle U\rangle\text{Tn(0),?Ty(t) ,}\lozenge$$
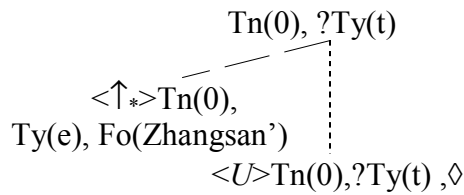
<div align="center">Fig-6.8</div>

As the pointer stays at the $\langle U\rangle$Tn(n) node, V_1 is parsed. Through the lexical actions that V_1 contributes, the first propositional template is constructed, shown in Fig-6.9.

(6.28) c.　　Parsing *Zhangsan he*

$$\text{Tn(0) ?Ty(t)}$$

$$\langle\uparrow_*\rangle\text{Tn(0),}$$
$$\text{Ty(e), Fo(Zhangsan'')}$$
$$\langle U\rangle\text{Tn(0),?Ty(t), }\lozenge$$

$$?\text{Ty}(e_s) \qquad ?\text{Ty}(e_s{\rightarrow}t)$$

$$?\text{Ty}(e) \qquad ?\text{Ty}(e{\rightarrow}(e_s{\rightarrow}t))$$

$$?\text{Ty}(e) \qquad \text{Ty}(e{\rightarrow}(e{\rightarrow}(e_s{\rightarrow}t)))$$
$$\text{Fo}(\lambda x\lambda y\lambda t.\text{He'}(t, y, x)), [\downarrow]\bot$$
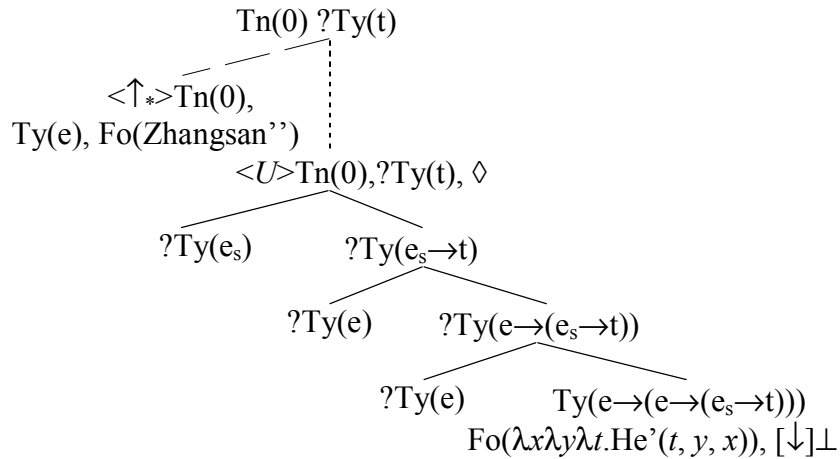
<div align="center">Fig-6.9</div>

V_2 is parsed under the trigger of ?Ty(t) and $?\text{Ty}(e_s)$. A package of lexical actions fire; as a result, the partial tree is further updated as follows.

(6.28)   e.   Parsing *Zhangsan he-zui (-le)*

$$Tn(0) \ ? \ Ty(t)$$

$\langle\uparrow_*\rangle Tn(0),$
$Ty(e), Fo(Zhangsan')$

$?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

$?Ty(t)$ $Ty(t \rightarrow e_s),$ $?Ty(e) , \Diamond$ $Ty(e \rightarrow (e_s \rightarrow t)),$
                   $Fo(\lambda P[\varepsilon, \mathbf{S}, P])$ $Fo(\lambda y \lambda t.Zui'(t, y)), [\downarrow]\bot$

$Ty(e_s), Fo(\mathbf{S})$ $?Ty(e_s \rightarrow t)$

$?Ty(e)$ $?Ty(e \rightarrow (e_s \rightarrow t))$

$?Ty(e)$ $Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t))),$
                   $Fo(\lambda x \lambda y \lambda t.He'(t, y, x)), [\downarrow]\bot$
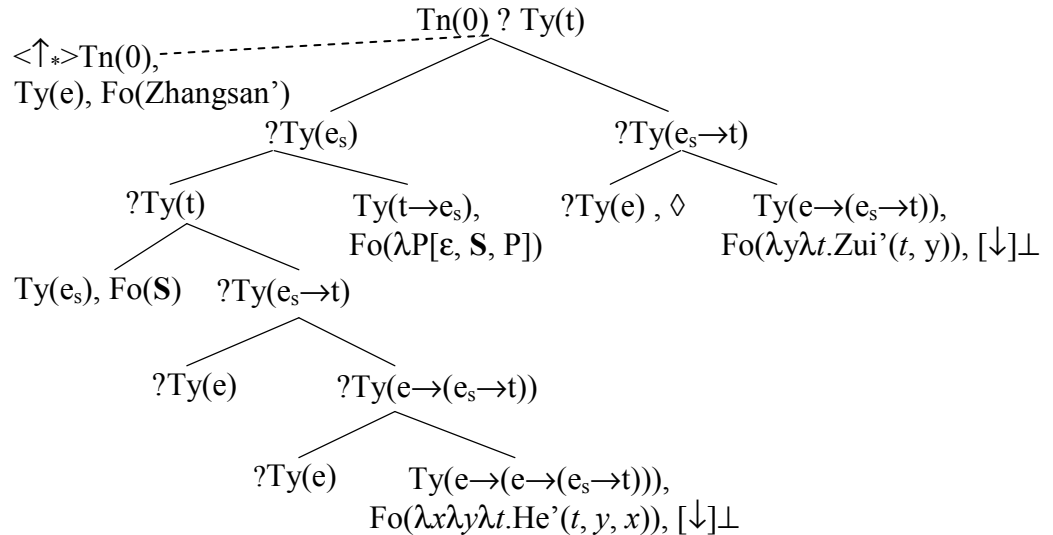
Fig-6.10

The pointer appears at the only individual argument node on the resultative propositional template, where ?Ty(e) stands. The requirement is satisfied through Merge, i.e. the unification between the unfixed node (*Adjunction-created node) and the current fixed node. Then the pointer returns to the topnode. Applying the Anticipation rule, the pointer goes down to the internal argument node of the first propositional template. The word *jiu* 'alcohol' is parsed.

(6.29) *Jiu* 'alcohol' (object in RVC)

IF $?Ty(e)$
THEN   the standard α-actions where $Fo(\alpha)=Fo(\varepsilon, w, Jiu'(w))$
ELSE   Abort

Now the pointer moves one step up and then down to the external argument node within the current tree domain. The external argument node on the first propositional template obtains a formula through Metavariable Insertion and Substitution.

(6.30)   *Zhangsan he-zui-le jiu*

Tn(0), ?Ty(t)

?Ty(e$_s$)   ?Ty(e$_s$→t)

?Ty(t)   Ty(t→e$_s$),   ~~?Ty(e),~~ Ty(e),   Ty(e→(e$_s$→t)),
                Fo(λP[ε, **S**, P]) Fo(Zhangsan')   Fo(λyλt.Zui'(t, y)), [↓]⊥

Ty(e$_s$), Fo(**S**)   ?Ty(e$_s$→t)

Ty(e), Fo(**U**)   ?Ty(e→(e$_s$→t))
⇑

Ty(e),Fo(Zhangsan')   ~~?Ty(e)~~   Ty(e→(e→(e$_s$→t))),
                Ty(e), Fo(ε, *v*, Jiu'(*v*) , ◊)   Fo(λ*x*λ*y*λt.He'(t, *y*, *x*)), [↓]⊥

Fig-6.11

A question needs to be considered here: Why does the metavariable inserted into the external argument node on the first propositional template not pick out some substituend from the general context? The answer lies in the semantics of the RVC sentence. Since this sentence is intended to express a complex event in which the two subevents are tightly intertwined, they tend to share participants as long as there is such a possibility. Therefore, a formula in the domain of one proposition is more likely to be taken to be the substituend of a metavariable in the domain of the other proposition than a substituend from the general context. In fact, nothing excludes the possibility that a formula from the general context becomes the substituend for a metavariable on the partial tree. I assume that Relevance-Theoretic constraints (Sperber and Wilson 1986 and 1995) will operate to select proper substituends, namely, an RVC construction constitute the minimal and most relevant context in which the arguments of verbs obtain their semantic contents; and when an argument of V$_1$ or V$_2$ cannot obtain a proper content the context of relevance will be enlarged untill the proper content is obtained.

We return to the above parsing process. As the requirement on each daughter node is satisfied, the rule of Elimination is applied and the formulae on the nodes are

combined through functional application, through which a complete logic formula comes into being at the ultimate topnode: Fo(Zui' (ε, s, He'(s, Zhangsan', (ε, v, Jiu'(v))), Zhangsan')), Ty(t). Applying the rule of Term Reconstruction, we obtain Zui' (*a*, Zhangsan') ∧ He'(*a*, Zhangsan' (ε, v, Jiu'(v))) where *a*=ε, s, Zui' (s, Zhangsan) ∧ He'(s, Zhangsan', (ε, v, Jiu'(v))). This latter formula is definitionally equivalent to the familiar logical form ∃s. Zui' (s, Zhangsan') ∧ He' (s, Zhangsan', Jiu'), which has to be further enriched into ∃s∃e_1∃e_2. s=<e_1, e_2> ∧ He'(e_1, Zhangsan') ∧ He' (e_2, Zhangsan', Jiu') to ensure the establishment of a sound interpretation.

Next, I explain the puzzle of why the object in this pattern cannot be referential. This characteristic of the object in Pattern-1 is related to the general semantic property of RVC and the specific property of the verb that functions as V_1 and the semantic property of the postverbal argument expression.

A restriction on RVC is that this construction only allows a single resultative subevent to be expressed (see Tenny 1987: 190 and Simpson 1983 for a similar restriction on the resultative construction in English; but see Goldberg 1991 for some exceptional cases in English). Consider the following facts.

(6.31) a. *Zhangsan zuo-lei-le.*

                sit-tired-PFT

        'Zhangsan sat too much and he got tired as a result.'

    b. *Zhangsan zuo-fan-le.*

                sit-bored-PFT

        'Zhangsan sat too much and he got bored as a result.'

    c. * *Zhangsan zuo-fan-lei-le.*

                sit-bored-tired-PFT

    d. * *Zhangsan zuo-lei-fan-le.*

(6.31a) and (6.31b) illustrate two well-formed instances of RVC, either of which includes only one resultative subevent. (6.31b) and (6.31c) illustrate two ill-formed instances of RVC, in each of which there are two resultative verbs.

This restriction provides an explanation of why the object in Pattern-1 cannot be quantified with the following assumption. According to Verkuyl (1993), when a verb has an [+ADD] feature, that is, it expresses an activity that involves the change of measurement and its internal argument is a specifically quantified argument, recorded as [+SQA], a terminativity reading will arise. The terminativity reading can be taken to be a resultative state. In the current case, the quantified postverbal expression, if understood as the internal argument of *he* 'drink' which is a verb with [+ADD] feature, can trigger the inference of a resultative subevent: a particular amount of alcohol disappeared/was consumed. On the other hand, V_2 *zui* 'drunk' expresses a different resultative state. Then two resultative states co-occur, which violates the one-resultative-subevent restriction on RVC. Therefore, in this pattern, the object cannot be quantified. Since *jiu* 'alcohol' in the current case is non-referential and only has a generic reading, no double-result construal arises.

In the following subsections, I go through other attested patterns but I do not elaborate on each of them as I do with Pattern-1 unless there is a need of clarification. I only give the patterns along with the exemplary sentences, the major parsing steps that result in the patterns, the outputs of these parsing processes, and the pre-Completion partial trees that can approximately demonstrate how the outputs are constructed. Additionally, in the outputs, I will not always use the full forms of epsilon terms that represent individuals because of the limited space. But to ensure that the simplification does not totally lose its expressiveness in representing a

complex event, I keep the full forms of epsilon terms of situation. I will also keep the full forms of epsilon terms that are obtained through Thematic Abduction where the predicates expressing the thematic roles are given in Chinese and the corresponding English translations are given in footnotes. The thematic roles that I will provide are fine-grained thematic roles, for example the agent of the verb *da* 'hit' is Fo(ε, u, Dazhe' (u)) where the expression 'Dazhe' means 'hitter'.

6.3.2.2 Constructing Pattern-2

Pattern-2: $V_A[NP_L, NP_R]$ & $V_R[NP_R]$

Zhangsan chi-guang-le mifan

eat-bare-PFT rice

'Zhangsan ate up the rice.'

THE MAJOR PARSING STEPS:

   ♦   The unfixed node created through *Adjunction (the unfixed node henceforth) Merges with the external argument node on the first propositional template.

   ♦   The only argument node of the resultative propositional template receives a formula through the standard α-actions induced by the parse of NP_R.

   ♦   The formula of NP_R is copied onto the internal argument node on the first propositional template through Metavariable Insertion and Substitution.

   ♦   **S** is instantiated by s.

THE OUTPUT: Fo(Guang'((ε, s, Chi'(s, Zhansan', Mifan')), Mifan')), Ty(t).

THE PRE-COMPLETION PARTIAL TREE (SEE THE NEXT PAGE):

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(6.32) Parsing *Zhangsan chi-guang-le mifan*

Tn(0), ?Ty(t)

?Ty(e_s)   ?Ty(e_s→t)

?Ty(t)   Ty(t→e_s),   ~~?Ty(e),~~ Ty(e),   Ty(e→(e_s→t)), [↓]⊥
           Fo(λP[ε, **S**, P])   Fo(Mifan')   Fo(λyλt.Guang'(t, y)),

Ty(e_s),Fo(**S**)   ?Ty(e_s→t)

~~?Ty(e),~~   ?Ty(e→(e_s→t))
Ty(e), Fo(Zhangsan')

           Ty(e), Fo(**V**) , ◊   Ty(e→(e→(e_s→t))),
           ⇑   Fo(λyλxλt.Chi'(t, x, y)), [↓]⊥
           Ty(e), Fo(Mifan')
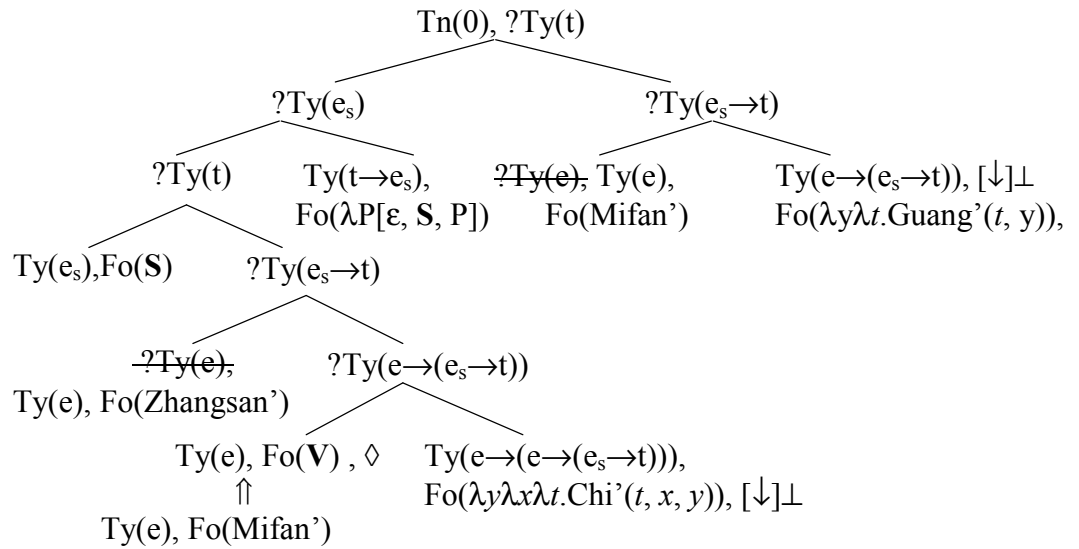
Fig-6.12

6.3.2.3 Constructing Pattern-3

Pattern 3: V_1[$NP_{L,}$ NP_R] & V_2 [NP_L, NP_R]

Zhangsan zhan-sheng-le   Lisi.

fight-win-PFT

'Zhangsan fought against Lisi and beat Lisi.

THE MAJOR PARSING STEPS:

♦   The unfixed argument node Merges with the external argument on the resultative propositional template.

♦   The internal argument node on the resultative propositional template receives a formula through the standard α-actions induced by the parse of NP_R.

♦   Finally the semantic content of the two formulae are copied onto the two individual argument nodes on the first propositional template through Metavariable Insertion and Substitution.

♦   **S** is instantiated by s.

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Fo(Sheng'((ε, s, Zhan'(s, Zhangsan', Lisi)), Zhangsan', Lisi')), Ty(t).

THE PRE-COMPLETION PARTIAL TREE:

(6.33) Parsing *Zhangsan zhan-sheng-le Lisi*

$Tn(0), ?Ty(t), ◊$

$?Ty(e_s)$

$?Ty(t)$ $Ty(t→e_s), Fo(λP[ε, \mathbf{S}, P])$ $Ty(e),$ Fo(Zhangsan')

$?Ty(e_s→t)$

$Ty(e), Fo(\mathbf{S})$ $?Ty(e_s→t)$

$Ty(e), Fo(Lisi')$

$Ty(e→(e→(e_s→t))),$
$Fo(λxλyλt.Sheng'(t, y, x)), [↓]⊥$

$Ty(e),Fo(\mathbf{U})$ $?Ty(e→(e_s→t))$
⇑
$Ty(e), Fo(Zhangsan')$

$Ty(e), Fo(\mathbf{V})$ $Ty(e→(e→(e_s→t))),$
⇑ $Fo(λyλxλtZhan'(t, x, y)), [↓]⊥$

$Ty(e), Fo(Lisi')$
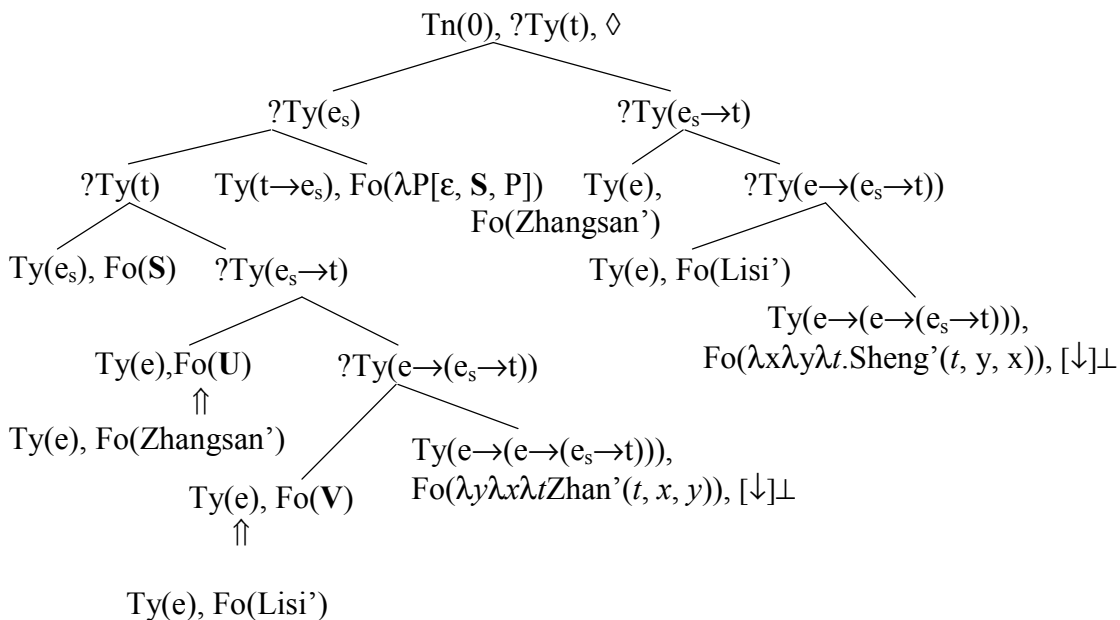
Fig-6.13

6.3.2.4 Constructing Pattern-4

Pattern-4 $V_1[NP_L, φ] \& V_2 [NP_L, NP_R]$

Da(Zhangsan, x) & Ying (Zhangsan, Lisi)

Zhangsan da-ying-le Lisi

hit-win-PFT

'Zhangsan hit (something) and beat Lisi.

THE MAJOR PARSING STEPS:

♦ The external argument node on the resultative propositional template receives a formula through Merging with the unfixed node.

♦ The internal argument node on the resultative propositional template receives a formula through the standard α-actions.

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- ♦ The external argument node on the first propositional template receives a formula through Metavariable Insertion and Substitution.
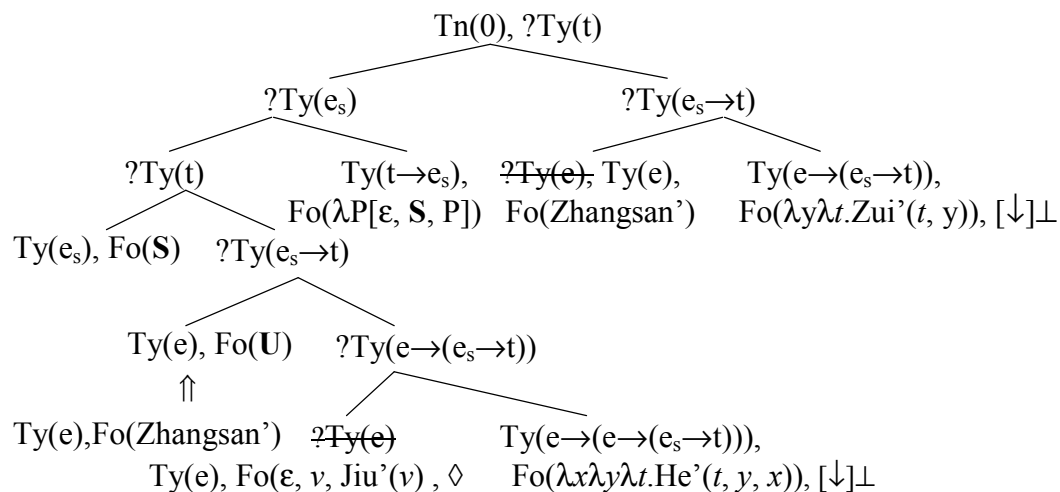- ♦ The internal argument node on the first propositional template is annotated with a thematic formula through Thematic Abduction.
- ♦ **S** is instantiated by s.

THE OUTPUT:

Fo(Ying'((ε, s, Da'(s, Zhangsan, (ε, v, Beidazhe'[40] (v)))), Zhangsan', Lisi')).

THE PRE-COMPLETION PARTIAL TREE:

(6.34)   Parsing *Zhansan da-ying Lisi*.

$$Tn(0),\ ?Ty(t),\ \Diamond$$

$$?Ty(e_s)$$

$$?Ty(e_s \to t)$$

$$?Ty(t)\quad Ty(t \to e_s),\ Fo(\lambda P[\varepsilon,\ \mathbf{S},\ P])$$

$$Ty(e),\ Fo(Zhangsan')$$

$$?Ty(e \to (e_s \to t))$$

$$Ty(e_s),\ Fo(\mathbf{S})\qquad ?Ty(e_s \to t)$$

$$Ty(e),\ Fo(Lisi')\quad Ty(e \to (e \to (e_s \to t))),\ Fo(\lambda x \lambda y \lambda t.Ying'(t,\ y,\ x)),\ [\downarrow]\bot$$

$$Ty(e),Fo(\mathbf{U})$$
$$\Uparrow$$
$$Ty(e),\ Fo(Zhangsan')$$

$$?Ty(e \to (e_s \to t))$$

$$Ty(e)$$
$$Fo(\varepsilon,\ v,\ Beidazhe'(v))$$

$$Ty(e \to (e \to (e_s \to t))),$$
$$Fo(\lambda y \lambda x \lambda t Zhan'(t,\ x,\ y)),\ [\downarrow]\bot$$
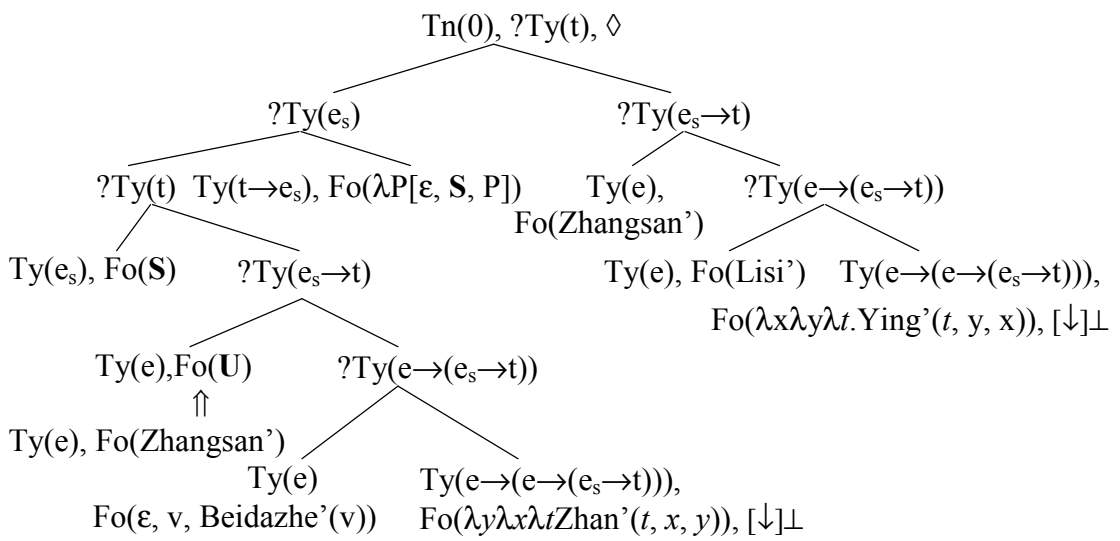
Fig-6.14

6.3.2.5 Constructing Pattern-5

Pattern 5: $V_1[NP_L]\ \&V_2[NP_L,\ NP_R]$

Zhangsan zou-jin-le   woshi.

walk-enter-PFT bedroom

'Zhangsan walked into the bedroom.'

THE MAJOR PARSING ACTIONS:

---

[40] This expression means 'the hitted'.

- The unfixed node Merges with the external argument on the resultative propositional template.

- The internal argument node on the resultative propositional template receives a formula through the standard α-actions.

- The only individual argument node on the first propositional template receives a formula through Metavariable Insertion and Substitution.

- **S** is instantiated by s.

Fo(Jin'((ε, s, Zou'(s, Zhangsan')), Zhangsan', Woshi')), Ty(t).

THE PRE-COMPLETION PARTIAL TREE:

(6.35) Parsing *Zhangsan zou-jin-le woshi*.

$$\text{Tn(0), ?Ty(t), } \Diamond$$

$$?Ty(e_s) \qquad\qquad ?Ty(e_s \to t)$$

$$?Ty(t) \quad Ty(t\to e_s), Fo(\lambda P[\varepsilon, \mathbf{S}, P]) \quad Ty(e), \qquad\qquad ?Ty(e\to(e_s\to t))$$

$$Fo(Zhangsan')$$

$$Ty(e_s), Fo(\mathbf{S}) \quad ?Ty(e_s\to t) \qquad\qquad Ty(e), Fo(Woshi')$$

$$Fo(\lambda x\lambda y\lambda t.Jin'(t, y, x)),$$

$$Ty(e), Fo(\mathbf{U}) \quad Ty(e\to(e_s\to t)), \qquad\qquad Ty(e\to(e\to(e_s\to t))), [\downarrow]\bot$$

$$\Uparrow \qquad\qquad Fo(\lambda z\lambda t. Zou'(t, z))$$

$$Ty(e), Fo(Zhangsan')$$
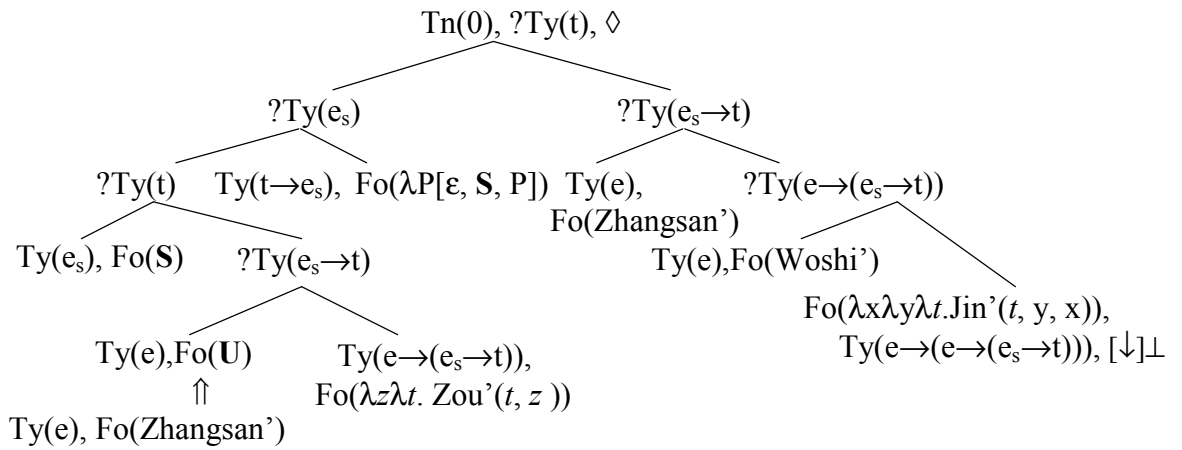
Fig-6.15

6.3.2.6 Constructing Pattern-6

Pattern-6:   V₁[NP_R] & V₁[NP_L, NP_R]

Zhangsan jia   pao-diu- le yi-tou lü.

           home run-lose-PFT one-CL donkey

'Zhangsan's lost a donkey who ran (randomly).'

Pattern-6 of RVC deserves special attention in that it is wrongly ruled out by previous theories, as is shown in the literature review of this chapter.

THE MAJOR PARSING STEPS:

♦ The internal argument node on the resultative propositional template receives a formula through the standard α-actions.

♦ The external argument node on the resultative propositional template obtains a formula through Merging with the unfixed node.

♦ The formula on the internal argument node of the resultative propositional template is copied onto the only individual argument node on the first propositional template.

♦ **S** is instantiated by s.

THE OUTPUT:

Fo(Diu'((ε, s, Pao'(s, Lü')), Zhangsan_jia', Lü')), Ty(t).

THE PRE-COMPLETION PARTIAL TREE

(6.36) Parsing *Zhangsanjia pao-diu-le yi-tou lü*.

$$\text{Tn}(0), \ ?\text{Ty}(t), \Diamond$$

$$?\text{Ty}(e_s) \qquad\qquad ?\text{Ty}(e_s{\rightarrow}t)$$

$$?\text{Ty}(t) \quad \text{Ty}(t{\rightarrow}e_s), \text{Fo}(\lambda P[\varepsilon, \mathbf{S}, P]) \quad \text{Ty}(e) \qquad ?\text{Ty}(e{\rightarrow}(e_s{\rightarrow}t))$$
$$\text{Fo(Zhangsan\_jia')}$$

$$\text{Ty}(e_s), \text{Fo}(\mathbf{S}) \quad ?\text{Ty}(e_s{\rightarrow}t) \qquad\qquad\qquad \text{Ty}(e),$$
$$\text{Fo}(\varepsilon, w, \text{Lü'}(w))$$

$$\text{Ty}(e), \text{Fo}(\mathbf{V}) \qquad \text{Ty}(e{\rightarrow}(e_s{\rightarrow}t)), \qquad\qquad \text{Ty}(e{\rightarrow}(e{\rightarrow}(e_s{\rightarrow}t))),$$
$$\Uparrow \qquad\qquad \text{Fo}(\lambda z\lambda t.\text{Pao'}(t, z)), [\downarrow]\bot \qquad \text{Fo}(\lambda x\lambda y\lambda t.\text{Pao'}(t, y, x)), [\downarrow]\bot$$
$$\text{Ty}(e), \text{Fo}(\varepsilon, w, \text{Lü'}(w))$$
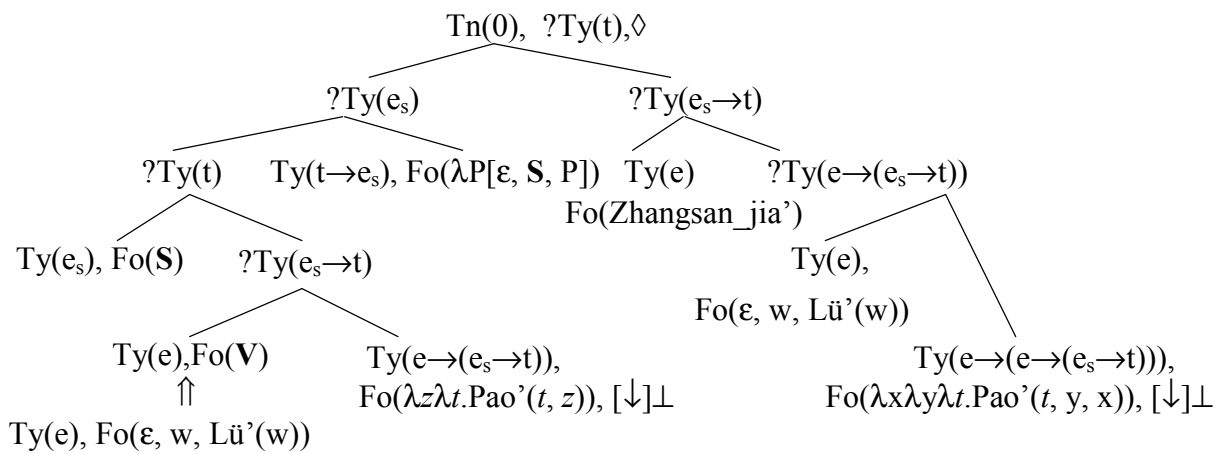
Fig-6.16

6.3.2.7 Constructing Pattern-7

Pattern-7 V₁[NP_R] & V₂[NP_L]

Keting   liu-man-le   zangshui.

living-room flow-full-PFT dirty.water

'The living room was full of dirty water which flew.'

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THE MAJOR PARSING STEPS:

♦ The unfixed argument node Merges with the argument node on the resultative template.

♦ The individual argument node of the first propositional template receives a formula through the standard α-actions.

♦ **S** is instantiated by s.

THE OUTPUT:

Fo(Man'((ε, s, Liu'(s, Zangshui')), Keting')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE :

(6.37)   Parsing *Keting liu-man-le zangshui*

Tn(0), Ty(t),◊

?Ty(e_s)   ?Ty(e_s→t)

?Ty(t)   (t→e_s), Fo(λP[ε, **S**, P])   Ty(e)   Ty(e→(e_s→t)),
                                            Fo(Keting')   Fo(λyλ*t*.Man'(*t*, y)), [↓]⊥

Ty(e_s), Fo(**S**)   ?Ty(e_s→t)

Ty(e),   Ty(e→(e_s→t)),
Fo(Zangshui')   Fo(λ*z*λ*t*.Liu'(*t*, *z*)), [↓]⊥
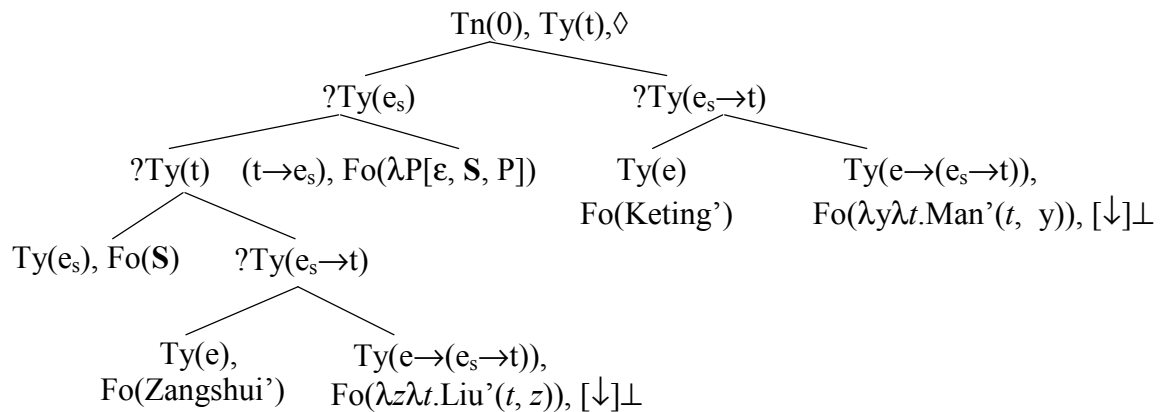
Fig-6.17

In Y. Li's (1990, 1991, 1993, 1995) theory, it is assumed that the argument of V_1 is always thematically more prominent than the argument of V_2 and the argument of V_1 cannot appear as the object, which wrongly rules out Pattern-7. In the current account, this pattern is constructed through the same parsing mechanisms as other patterns.

6.3.2.8 Constructing Pattern-8

Pattern-8: V_1[NP$_L$] & V_2 [NP$_R$]

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Zhangsan shui-zhong- le   yanjing.

sleep-swollen-PFT eye

'Zhangsan slept (too much) and his eyes got swollen.'

THE MAJOR PARSING STEPS:

♦   The unfixed argument node Merges with the argument node on the first propositional template.

♦   The individual argument node of the resultative propositional template receives a formula through the standard α-actions.

♦   **S** is instantiated by s.

THE OUTPUT:

Fo(Zhong'((ε, s, Shui'(s, Zhangsan')), Yanjing')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE

(6.38) Parsing *Zhangsan shui-zhong-le yanjing*.

$$Tn(0), ?Ty(t), \Diamond$$

$?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

$?Ty(t)$ $Ty(t \rightarrow e_s), Fo(\lambda P[\varepsilon, \mathbf{S}, P])$ $Ty(e),$ $Ty(e \rightarrow (e_s \rightarrow t))$
                                          $Fo(Yanjing')$ $Fo(\lambda y \lambda t.Zhong'(t, y)), [\downarrow]\bot$

$Ty(e_s), Fo(\mathbf{S})$ $?Ty(e_s \rightarrow t)$

$Ty(e), Fo(Zhangsan')$ $Ty(e \rightarrow (e_s \rightarrow t)),$
                          $Fo(\lambda y \lambda t.Shui'(t, y)), [\downarrow]\bot$
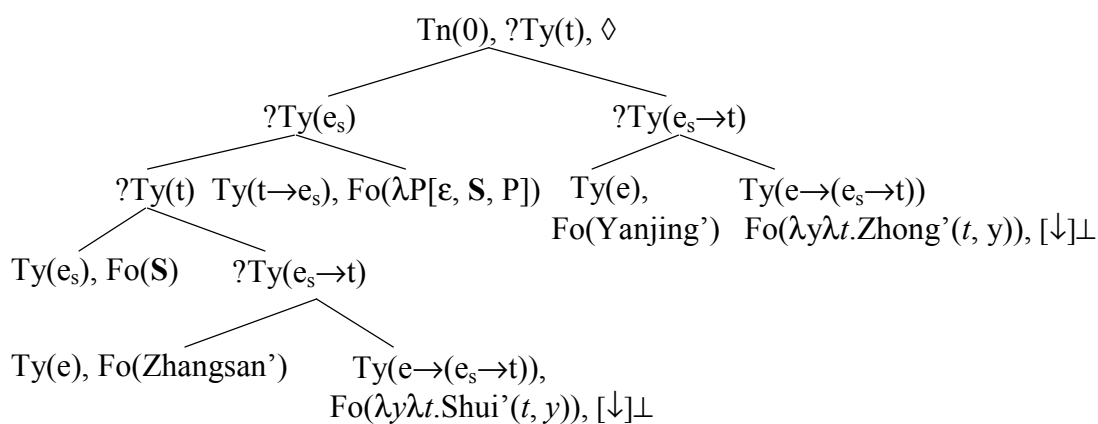
Fig-6.18

6.3.2.9 Constructing Pattern-9

Pattern-9 $V_1[NP_L, \varphi]$ & $V_2[NP_R]$

Chi (Zhangsan, x) & Zang(Zuiba)

Zhangsan chi-sang-le zuiba.

eat-dirty-PFT mouth

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'Zhangsan ate (something) and his mouth got dirty.'

the major parsing steps:

- ◆ The only individual argument node on the resultative propositional template obtains a formula through the standard α-actions.

- ◆ The unfixed argument node Merges with the external argument node on the first propositional template.

- ◆ The requirement at the internal argument node on the first propositional template is satisfied through Thematic Abduction.

- ◆ **S** is instantiated by s.

THE OUTPUT:

$$\text{Fo(Zang'}((\epsilon, s, \text{Chi'}(s, \text{Zhangsan'}, (\epsilon, v, \text{Shiwu}^{41}{}'(v)))), \text{Zuiba'})), \text{Ty}(t)$$

THE PRE-COMPLETION PARTIAL TREE

(6.39) Parsing *Zhangsan chi-zang-le zuiba*.
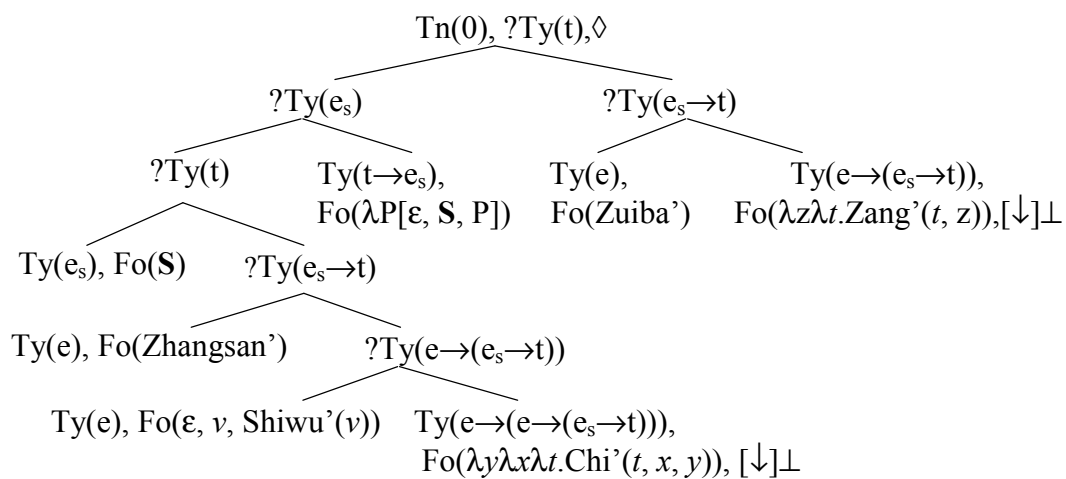
Fig-6.19

6.3.2.10 Constructing Pattern-10

Pattern-10 $V_1[\varphi, NP_L]$ & $V_2[NP_R]$

Xi (x, Yifu) & Zhong (Shouwanzi)

Zhei-jian yifu xi-zhong-le   wode shouwanzi.

this-CL clothes wash-swollen-PFT my   wrist

---

[41] The expression means 'food'.

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'This item of clothes was washed and my wrist got swollen.'

THE MAJOR PARSING STEPS:

- ◆ The only argument on the resultative propositional template receives a formula through the standard α-actions.

- ◆ The unfixed argument node Merges with the internal argument node on the first propositional template.

- ◆ The external argument node on the first propositional template receives a formula through Thematic Abduction.

- ◆ **S** is instantiated by s.

THE OUTPUT:

Fo(Zhong'((ε, s, Xi'(s, (ε, u, Xizhe'[42] (u)), Yifu')), Shouwanzi')) , Ty(t)

THE PRE-COMPLETION PARTIAL TREE:

(6.40) Parsing *Zhei-jian yifu xi-zhong-le wode shou wanzi*.
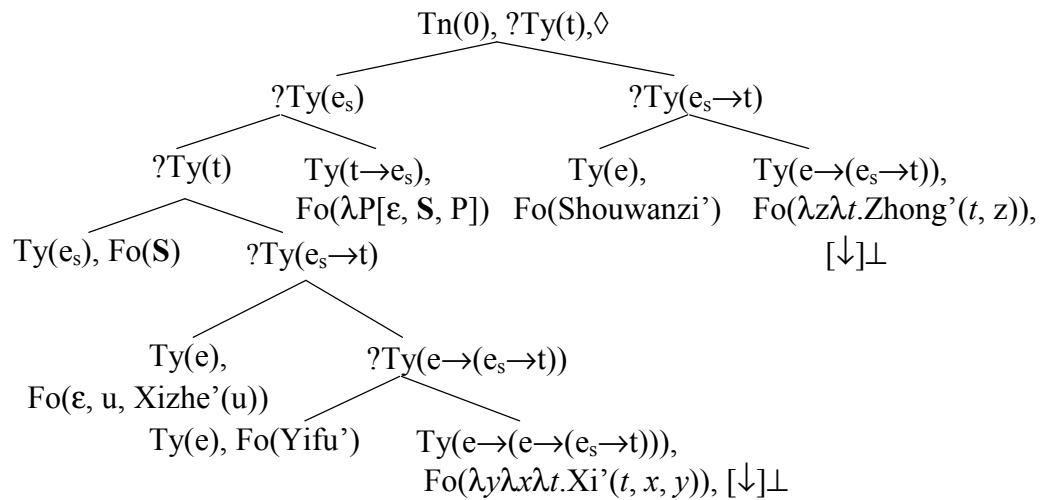
Fig-6.20

I put off the discussion of Pattern-11 to the end of section 6.3 since this naturally leads onto the material of section 6.4 on unattested patterns. Next I present the DS account of Pattern-12

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[42] The expression means 'washer' or 'some person that washes'.

6.3.2.11 Constructing Pattern-12

Pattern-12 $V_1[NP_R, NP_L]$ & $V_2[NP_L, NP_R]$

Xi (Haimian, Shui) & Jin (Shui, Haimian)

Shui   xi-jin-le   haimian.

water absorb-enter-PFT sponge

'The water was absorbed into the sponge.'

THE MAJOR PARSING STEPS:

♦ The external argument on the resultative propositional template Merges with the unfixed argument node.

♦ The internal argument node on the resultative propositional template receives a formula through the standard α-actions.

♦ The formulae of the two arguments of the resultative predicate are copied onto the two individual argument nodes of the first propositional template in an 'inverse way' through Metavariable Insertion and Substitution, which results in the impression of inversion.

♦ **S** is instantiated by s.

THE OUTPUT: Fo(Jin'((ε, s, Xi'(s, Haimian', Shui')), Shui', Haimian')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE (see the next page):

(6.41)   Parsing *Shui xi-jin-le haimian*.

Tn(0), ?Ty(t), ◊

?Ty(e_s)   ?Ty(e_s→t)

?Ty(t) Ty(t→e_s), Fo(λP[ε, **S**, P])   Ty(e),   ?Ty(e→(e_s→t))
                                            Fo(ε, u, Shui'(u))

Ty(e_s), Fo(**S**)   ?Ty(e_s→t))   Ty(e),   Ty(e→(e→(e_s→t))),
                                                               Fo(Haimian') Fo(λxλyλ*t*.Jin'(*t*, y, x)),
                                                                              [↓]⊥
Ty(e),Fo(**U**)   ?Ty(e→(e_s→t))
   ⇑
Ty(e), Ty(e), Fo(**V**)   Ty(e→(e→(e_s→t))),
Fo(Haimian')   ⇑   Fo(λ*y*λ*x*λ*t*.Xi'(*t*, x, *y*)), [↓]⊥
             Ty(e), Fo(Shui')
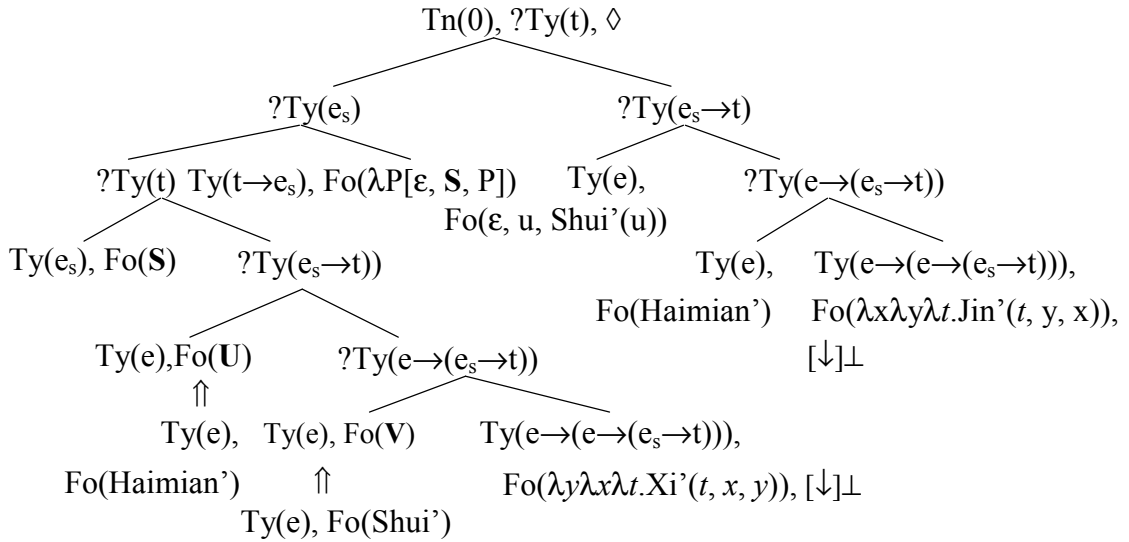
Fig-6.21

6.3.2.12 Constructing Pattern-13

Pattern-13   V₁[ψ, φ] & V₂ [NP_L, NP_R]

Chi[x, y] & Cheng [Xiaomanyao, Shuitongyao]

Xiaomanyao chi-cheng-le   shuitongyao.

thin.wait   eat-become-PFT thick.waist

'A thin waist became a thick waist because of eating.'

THE MAJOR PARSING STEPS:

♦   The unfixed argument node Merges with the external argument node
    on the resultative propositional template.

♦   The internal argument node on the resultative propositional template
    receives a formula through the standard α-actions.

♦   The two individual argument nodes on the first propositional
    template receive two thematic formulae through Thematic Abduction.

♦   **S** is instantiated by s.

THE OUTPUT (see the next page):

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Fo(Cheng'((ε, s, Chi'(s, (ε, u, Shizhe [43] '(u)), (ε, v, Shiwu' [44] (v)))), Shuitongyao', Xiaomanyao')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE:

(6.42) Parsing *Xiaoman yao chi-cheng-le shuitong yao*

$Tn(0)$, ?$Ty(t)$, ◊

?$Ty(e_s)$?$Ty(e_s{\rightarrow}t)$

?$Ty(t)$ $Ty(t{\rightarrow}e_s)$, $Fo(\lambda P[\varepsilon, \mathbf{S}, P])$ $Ty(e)$,   ?$Ty(e{\rightarrow}(e_s{\rightarrow}t))$
                                    $Fo(Xiaomanyao')$

$Ty(e_s)$, $Fo(\mathbf{S})$?$Ty(e_s{\rightarrow}t))$ $Ty(e)$, $Ty(e{\rightarrow}(e{\rightarrow}(e_s{\rightarrow}t)))$,
                                              $Fo(Shuitongyao')$ $Fo(\lambda x\lambda y\lambda t.Cheng'(t, y, x))$,

$Ty(e)$?$Ty(e{\rightarrow}(e_s{\rightarrow}t))$ [↓]⊥
$Fo(\varepsilon, u, Eater'(u)$

$Ty(e)$ $Ty(e{\rightarrow}(e{\rightarrow}(e_s{\rightarrow}t)))$,
$Fo(\varepsilon, v, Shiwu'(v))$ $Fo(\lambda y\lambda x\lambda t.Chi'(t, x, y))$, [↓]⊥
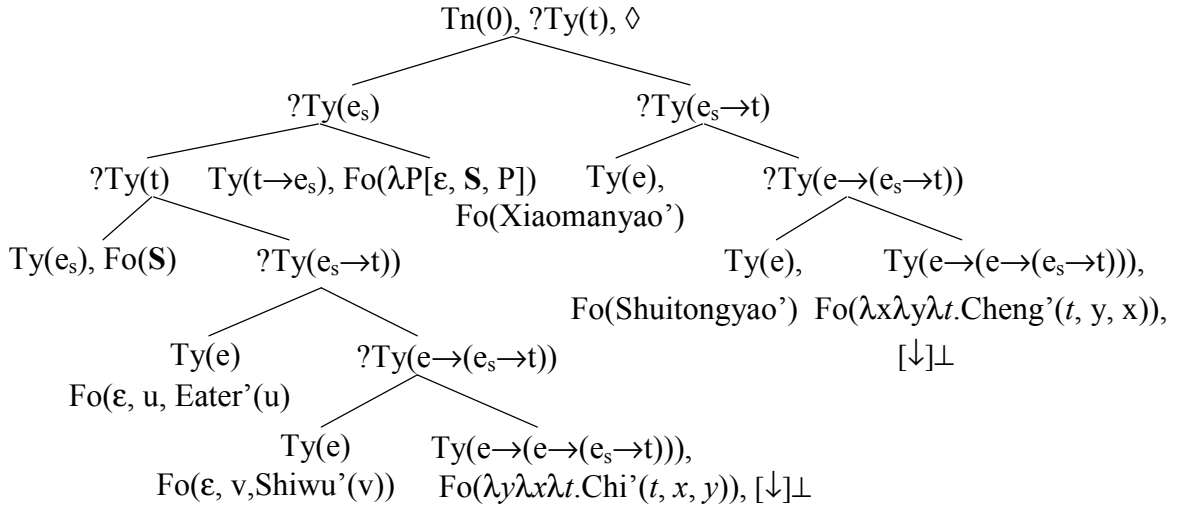
Fig-6.22

6.3.2.13 Constructing Pattern-14

Pattern-14 $V_1[\varphi]$ & V_2 [NP_L, NP_R]

Xiao(x) & Cheng[Dayajing, Xiaomimiyan]

Dayanjing xiao-cheng-le   xiaomimiyan.

big.eye   smile-become-PFT small.eye

'Big eyes became small eyes because of smiling.'

THE MAJOR PARSING STEPS:

♦   The internal argument node and the external argument node on the resultative predicate obtain formulae respectively through Merge and the standard α-actions.

---

[43] The expression means 'eater'.
[44] This expression means 'food'.

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- The only individual argument of the first predicate obtains a thematic role formula through Thematic Abduction.

- **S** is instantiated by s.

THE OUTPUT:

Fo(Cheng' ((ε, s, Xiao'(s, (ε, u, Xiaozhe' [45] (*u*)))), Dayanjing', Xiaomimiyan')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE:

(6.43) Parsing *Da Yanjing xiao-cheng-le xiao mimiyan*.
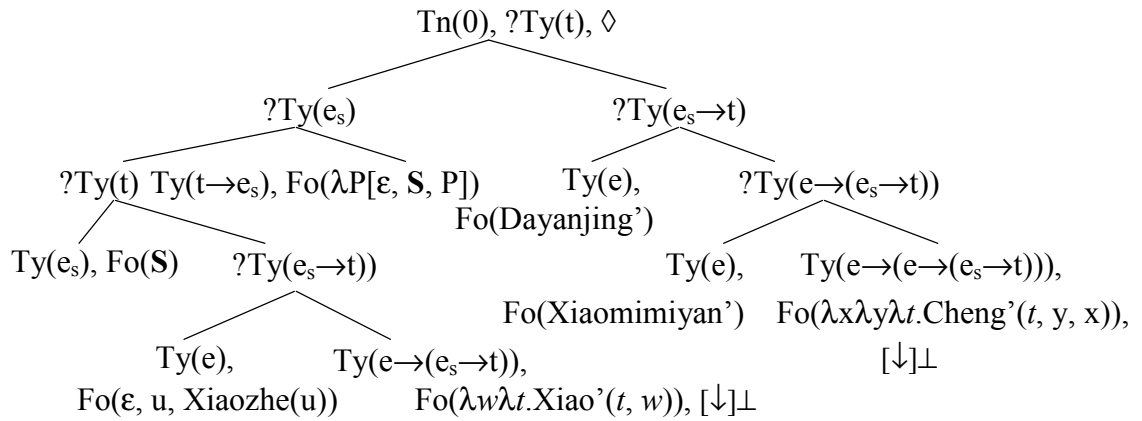
Fig-6.23

6.3.2.14 Constructing Pattern-15

Pattern-15 $V_1[\varphi, NP_L]$ & $V_2[NP_L, NP_R]$

Mo[x,Tiebang] & Cheng[Tiebang, Xiuhuazhen]

Tiebang   mo-cheng-le   xiuhuazhen.

iron.piece grind-become-PFT needle

'The iron is ground and became a needle.'

---

[45] This expression means 'smiler'.

THE MAJOR PARSING STEPS:

- ◆ The internal argument node on the resultative propositional template obtains a formula through the standard α-actions.

- ◆ The unfixed node Merges with the external argument node of the resultative propositional template.

- ◆ The internal argument node of the first propositional template receives the formula through Metavariable Insertion and Substitution.

- ◆ The external argument node on the first propositional template receives a formula through Thematic Abduction

- ◆ **S** is instantiated by s.

THE OUTPUT

Fo(Cheng'((ε, s, Mo'(s, (ε, u, Mozhe'[46](u)), (Xiuhuazhen'))), Tiebang', Xiuhuazhen')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE (see next page):

(6.44)   Parsing *tiebang mo-cheng-le xiuhuazhen*.
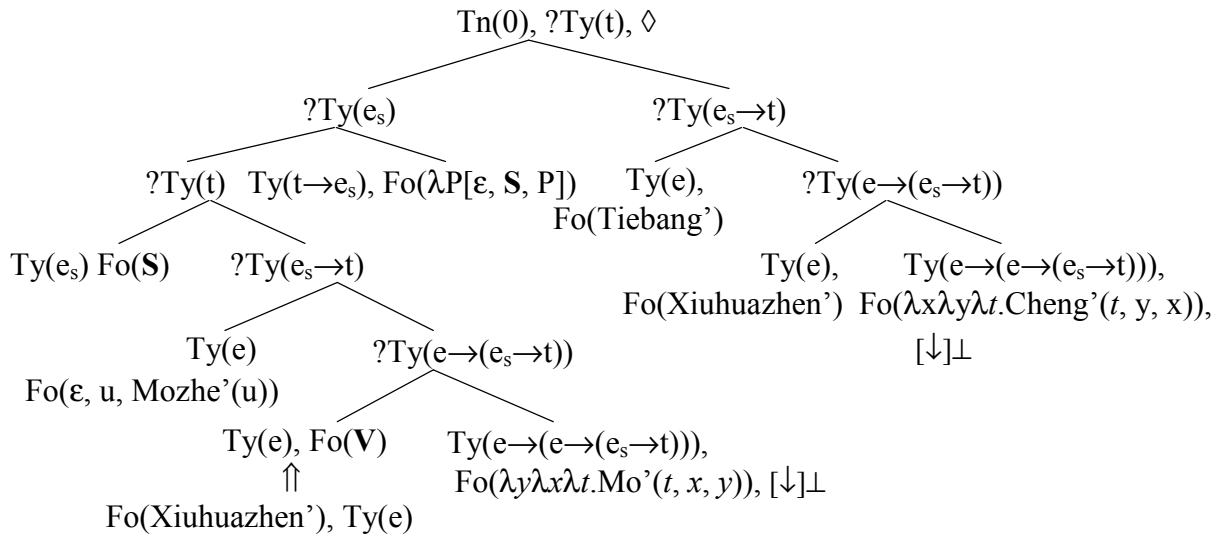
Fig-6.24

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[46] This expression means 'grinder'.

6.3.2.15 Constructing Pattern-16

Pattern-16 $V_1[\varphi, NP_R]$ & $V_2[NP_L]$

Dao(x, Laji) & Man'(Guangchang)

Guangchang dao-man-le   laji.

square   dump-full-PFT garbage

'A lot of garbage was dumped and the square was full.'

THE MAJOR PARSING STEPS:

♦   The unfixed argument node Merges with the only individual argument node on the resultative propositional template.

♦   The internal argument node on the first propositional template obtains a formula through the standard α-actions.

♦   The external argument node on the first propositional template obtains a contentful formula through Thematic Abduction.

♦   **S** is instantiated by s.

THE OUTPUT:

Fo(Man'((ε, s, Dao'(s, (ε, u, Daozhe'[47](u)), (Laji'))), Guangchang')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE:

(6.45) Parsing *Guangchang dao-man-le laji*.

$$Tn(0), ?Ty(t), \Diamond$$

$?Ty(e_s)$ $?Ty(e_s \to t)$

$?Ty(t)$ $Ty(t \to e_s)$, $Fo(\lambda P[\varepsilon, \mathbf{S}, P])$ $Ty(e)$, $Ty(e \to (e_s \to t))$,
                                          $Fo(Guangchang')$ $Fo(\lambda y \lambda t.Man'(t, y))$, $[\downarrow]\bot$

$Ty(e)$, $Fo(\mathbf{S})$ $?Ty(e_s \to t))$

$Ty(e)$ $?Ty(e \to (e_s \to t))$
$Fo(\varepsilon, u, Daozhe'(u))$

$Ty(e)$, $Ty(e \to (e \to (e_s \to t)))$,
$Fo (Laji')$ $Fo(\lambda y \lambda x \lambda t.Dao'(t, x, y))$, $[\downarrow]\bot$
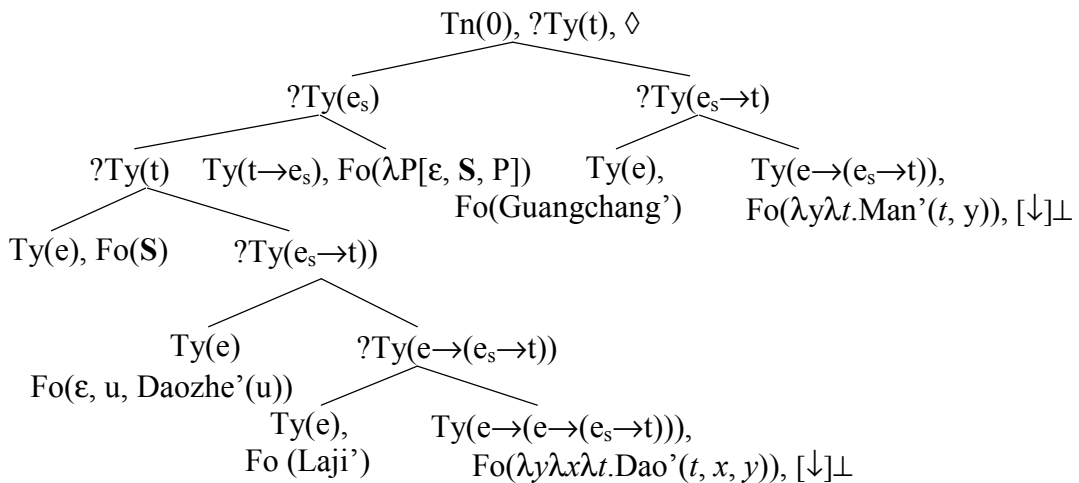
Fig-6.25

---

[47] The expression means 'dumper'.

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6.3.2.16 Constructing Pattern-17

Pattern-17 $V_1[\varphi, NP_R]$ & $V_2[NP_L, NP_R]$

Gai(x, Fangzi) & Cheng (Tudi, Fangzi)

Suoyou-de tudi dou gai-cheng-le   fangzi.

all   land all   build-become-PFT house

'All land became houses through building.'

THE MAJOR PARSING STEPS:

♦ The unfixed node Merges with the external argument node on the resultative propositional template. The internal argument node on the resultative propositional template obtains a formula through the standard α-actions.

♦ The internal argument on the first propositional template obtains a formula through Metavariable Insertion and Substitution. The external argument on the first propositional template obtains a formula through Thematic Abduction.

♦ **S** is instantiated by s.

THE OUTPUT:

Fo(Cheng'((ε, s, Gai(s, (ε, u, Gaizhe'[48](u)), Fangzi')), Tudi', Fangzi')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE (see the next page):

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[48] The expression Gaizhe' means 'builder'.

(6.46) Parsing *Tudi gai-cheng-le fangzi*.

$$Tn(0), ?Ty(t), \lozenge$$

```
                        Tn(0), ?Ty(t), ◊
                    ┌──────────────┴──────────────┐
                ?Ty(eₛ)                        ?Ty(eₛ→t)
          ┌────────┴────────┐            ┌────────┴────────┐
      ?Ty(t)  Ty(t→eₛ), Fo(λP[ε,S, P])  Ty(e),      ?Ty(e→(eₛ→t))
     ┌────┴────┐                        Fo(Tudi')  ┌──────┴──────┐
  Ty(eₛ) Fo(S)  ?Ty(eₛ→t)              Ty(e), Fo(Fangzi')  Ty(e→(e→(eₛ→t))),
             ┌──────┴──────┐                            Fo(λxλyλt.Chen'(t, y, x)), [↓]⊥
          Ty(e)       ?Ty(e→(eₛ→t))
       Fo(ε, u, Gaizhe'(u))  ┌──────┴──────┐
                        Ty(e), Fo(V)  Ty(e→(e→(eₛ→t))),
                            ⇑        Fo(λyλxλt.Gai'(t, x, y)), [↓]⊥
                      Fo(Fangzi'), Ty(e)
```
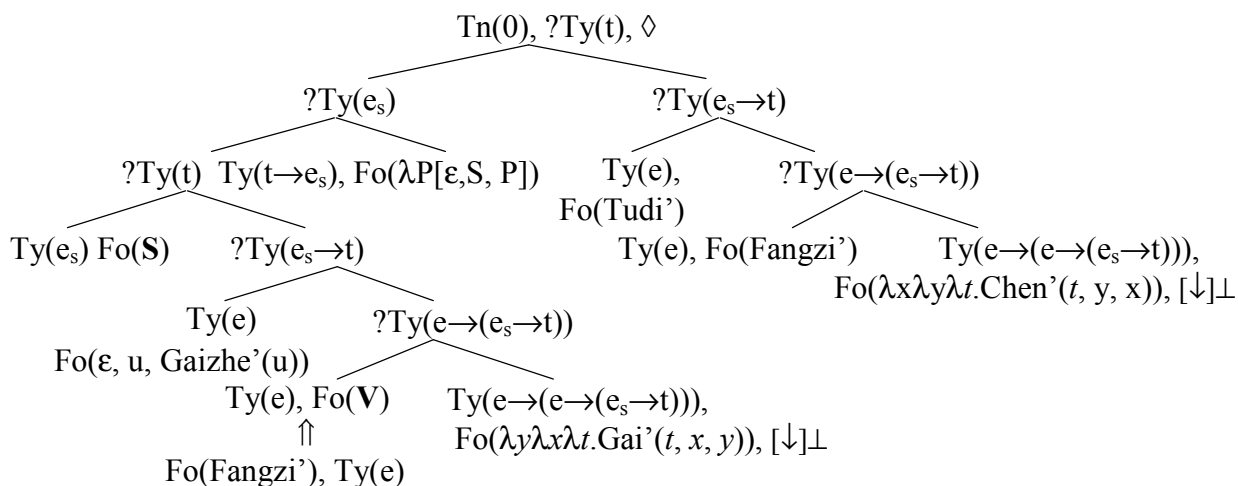
Fig-6.26

6.3.2.17 Constructing Pattern-18

Pattern-18 $V_1[NP_R, \varphi]$ & $V_2[NP_L, NP_R]$

Kao[daxuesheng, x] & Chu' (Jiating, daxuesheng)

Pinkun jiating kao-chu   san-ge daxuesheng.

poor   family test-produce three-CL college.student

'The poor family contributed three college students through (students') attending examination.'

THE MAJOR PARSING STEPS:

♦ The internal argument node and the external argument on the resultative propositional template obtain formulae respectively through the standard α-actions and Merge.

♦ The external argument node on the first propositional template obtains a formula through Metavariable Insertion and Substitution; the internal argument node on the first propositional template receives a formula through Thematic Abduction.

♦ S is instantiated by s.

THE OUTPUT:

Fo(Chu'((ε, s, Kao'(s, Daxuesheng', (ε, v, Kemu'[49] (v)))), Pinkun_jiating', Daxuesheng'), Ty(t)

THE PRE-COMPLETION PARTIAL TREE (see the next page):

(6.47) Parsing *Pinkun jiating kao-chu-le san-ge daxuesheng*.

Tn(0), ?Ty(t), ◊

?Ty(e$_s$)   ?Ty(e$_s$→t)

?Ty(t) Ty(t→e$_s$), Fo(λP[ε, **S**, P])   Ty(e),   ?Ty(e→(e$_s$→t))
                                    Fo(Pinkun_jiatiing')

Ty(e$_s$) Fo(**S**)   ?Ty(e$_s$→t)   Ty(e),   Ty(e→(e→(e$_s$→t))),
                                              Fo(Daxuesheng')   Fo(λxλyλ*t*.Chu'(*t*, y, x)), [↓]⊥

Ty(e), Fo(**U**)   ?Ty(e→(e$_s$→t))
  ⇑
Fo(Daxuesheng'), Ty(e)
              Ty(e),   Ty(e→(e→(e$_s$→t))),
          Fo(ε, v, Kemu' (v))   Fo(λ*y*λ*x*λ*t*.Kao'(*t*, *x*, *y*)), [↓]⊥
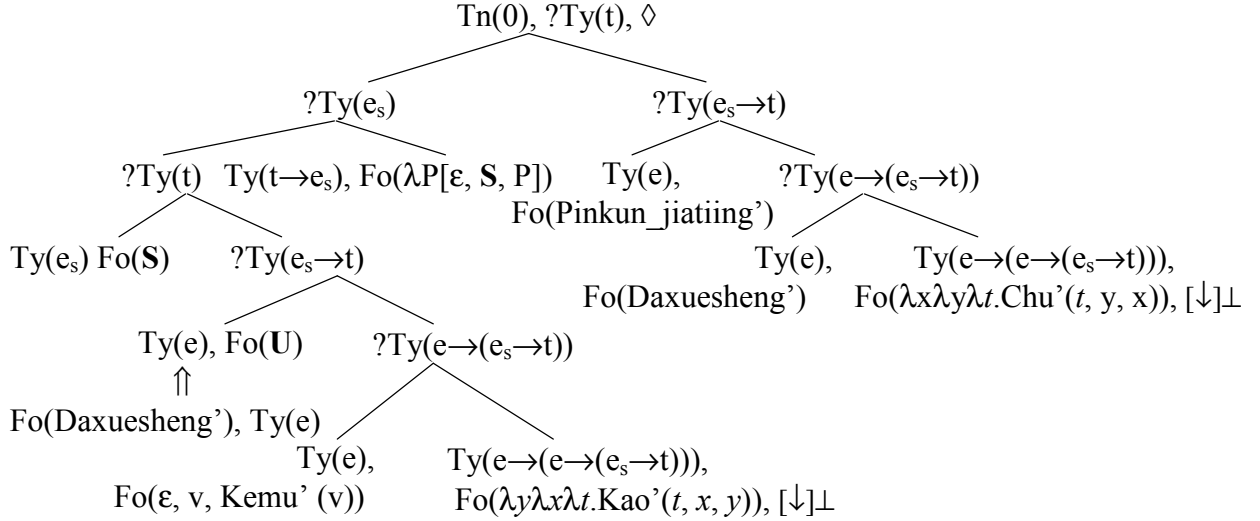
Fig-6.27

6.3.2.18 Constructing Pattern-11

Now I return to Pattern-11 which has not been treated because the ambiguity of the exemplar.

Pattern 11   V$_1$[NP$_R$, NP$_L$] & V$_2$[NP$_R$]   {inverse argument realization of V$_1$}

Zhangsan zhui-lei-le Lisi.

chase-tired-PFT

'Lisi chased Zhangsan and Lisi got tired.'

THE MAJOR PARSING STEPS:

♦   The only individual argument node on the resultative propositional template receives a formula through the standard α-action.

---

[49] This expression means 'subject'.

- The external argument node on the first propositional template receives a formula through Metavariable Insertion and Substitution

- The unfixed argument node Merges with the internal argument node on the first propositional template.

- **S** is instantiated by s.

THE OUTPUT:

Fo(Lei'((ε, s, Zhui' (s, Lisi' Zhangsan')), Lisi')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE:

(6.48) a.   Parsing *Zhangsan zhui-lei-le Lisi*

$$Tn(0), ?Ty(t), \Diamond$$

$?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

$?Ty(t)$ $Ty(t \rightarrow e_s)$, $Ty(e)$, $Ty(e \rightarrow (e_s \rightarrow t))$,
                $Fo(\lambda P[\varepsilon, \mathbf{S}, P])$ $Fo(Lisi')$ $Fo(\lambda z \lambda t.Lei'(t, z))$, $[\downarrow]\bot$

$Ty(e_s), Fo(\mathbf{S})$ $?Ty(e_s \rightarrow t)$

$Ty(e), Fo(\mathbf{U})$ $?Ty(e \rightarrow (e_s \rightarrow t))$
$\Uparrow$
$Ty(e), Fo(Lisi')$

$Ty(e)$, $Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t)))$,
$Fo(Zhangsan')$ $Fo(\lambda y \lambda x \lambda t.Zhui'(t, x, y))$, $[\downarrow]\bot$
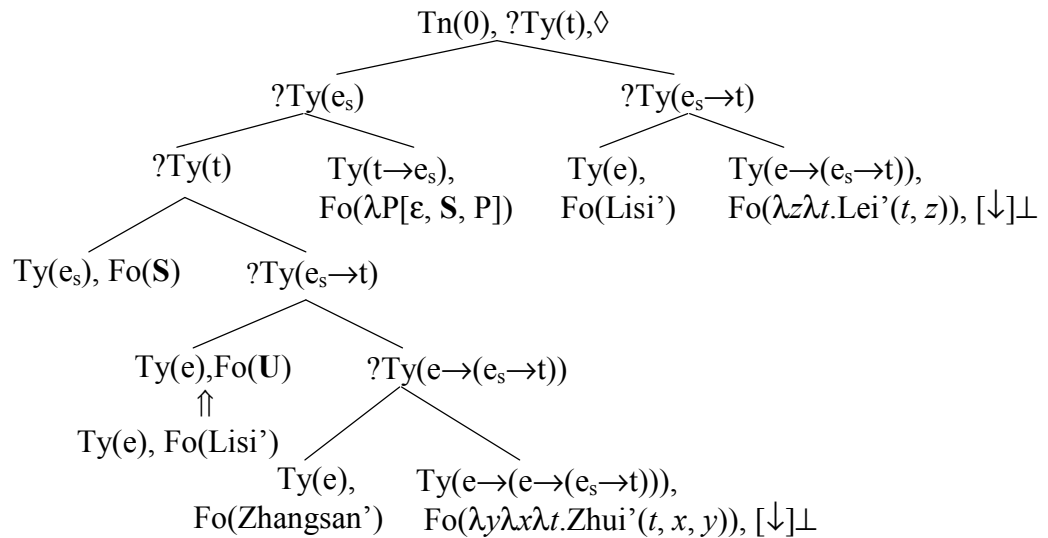
Fig-6.28

The example is three-way ambiguous. A second reading can be achieved if the sentence is parsed in the following way:

- The unfixed argument node Merges with the external argument node on the first propositional template.

- The individual argument node on the resultative propositional template receives a formula through the standard α-actions.

- The internal argument node on the first propositional template receives a formula through Metavariable Insertion and Substitution.

- **S** is instantiated by s.

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THE OUTPUT:

Fo(Lei'((ε, s, Zhui' (s, Zhangsan', Lisi')), Lisi')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE

(6.48)   b.   Parsing *Zhangsan zhui-lei-le Lisi*.
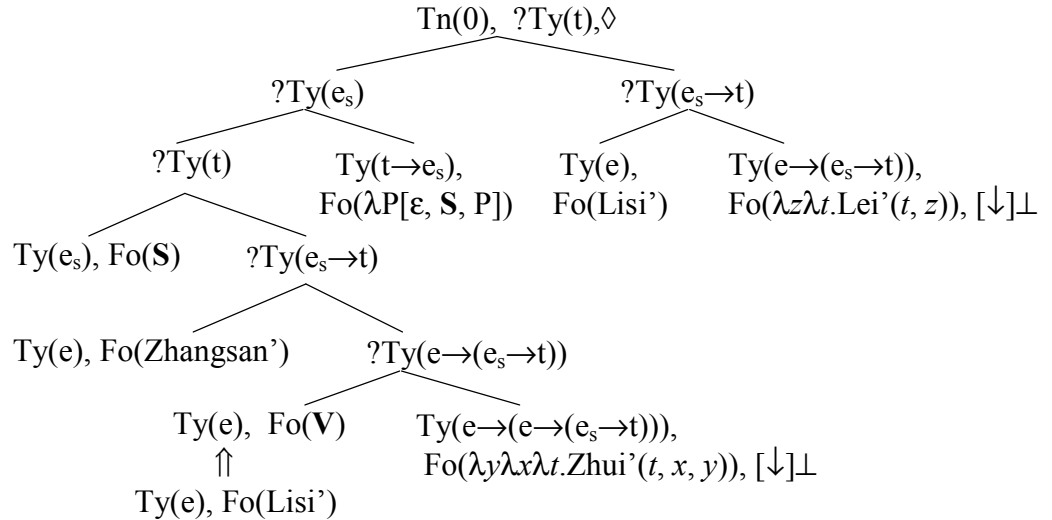
Fig-6.29

A third reading can be derived if the sentence is parsed in the following way.

- ♦ The unfixed node Merges the only individual argument node of the resultative propositional template.

- ♦ The internal argument node on the first propositional template receives a formula through the standard α-actions.

- ♦ The external argument node on the first propositional template obtains the formula through Metavariable Insertion and Substitution.

- ♦ **S** is instantiated by s.

THE OUTPUT:

Fo(Lei'((ε, s, Zhui' (s, Zhangsan', Lisi')), Zhangsan')), Ty(t)

THE PRE-COMPLETION PARTIAL TREE (see the next page):

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(6.48) c. *Zhangsan zhui-lei-le Lisi*

Tn(0), ?Ty(t),◊

?Ty(e_s)   ?Ty(e_s→t)

?Ty(t)   Ty(t→e_s),   Ty(e),   Ty(e→(e_s→t)),
          Fo(λP[ε, **S**, P]) Fo(Zhangsan') Fo(λzλt.Lei'(t, z)), [↓]⊥

Ty(e_s), Fo(**S**)   ?Ty(e_s→t)

Ty(e), Fo(**U**)   ?Ty(e→(e_s→t))
  ⇑
Ty(e), Fo(Zhangsan')

                 Ty(e),   Ty(e→(e→(e_s→t))),
                 Fo(Lisi')   Fo(λyλxλt.Zhui'(t, x, y)), [↓]⊥
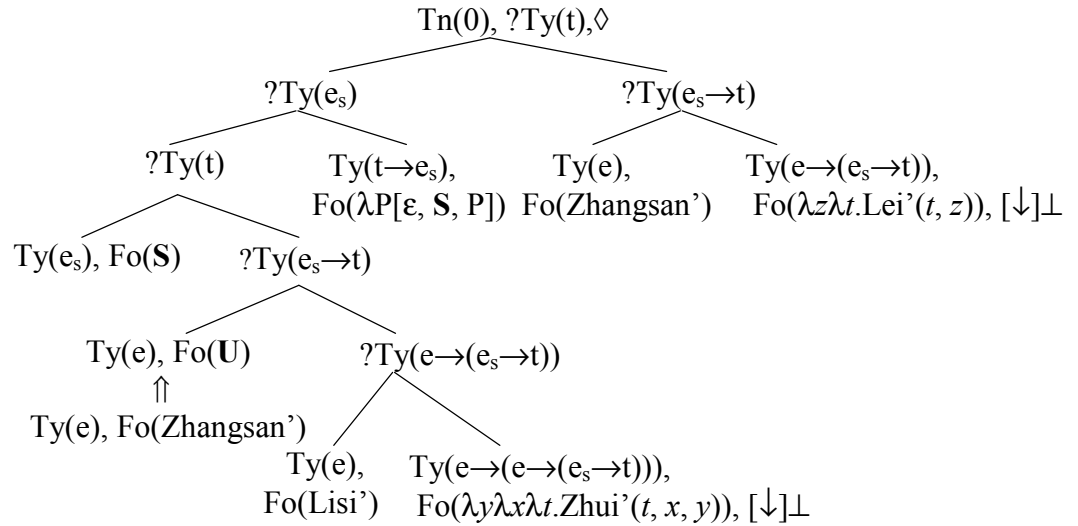
Fig-6.30

The current theory cannot only account for the three-way ambiguity of the exemplary sentence at issue but also the unavailable reading *Lisi chased Zhangsan and Zhangsan got tired* (No. 16. V_1 [NP_R, NP_L] & V_2 [NP_L]). For such a reading to arise, the following parsing steps must be taken:

♦ The unfixed argument node must Merge with the only argument node on the resultative propositional template.

♦ The external argument node on the first propositional template must obtain a formula through the standard α-actions.

However, an external argument cannot directly trigger the standard α-actions. The illicit pre-completion partial tree is given below, where the greyness of Ty(e), Fo(Lisi') indicates that it is impossible that this expression appear in this position.

(6.48)   d.   Parsing *Zhangsan zhui-lei-le Lisi*

$Tn(0), ?Ty(t), \Diamond$

$?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

$?Ty(t)$ $Ty(t \rightarrow e_s),$ $Ty(e),$ $Ty(e \rightarrow (e_s \rightarrow t)),$
$Fo(\lambda P[\varepsilon, \mathbf{S}, P])$ $Fo(Zhangsan')$ $Fo(\lambda z \lambda t. Lei'(t, z)), [\downarrow]\bot$

$Ty(e_s), Fo(\mathbf{S})$ $?Ty(e_s \rightarrow t)$

$Ty(e), Fo(Lisi')$ $?Ty(e \rightarrow (e_s \rightarrow t))$

$Ty(e), Fo(\mathbf{V})$ $Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t))),$
$\Uparrow$ $Fo(\lambda y \lambda x \lambda t. Zhui'(t, x, y)), [\downarrow]\bot$
$Ty(e), Fo(Zhangsan')$
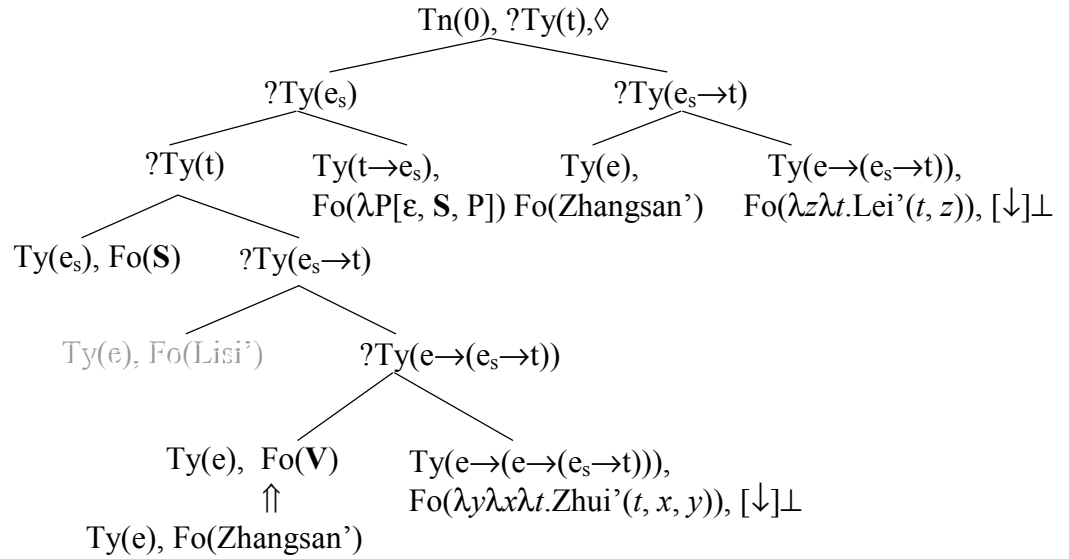
Fig-6.31

Thus, the inverse argument realization pattern, the ambiguity, and the so-called unavailable reading of the exemplar are accounted for uniformly. What deserves our attention is that the unavailable reading discussed above is one of many unattested patterns of argument realization in RVC. In the next section, I will turn attention to those unattested patterns, and make an explanation of their unattestedness in the light of the current theory.

6.4 Unattested Patterns

The unattested patterns are classified into two types. The first type is ruled out by the standard α-actions. The second type is ruled out by Thematic Abduction. In addition, some examples that fall into certain grammatically possible patterns may be found unacceptable; this kind of unacceptability is usually caused by pragmatic infelicity. In this section, I discuss the two types of unattested patterns. I will discuss the third situation in the next section.

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If a pattern requires an external argument node to receive a formula through direct lexical input, i.e. the standard α-actions, this pattern is excluded because the standard α-actions cannot be induced by ?Ty(e) on this node. The patterns of this kind are given below.

NO.	ATB	PATTERN	NO.	ATB	PATTERN
4	*	$V_1[NP_L]$ & $V_2[NP_R, NP_L]$	34	*	$V_1[NP_R, NP_L]$ & $V_2[NP_R, \varphi]$
6	*	$V_1[NP_R]$ & $V_1[NP_R, NP_L]$	36	*	$V_1[NP_R, NP_L]$ & $V_2[\psi, \varphi]$
8	*	$V_1[NP_L]$ & $V_2[NP_R, \varphi]$	38	*	$V_1[NP_L, \varphi]$ & $V_2[NP_R, NP_L]$
12	*	$V_1[\varphi]$ & $V_2[NP_R, NP_L]$	39	*	$V_1[NP_L, \varphi]$ & $V_2[NP_R, \psi]$
16	*	$V_1[NP_R, NP_L]$ & $V_2[NP_L]$	42	*	$V_1[\varphi, NP_L]$ & $V_2[NP_R, NP_L]$
18	*	$V_1[NP_R, NP_L]$ & $V_2[\varphi]$	44	*	$V_1[\varphi, \psi]$ & $V_2[NP_R, NP_L]$
21	*	$V_1[NP_R, \varphi]$ & $V_2[NP_L]$	45	*	$V_1[\varphi, NP_L]$ & $V_2[NP_R, \psi]$
24	*	$V_1[NP_L, NP_R]$ & $V_2[NP_R, NP_L]$	48	*	$V_1[NP_R, \varphi]$ & $V_2[NP_R, NP_L]$
28	*	$V_1[NP_L, NP_R]$ & $V_2[NP_R, \varphi]$	49	*	$V_1[NP_R, \varphi]$ & $V_2[NP_L, \psi]$
32	*	$V_1[NP_R, NP_L]$ & $V_2[NP_L, \varphi]$	50	*	$V_1[NP_R, \varphi]$ & $V_2[\psi, NP_L]$
33	*	$V_1[NP_R, NP_L]$ & $V_2[\varphi, NP_L]$	52	*	$V_1[\varphi, NP_R]$ & $V_2[NP_R, NP_L]$

Table-6.1

But No. 24, No. 28 and No. 52 need to be elaborated. At first sight, the three patterns seem to be able to arise if we assume that the internal argument node on the first propositional template obtains a formula through the standard α-actions, which is grammatically allowable, and this formula is copied (through Metavariable Insertion and Substitution) onto the external argument of the resultative propositional template. Why cannot these actions happen? The answer goes as follows:

We have assumed that the pointer appears at the lowest argument node on the resultative propositional template as this template is constructed through the parse of V_2. The pointer can only move upward step by step as the requirements on this

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template are satisfied one by one. Therefore, the pointer arrives at the external argument node on the resultative propositional template much earlier than it appears somewhere on the first propositional template, which means that when a Metavariable is inserted on the former node, the internal argument node on the first propositional template has not yet received any formula through direct lexical input. Hence, it is impossible for No.24, No. 28 and No.52 to arise. The exclusion of these patterns is schematically demonstrated below.
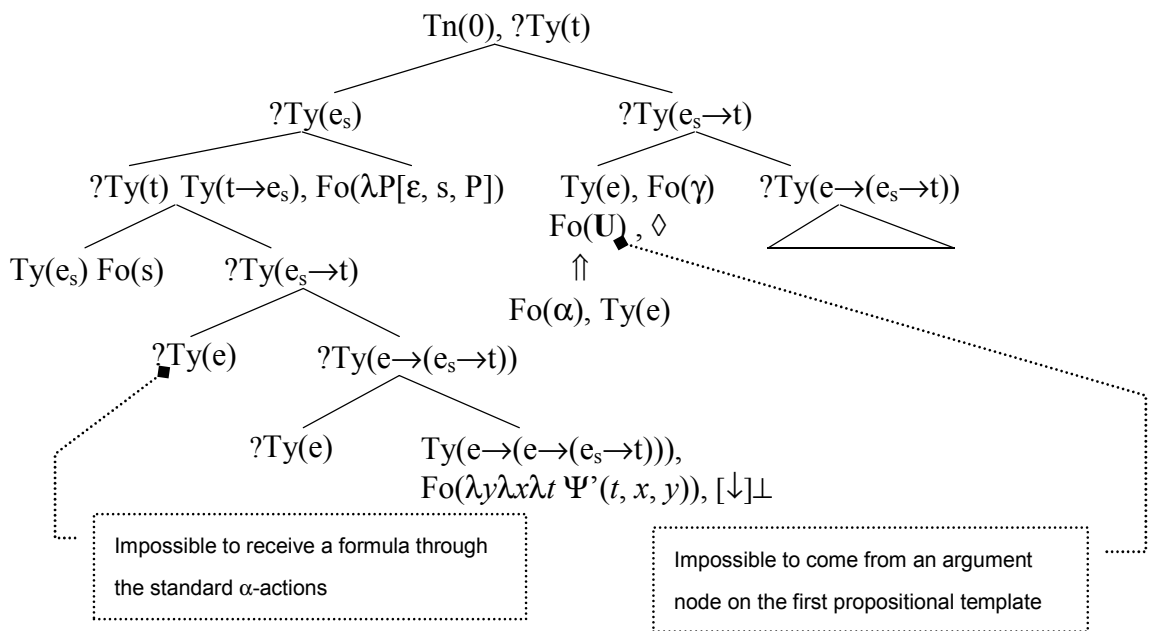
Fig-6.32

Since Thematic Abduction applies only to an argument node on a propositional template that is dominated by an event argument node, the following patterns where the Greek letters represent unrealized arguments are excluded as well.

NO.	ATB	PATTERN	NO.	ATB	PATTERN
7	*	$V_1[NP_L]$ & $V_2[\varphi, NP_R]$	28	*	$V_1[NP_L, NP_R]$ & $V_2[NP_R, \varphi]$
8	*	$V_1[NP_L]$ & $V_2[NP_R, \varphi]$	29	*	$V_1[NP_L, NP_R]$ & $V_2[\varphi, \psi]$
9	*	$V_1[NP_R]$ & $V_2[NP_L, \varphi]$	35	*	$V_1[NP_R, NP_L]$ & $V_2[\varphi, NP_R]$
10	*	$V_1[NP_R]$ & $V_2[\varphi, NP_L]$	36	*	$V_1[NP_R, NP_L]$ & $V_2[\psi, \varphi]$
24	*	$V_1[NP_L, NP_R]$ & $V_2[NP_R, NP_L]$	40	*	$V_1[NP_L, \varphi]$ & $V_2[\psi, NP_R]$
25	*	$V_1[NP_L, NP_R]$ & $V_2[NP_L, \varphi]$	46	*	$V_1[\varphi, NP_L]$ & $V_2[\varphi, NP_R]$
26	*	$V_1[NP_L, NP_R]$ & $V_2[\varphi, NP_L]$	53	*	$V_1[\varphi, NP_R]$ & $V_2[\psi, NP_L]$
27	*	$V_1[NP_L, NP_R]$ & $V_2[\varphi, NP_R]$	54	*	$V_1[\psi, NP_R]$ & $V_2[NP_L, \varphi]$

Table-6.2

The exclusion of these patterns is schematically demonstrated below.
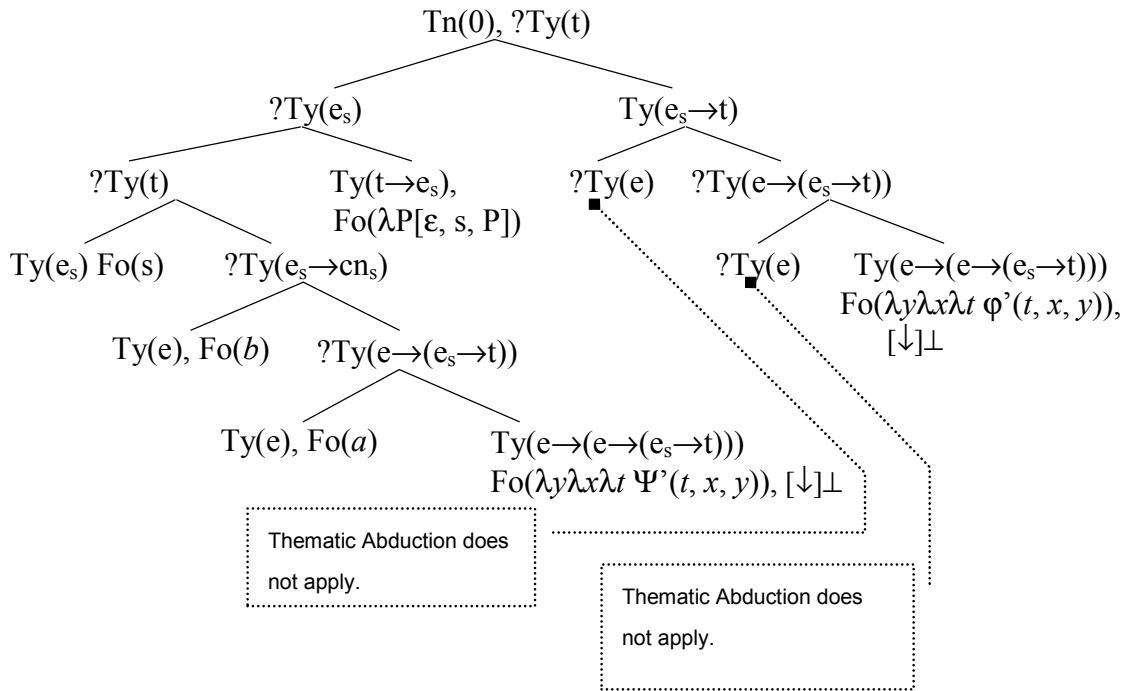
Fig-6.33

To sum up, through a very small number of stipulations, a Dynamic Syntax model of argument realization in Chinese RVC is established, in which the descriptive generalizations of argument realization in RVC, given in (5.35), (5.36) and (5.37) , are all accommodated. On the other and the unattested patterns are all ruled out.

6.5 Arguments Realized as Null Pronouns in RVC

Although the arguments of V₂ must be realized, they can also be realized as null pronouns. For example, in the following dialogue the arguments of V₂ are not directly expressed but are still inferable from the context.

(6.49) A: *Ni chi-bao fan le ma*?

you eat-full meal PRT PRT

'Have you eaten yourself full?'

B: *Chi-bao le.*

eat-full PRT

'I have eaten myself full.'

The single argument of the verb *bao* 'full' in B's reply given above is not expressed but inferable, i.e. the speaker him/herself. A two-place V₂ can also have arguments realized as null pronouns. This is illustrated below.

(6.50) A: *Qu   kankan,   tiebang zhende mo-cheng   xiuhuazhen le ma*?

quick go have.a.look iron.stick really grind-become needle   PFT PRT

'Go and make out if the iron stick has been ground into a needle?'

B: *Bu yong qu kan le*, *yijing mo-cheng-le*.

NEG use go see PRT already grind-become

'There is no use to look any more. It has already been ground into a needle.'

In (6.50), B's reply involves an RVC sentence. The second verb in this RVC is a two-place predicate and its two arguments are obviously realized as null pronouns since their referents are definitely inferable from the context.

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It should be noted that it is not the case that the arguments of V_2 can always be properly realized as null pronouns. Consider the unlikely reading given in English for the following RVC sentence.

(6.51)   *Zhangsan da-ying-le Lisi.*

                play-beat-PFT

      # 'Zhangsan played something (given in the context) and someone (given in the context) beat Lisi.'

According to the reading given for (6.51), the external argument of the second verb is realized as a null pronoun, i.e. it obtains a referent from the general context rather than from the string-internal context. This reading is weird although it is not impossible. Actually I have indicated that the semantics of an RVC sentences is a complex event consisting of the subevent. Since the two subevents are tightly intertwined, it is natural that they tend to share as many participants as possible. For the intended reading of the sentence given above, the winner argument is expected to be someone other than *Zhangsan*. This reading is difficult to obtain unless there is a very special context; otherwise, *Zhangsan* is the most relevant candidate for the winner argument of V_2.

In fact, even in a sentence where the arguments of the first verb are unspecifiable by context, they are still related to the second subevent indirectly. For example, in the following sentence, the argument of the first verb is unrealized.

(6.52)   *Da yanjing xiao-cheng xia mimi yan.*

        big eye   smile-become small.eye

        'Big eyes become small eyes in smiling.'

In (6.52) the identity of the smiler does not have to be specifiable in the context but it is always inferable that the smiler must be the possessor of the big eyes. It defies common sense that someone smiles and as a result someone else's big eyes become small eyes.

In general, lexicalized and grammaticalized semantic contents constitute the semantic foundation of sentences in natural languages. Pragmatic inference can enrich the semantic foundation to various extents. Nevertheless, presently it is still unlikely to predict how many readings are available for a sentence.

6.6 Conclusion

This chapter reviews various previous theoretical accounts of argument realization in RVC and proposes a Dynamic Syntax account. The existing theories have a common problem of undergeneration. The account that I have presented here is that RVC is a syntactic construction and the various argument realization patterns are semantic interpretations constructed through dynamic parsing processes. In the dynamic account, argument realization refers to the process through which the argument nodes on a propositional template obtain formulae through different mechanism, including *Adjunction plus Merge (the effect of subject), the standard α-actions (direct lexical input), Metavariable Insertion plus Substitution and Thematic Abduction (the effect of unrealized argument). All the attested patterns of argument realization can be constructed and all the unattested patterns are excluded by different means. This account suffers no problem of undergeneration or overgeneration. What's more, the RVC sentences that involve inverse argument realization are parsed in the same way as other RVC sentences that do not involve inverse argument realization. This lays a theoretical foundation for a unified theoretical account explaining two puzzling inverse argument realization phenomena in Mandarin. This will be explored in the next two chapters.

7.1 Introduction

The analysis of RVC shows that in a construction that expresses a complex event, different verbs have asymmetrical statuses in determining the patterns of argument realization. Specifically, V_2 in RVC takes precedence over V_1 in determining the argument realization patterns. The Dynamic Syntax account accommodates all the attested patterns of argument realization in RVC, including the so-called inverse argument realization concerning V_1. According to my working assumptions, an inverse argument realization of V_1 appears through parsing steps where the formula contributed by the preverbal (V_1) argument expression appears at the internal argument node on the first propositional template through Merge and the formula contributed by the object which initially appears at an argument node on the resultative propositional template is copied onto the external argument node on the first propositional template. Put simply, an inverse argument realization pattern appears only when a complex semantic representation is under construction. Along these lines of thought I will now give a dynamic account of the agentive inversion construction in Mandarin.

An agentive inversion in traditional grammar refers to a paradigm of agent argument alternation that involves two constructions: In the canonical construction, the agent is realized as the subject and the patient as the object. In the agentive inversion construction the agent is the object and the patient the subject. The two constructions are illustrated by the following sentences.

(7.1) a.   *San-ge ren   chi-le yi-wan mifan.*   [CANONICAL CONSTRUCTION]

three-CL person eat-PFT one-CL rice

'Three people ate one bowl of rice.'

  b.   *Yi-wan mifan chi-le san-ge ren.*   [INVERSION CONSTRUCTION]

one-CL rice   eat-PFT three-CL person

'One bowl of rice was eaten by three people.'

(7.2) a.   *San-ge ren he-le   yi-ping jiu.* [INVERSION CONSTRUCTION]

three-CL person drink-PFT one-CL alcohol

'Three people drank one bottle of alcohol.'

  b.   *Yi-ping jiu he-le   san ge-ren.*

one-CL alcohol drink-PFT three people

'One bottle of alcohol was drunk by three people.'

The canonical construction and the inversion construction are said to express the same event. (7.1a) and (7.1b) express the same eating event, and (7.2a) and (7.2b) express the same drinking event.

In spite of the semantic similarity described above, the canonical construction and the inversion construction are actually different from each other in several ways, which call for a theoretical explanation. The rest of the chapter contains the following contents: Section 7.2 is a traditional-grammar description of the two constructions on the agentive alternation paradigm. Section 7.3 is a further description of the two constructions with respect to their aspectual characteristics, which strengthens the impression that the two constructions are semantically different from each other. Section 7.4 reviews some previous works on the agentive inversion construction. Section 7.6 is a semantic analysis of the inversion construction. I will argue in this section that the inversion construction is a single-

verb construction but expresses a complex event and the inverse argument realization arises out of the pragmatically established semantic relationship between the arguments of one predicate and the other predicate, just like what happens in some cases of RVC. Section 7.6 gives a Dynamic Syntax account of the inversion construction, which demonstrates how the inverse argument realization pattern is achieved in a dynamic parsing process. Section 7.7 is the conclusion of this chapter.

7.2 A Descriptive Analysis

This description covers the basic syntactic structures of the two constructions, the difference in verb selection, aspect marker selection and object quantification and the overall semantic similarities and differences between the two constructions.

7.2.1 Restriction of Verb Selection

The most apparent restriction on the inversion construction is verb selection. Only a limited number of verbs can turn up in the inversion construction. The verbs in examples in (7.1) and (7.2) are *chi* 'eat' *he* 'drink' and *chuan* 'wear', e.g. (7.3). Another verb is *xi* 'wash'(c.f. Her 2009: 1163), which will be discussed later.

(7.3)   a.   *San-ge haizi chuan yi-jian yifu.*

                three-CL child wear one-CL clothes

                'Three children wore one piece of clothes (one after another).'

         b.   *Yi-jian yifu   chuan-le   san-ge haizi.*

                one-CL clothes wear--PFT three-CL child

                'One piece of clothes was worn by three children (one after another).'

In addition, Her (2006 and 2009) includes accommodation verbs such as *zhu* 'reside' *zuo* 'sit, *shui* 'sleep' on this list; however, these verbs are not exactly like *chi* 'eat', *he* 'drink' and *chuan* 'wear' since they can also undergo locative inversion which

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consumption verbs cannot. This difference can be observed in the following examples.

(7.4) a.   *San-ge ren zhu-le   yi-jian wuzi.*

               three-CL person reside-PFT one-CL room

               'Three people resided in one room'

  b.   *Yi-jian wuzi zhu-le san-ge   ren.*

               one-room reside-PFT three-CL person

               'One room was occupied by three people.'

               'One room accommodated three people'

  c.   *San-ge ren   zhu zai   yi-jian wuzi-li.*

               three-CL person reside LOC one-CL room-inside

               'Three people lived in a single room.'

  d. * *San-ge ren   chi zai canting.*

               three-CL person eat LOC dining.room

Sentences (7.4a) and (7.4b) illustrate the canonical construction involving the verb *zhu* 'reside'; (7.4c) shows that the verb *zhu* 'reside' can appear in a locative construction in which the location object is preceded by *zai*, which I provisionally take to be a locative marker. (7.4d) shows that the verb *chi* 'eat' cannot enter the locative construction. This test shows that verbs of accommodation and verbs of consumption are not of the same semantic type although they can both enter the agentive inversion construction. In this chapter, I will not investigate this difference between the two types of verbs and only concentrate on the fact that the verbs that can enter the agentive inversion construction constitute a closed set.

Some verbs seem to be agentive-inverting verbs but are not in fact. The word *chang* 'sing' is an example:

(7.5) a. *San-dai ren   chang yi-shou ge.*

three-CL person sing   one-CL song

'Three generations of people sang one song.'

b. *Yi-shou ge chang san-dai ren.*

one-CL song sing   three-CL person

'One song was sung by/over three generations of people.'

In (7.5a), the subject is *san-dai ren* 'three-generation people', which is the agent of the verb *chang* 'sing'; the object is the theme (not patient) *yi-shou ge* 'one-CL song'. In (7.5b), the subject of the sentence is *yi-shou ge* 'one-CL song' and the object is *san-dai ren* 'three-generation people'.

However, the paradigm of (7.5a) and (7.5b) is different from that of (7.1)-(7.3) in that *san-dai ren* 'three generations of people' in (7.5b) has a strong reading of duration when it appears in the object position. The duration meaning proves to be necessary for the acceptability of the sentence. The evidence is that if *dai* 'generation' is replaced with the general classifier *ge* indicating an individual, the canonical construction (7.6a) is still well-formed but the inversion construction (7.6b) is ill-formed.

(7.6) a. *San-ge ren   chang-le yi-shou ge.*

three-CL person sing-PFT one-CL song

'Three persons sang one song.'

b. * *Yi-shou ge chang-le san-ge ren.*

one-CL song sing-PFT three-CL person

The unacceptability of (7.6b) shows that *chang* 'sing' is not a real agentive-inverting verb. The postverbal *san-dai ren* (= three generation of people) in (7.5b) is highly likely to be a duration adverbial because the classifier *dai* 'generation' means a period of thirty years or so; therefore, *san-dai ren* (=three generation of people) refers to a period of time. In contrast, the classifier *ge* in the postverbal expression in (7.6b) expresses a general individuation of the set of people and does not carry any duration meaning.

The majority of the verbs in Mandarin cannot enter the inversion construction. There too many of these verbs to list here, so I will pick out only a few of them for illustration.

(7.7)   a.   *San-ge ren   xiu   yi-liang che.*
                 three-CL person repair one-CL car
                 'Three people repair one car.'

         b.   * *Yi-liang che xiu   san-ge ren.*
                 one-CL car   repair three-CL person

(7.8)   a.   *San-ge ayi zhaogu   ershi-ge   haizi.*
                 three-CL nurse take.care.of twenty-CL child
                 'Three nurses take care of twenty children.'

         b.   * *Ershi-ge haizi zhaogu   san-ge   ayi.*
                 twenty-CL child take.care.of three-CL nurse
                 'Three nurses take care of twenty children.'

(7.7a) is the canonical construction with the verb *xiu* 'repair'. The agent is the subject; the patient is the object. (7.7b) is an ill-formed inversion construction. Likewise, the verb *zhaogu* 'take care of' does not allow inverse argument realization. (7.8b) is also unacceptable. The unacceptability of this sentence holds for the

intended reading given in English. The object cannot be understood as the agent nor can the subject be understood as the patient. This sentence is acceptable for the reading that the children are understood as the agent and the nurses are understood as the patient. In a word, the canonical construction is open to all transitive verbs but the inversion construction is not.

7.2.2 Restriction of Aspect Marker Selection

A second difference between the canonical construction and the inversion construction is that the canonical construction is more restricted with respect to aspect marker selection. The canonical construction can alternatively take the progressive marker *zhe*, the perfect marker *le* and the experiential marker *guo*. The inversion construction can take *guo* and *le* but cannot take *zhe*. The sentences in (7.9) illustrate the free selection of aspect markers by the canonical construction. The sentences in (7.10) illustrate the (in)compatibilities of various aspect markers with the inversion construction.

(7.9) a. *San-ge   ren   chi-zhe yi-wan mifan.*
           three-CL person eat-PROG one-CL rice
           'Three people were eating one bowl of rice.'

       b. *San-ge   ren   chi-le   yi-wan mifan.*
           three-CL person eat-PFT one-CL rice
           'Three people have eaten one bowl of rice.'

       c. *San-ge   ren   chi-guo yi-wan mifan.*
           three-CL person eat-EXP one-CL rice
           'Three people once ate one bowl of rice.'

       d. *San-ge   ren   chi yi-wan fan.*
           three-CL person eat one-CL rice
           'Three people eat one bowl of rice.'

(7.10) a.   *_Yi-wan mifan chi-zhe   san-ge   ren._

           one-CL rice   eat-PROG three-CL person

      b.   _Yi-wan mifan chi-le san-ge   ren._

           one-CL rice eat-PFT   three-CL person

           'One bowl of rice was eaten by three people.'

           'One bowl of rice fed three people.'

      c.   ? _Yi-wan mifan chi-guo san-ge ren._

           one-CL rice   eat-EXP   three-CL person

           'One bowl of rice once was eaten by three people.'

      d.   _Yi-wan mifan chi san-ge   ren._

           one-CL rice   eat three-CL person

           'One bowl of rice is eaten by three people.'

           'One bowl of rice feeds three people.'

Two questions must be asked: Why can the canonical construction take the progressive marker _zhe_ but the inversion construction cannot? Is this restriction of aspect marker selection related to the restriction of verb selection? These questions will be answered below.

7.2.3 Restriction of Quantification over the Agentive Expression

The agent NP in the inversion construction must be quantified (by a numeral plus a classifier) whereas there is no such requirement on the canonical construction. In all the above wellformed instances of the inversion construction, the agentive expressions are always numerically quantified. The following examples provide both positive and negative evidence.

(7.11) a.   _Zhei-ge ren   chi-le   yi-wan mifan._

           this-CL person eat-PFT one-CL rice

           'This person ate one bowl of rice.'

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b.   * *Yi-wan mifan chi-le zhei-ge ren.*

        one-CL rice   eat-PFT this-CL person

        'One bowl of rice was eaten by this person.'

In the two sentences in (7.11), *ren* 'person' is only modified by a demonstrative pronoun (plus a classifier) *zhei-ge* 'this-CL'. The canonical construction (7.11a) is acceptable but the inversion construction (7.11b) is unacceptable. Even if the agent expression is modified by a demonstrative pronoun with a plural classifier, the sentence in the inversion construction is still bad, for example (7.12b).

(7.12) a.   *Zhei-xie   ren   chi-le   yi-wan fan.*

        this-CL.PL person eat-PFT one-CL rice

        'These people ate one bowl of rice.'

b.   * *Yi-wan mifan chi-le zhei-xie   ren.*

        one-CL rice   eat-PFT this-CL.PL person

        'One bowl of rice was eaten by these people.'

In contrast, no matter whether the patient expression is quantified or not in the canonical construction, the acceptability of the sentences is not affected. This is illustrated by (7.13a).

(7.13) a.   *San-ge ren   chi-le   na-wan mifan.*

        three-CL person eat-PFT that-CL rice

        'Three people ate that bowl of rice.'

b.   *Na-wan mifan chi-le san-ge   ren.*

        that-CL rice   eat-PFT three-CL person

        'That bowl of rice was eaten by three people.

The importance of the numerical quantification of the agent expression for the acceptability of the inversion construction can also be seen in the cases where the personal pronoun expressing the agent can appear in the postverbal position with a numerically quantified agent expression, e.g. (7.14b), but it cannot without a numerically quantified agent expression, e.g. (7.14c).

(7.14) a.   *Tamen san-ge   ren   chi-le yi-wan mifan.*

        they   three-CL person   eat-PFT one-CL rice

        'They three ate one bowl of rice.'

    b.   *Yi-wan mifan chi-le   tamen san-ge   ren.*

        one-CL rice eat-PFT   they   three-CL person

        'One bowl of rice was eaten by them three.'

    c.   * *Yi-wan mifan chi-le   tamen.*

        One-CL rice eat-PFT they

        'One bowl of rice was eaten by them.'

In (7.14b), *tamen* 'they' and *san-ge ren* 'three-CL people' co-occur in the postverbal positions. Arguably, it is the presence of *san-ge ren* 'three-CL people' rather than *tamen* 'they' that ensures the acceptability of this inversion construction. In contrast, the sentence (7.14c) is unacceptable in that the pronoun appears as the object alone.

To sum up, in the canonical construction the agent expression does not have to be quantified; in the inversion construction the numerical quantification of the agent expression is obligatory. The requirement of the quantification of the agent expression in the inversion construction has the implication that special attention must be given to quantification in the analysis of the agentive inversion construction and quantification may play a central role in determining the well-formedness of this construction. And this is crucial to the theoretical account of this construction.

7.2.4 Semantic Differences between the Two Constructions

Although the canonical construction and the inversion construction have long been claimed to be highly similar in the literature, the inversion construction has some *additional* meaning that the canonical construction does not. The inversion construction usually has the meaning that the agent is satisfied through the event such as eating, wearing and drinking, or that the patient is enough (in amount or durability etc.) to satisfy the agent. This can be seen in the following sentences.

(7.15) a. *Zhei-jian yifu tebie jieshi, zhengzheng chuan-le san-ge haizi.*
this-CL clothes very strong whole wear-PFT three-CL child
'The clothes was so strong; three children (one after another) wore it.'

　　 b. *Na-guo fan ke zhen bu shao, jingran chi-le san-ge ren*
that-CL rice PRT really NEG little surprisingly eat-PFT three-CL person
'That pot of rice was so much that surprisingly, its fed three people.'

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As the two sentences in (7.15) show, the inversion construction expresses a property of the subject. In (7.15a), the inversion construction expresses the durability of the clothes and the durability is shown through children's wearing the clothes. In (7.15b), it specifies the amount of the pot through the number of people that it feeds; and the amount of the pot of rice is shown through its being eaten by three people.

7.3 Aspectual Properties of the Two Constructions

In this section, I further show that the canonical and inversion constructions have different aspectual properties. This aspectual study provides more clues for understanding the inversion construction.

7.3.1 Aspectual Properties of the Canonical Construction

I take advantage of the preverbal duration phrase and the postverbal duration phrase as the diagnostics for the aspectual properties of sentences in Mandarin. The canonical construction can take the preverbal duration phrase (the telicity diagnostic) when the object (the patient) is quantified, e.g. (7.16a), but it cannot take the postverbal duration phrase (the atelicity diagnostic) when the object is quantified, e.g. (7.16b).

(7.16) a.　*San-ge　ren　　yi-hui'er jiu　chi-le　yi-guo　mifan.*
　　　　　three-CL person　a.moment then　eat-PFT　one-CL　rice
　　　　　'Three people ate a pot of rice just in a moment.'

　　　 b.　* *San-ge　ren　　chi-le　yi-hui'er　jiu　yi-guo　mifan.*
　　　　　three-CL person　eat-PFT　a.moment　then　one-CL　rice

In contrast, if the object is not quantified, then the sentence can take the postverbal duration phrase, e.g. (7.17a), but cannot take the preverbal duration phrase, e.g. (7.17b).

(7.17) a.　*San-ge　ren　　chi-le　yi-hui'er　mifan.*
　　　　　three-CL person　eat-PFT　a.moment　rice
　　　　　'Three people ate rice for a moment.'

　　　 b.　* *San-ge　ren　　yi-hui'er　chi-le　mifan.*
　　　　　three-CL person　a.moment　eat-PFT rice

The aspectual properties of the canonical construction shown in (7.16) and (7.17) are not surprising since Verkuyl (1972 and 1993) has indicated that the quantification of the object has impact on the aspectuality of a sentence.

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7.3.2 Aspectual Properties of the Inversion Construction

Applying the aspectual diagnostics to the inversion construction, we encounter a surprising situation: neither the preverbal duration phrase nor the postverbal duration phrase is accepted by the inversion construction. This is shown in (7.18)

(7.18) a.   * *Yi-guo mifan chi san tian   san-ge   ren.*
                one-CL rice   eat three day three-CL person

     b.   * *Yi-guo mifan san tian chi   san-ge   ren.*
                one-CL rice three day eat three-CL person

A conclusion that we can draw from (7.18) is that the inversion construction has a semantic property that is in no way compatible with a duration phrase and is similar, in terms of aspectuality, to the sentences that involve a state verb such as (7.19b) and (7.19c):

(7.19) a.   *Zhangsan-de gezi   gao.*
                Zhangsan's   height tall
                'Zhangsan is (very) tall.'

     b.   * *Zhangsan-de gezi   san   tian   gao.*
                Zhangsan's   height three day   tall.

     c.   * *Zhangsan-de gezi gao san   tian.*
                Zhangsan's height tall three day

Interestingly, the sentences involving only an individual-level state verb can take *le* but cannot take *zhe*, e.g. (7.20), just as the inversion construction does.

(7.20) a.   *Zhangsan-de gezi   gao-le.*
                Zhangsan's   height tall-PFT

'Zhangsan became tall.'

b. * *Zhangsan-de gezi   gao-zhe.*

    Zhangsan's   height tall-PROG

Like *gao* 'tall', the individual-level verbs (Carlson 1977) such as *chang* 'long', *duan* 'short', *qiang* 'strong', *ruo* 'weak', *ling* 'clever', *ben* 'foolish' among many others exhibit the above aspectual properties[50].

In the next section, I will examine two existing theories of the formation of the agentive inversion construction. These theories capture the inferential reading of the inversion construction but do not reveal the relationship between inverse argument realization and the three restrictions on the inversion construction.

7.4 Previous Works on the Agentive Inversion Construction

The agentive inversion construction has been discussed in the literature. However, it has been largely under-described. For example the canonical construction and the inversion construction are said to be semantically the same. My description has shown that the two constructions are not semantically the same although they have semantic similarities. The semantic differences are reflected by the fact that the two constructions have different aspect and aspectual properties, the fact that they select different verbs and the fact that the inversion construction express a complex event but the canonical construction does not. In this section, I review two previous theoretical accounts of the inversion construction. These accounts leave a lot of important issues unaccounted for.

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[50] It should be noted that individual-level verbs usually do not take the aspect marker *guo* 'EXP'; this is understandable because the properties that these words express are permenant and it is weird to say that something has the experience of having a permenant property which it always has.

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7.4.1 Derivational Accounts of the Inversion Construction

Noticing the subtle semantic difference between the canonical construction and the inversion construction, Charters (see Her 2009: 1156 for Helen Charters's p.c. with Her) suggests that the inversion construction is syntactically headed by a silent counterpart of *gou* 'be enough', which appears as a bound morpheme. The explicit verb appears in an embedded clause and undergoes verb movement to adjoin to the matrix verb. The underlying structure is illustrated below in (7.21) (c.f. Her 2009: 1157: (34)). The corresponding sentence with an explicit verb *gou* 'be enough for' is given in (7.22).

(7.21)　　*Zhei-guo rou　　e san-ge　　ren　　chi*.
　　　　　this-CL meat　　three-CL person eat

　　　　　'This pot of meat is enough for three people to eat'

(7.22)　　*Zhei-guo rou　gou　　san-ge　　ren　　chi*.
　　　　　this-CL meat　enough three-CL person eat

　　　　　'This pot of meat is enough for three people to eat.'

Her (2009) criticizes this theory and he points out that a syntactically derived construction must exhibit some robustness in syntactic behaviour and a considerable degree of productivity but the inverting verbs do not fit either criterion.

Ren (2005) holds a similar view as Helen Charters does and proposes that the implicit verb is *gei* 'give' (rather than *gou* 'be enough for') and that an inverting verb must denote an action at the completion of which the theme is to be occupied or possessed. This is taken to be the explanation of the verb selection restriction on the agentive inversion construction. Her (2009) indicates that the derivational rule that Ren (2005) proposes has the problem of overgeneration because for the verb like

mai 'buy', the buyer possesses the product at the end of the buying event but this verb cannot enter the inversion construction; and in fact *mai* 'buy' is only one out of many verbs that can meet Ren's semantic condition but cannot enter the inversion construction. On the other hand, Her argues that Ren's theory also suffers the problem of undergeneration since according to this theory a verb that cannot satisfy the semantic condition of final possession cannot enter the inversion construction but the verb *xi* 'wash', which does not satisfy the semantic condition, can enter this construction; for example (c.f. Her 2009: 1163 (61)):

(7.23) a.　　*Shi-ge　ren　xi　zhei-kuai feizao.*

　　　　　　ten-CL　person wash　this-CL　　soap

　　　　　　'Ten people used this block of soap to wash themselves.'

　　　 b.　　*Zhei-kuai feizao xi　shi-ge ren.*

　　　　　　this-CL　soap wash ten-CL person

　　　　　　'A block of soap accommodates the washing by ten people.'

(7.23a) is the canonical construction. (7.23b) is the inversion construction. The verb in the two sentences is *xi* 'wash'. Her's point is that the washing event does not end with the possession of the soap by the washing people and therefore Ren's theory wrongly excludes this verb from the list of inverting verbs. I endorse Her's criticism of Ren's theory – namely that the 'final possession' is neither a sufficient condition nor a necessary condition for the verbs that can enter the inversion construction. Since the necessary condition that Ren (2005) proposes is found invalid, the corresponding assumption that the implicit verb in the underlying structure is *gei* 'give' is not robust.

Interestingly, Her's counterexample against Ren's theory involves the verb *xi* 'wash'. However, intuitively, this verb literally does not express a consumption event since

we would not say that washing clothes or washing dishes is an event of consuming clothes or dishes. But it is undeniable that a washing event may involve the consumption of some detergent such as soap or washing powder etc. Therefore, *xi* 'wash' is at the most a verb that expresses a manner of consumption. Not all the verbs that express manners of consumption can enter the inversion construction. For example, a writing event consumes ink but ink appears neither as the object of *xie* 'write' in the canonical construction (7.24a) nor as the subject in the inversion construction (7.24b).

(7.24) a.   ? *Liang-ge ren xie-le   san-ping moshui*.

          two-CL person write-PFT three-CL ink

          'Two people used three bottles of ink in writing.' [Intended]

     b.   * *San-ping moshui xie-le liang-ge ren*.

          three-CL ink write-PFT two-CL person

In addition to the overgeneration and undergeneration problems with Ren's theory, the theory fails to explain why the object in the agentive inversion construction must be numerically quantified. Compare the following two sentences.

(7.25) a.   *Zhei-guo roui gei tamen chi* .

          this-CL   meat give they eat

          'This pot of meat is given to them to eat.'

     b.   * *Zhei-guo rou chi tamen*.

          this-CL   meat eat they

(7.25a) is a wellformed *gei* 'give' construction where the object of *gei* 'give' is not numerically quantified. (7.25b) is an inversion construction that is assumed by Ren to have the same underlying structure as the *gei* construction but this inversion

construction is ill-formed since the object in this sentence violates the restriction of obligatory quantification. If the inversion construction and the *gei* construction have the same underlying structure as Ren claims, Ren's theory should explain why there is such a difference between the covert *gei* 'give' and the overt *gei* 'give' but the theory cannot explain this difference.

Besides, there is also a third problem with Charters' and Ren's derivational accounts. If we assume with Charters that the inversion construction has the underlying form similar to that of *gou* 'enough' construction illustrated in (7.22), we cannot explain why the aspect marker *le* can appear in the inversion construction but cannot appear in the *gou/gei* 'enough/give' construction. Compare the following two sentences.

(7.26) a.   *Yi-guo rou   chi-le san-ge   ren.*
             one-CL meat eat-PFT three-CL person
             'One pot of meat has fed three people.'

       b.   *Yi-guo rou gou/gei(*-le)   san-ge   ren   chi(*-le).*
             one-CL meat enough/give-PFT three-CL person eat-PFT

(7.26b) is unacceptable no matter whether *le* follows the so-called head verb *gou* 'be enough for' or the so-called embedded verb *chi* 'eat'.

Another problem with the derivational theory is that it does not explain the difference between the *gou/gei* 'enough/give' construction and the inversion construction with respect to aspectuality. The inversion construction can take neither the preverbal duration phrase nor the postverbal duration phrase but the *gei/gou*-construction can take the postverbal duration phrase. Compare (7.27a) and (7.27b) on the one hand, and (7.27c) on the other hand.

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(7.27) a.   *Yi-guo rou gou   san-ge   ren   chi wu tian.*

one-CL meat enough three-CL person eat five day

'One pot of meat is enough for three people to eat for five days.'

b.   *Yi-guo rou gei san-ge   ren   chi wu tian*

one-CL meat give three-CL person eat five day

'One pot of meat provides for three people's eating for five days.'

c.   **Yi-guo rou chi san-ge   ren   wu tian.*

one-CL meat eat three-CL person five day

If (7.27c) has the same underlying structure as (7.27a) or (7.27b), it is expected that (7.27c) should be well-formed just like the other two sentences. This, however, is not the case. Therefore, it is not accounted for how these differences arise out of derivations from one and the same underlying structure.

To sum up, the derivation accounts do better than earlier works since they try to recognize the inferential meaning that the inversion construction has and intend to represent this meaning in the deep structure. However, the assumption that the inversion construction and *gou/gei*-construction has the same underlying structure as the agentive inversion leaves open the questions of why there are a number of differences between the two constructions that have the same underlying structure.

7.4.2 Composite Role Theory

Her (2006 and 2009) proposes a lexical mapping account of the inversion construction. In this theory, thematic roles are mapped onto abstract syntactic functions according to their rankings on the universal thematic hierarchy. Her assumes with Huang (1993) that the universal thematic hierarchy includes the extent role, which is given in (7.28) (c.f. Her 2006: 22; Her 2009: 1164)

(7.28) REVISED THEMATIC HIERARCHY

   Agent> beneficiary >goal/experiencer > instrument > patient/theme >
   locative/extent

On the other hand, Her adopts Huang's (1993) concept of 'composite role'. A composite role is the combination of two composing roles. Her assumes that the argument that takes the agent role also takes an extent role and such a composite role is written as *ag-ext*. The principle of strict one-to-one linking requires the suppression of one of the composing roles in the composite role. Given a composite role, one and only one composing role receives syntactic assignment. The suppressed composing role is not expressed by a syntactic argument but may be realized as a syntactic adjunct. The suppressed composing role is bound with the realized composing role and therefore it can emerge as part of the understanding of the sentence although it does not have an independent syntactic form.

The specific mapping in the canonical construction is that the *extent* in the *ag-ext* is suppressed; the agent is realized as the subject and the theme is expressed as the object. In the inversion construction, the agent in the composite *ag-ext* role is suppressed and the extent is the working thematic role. Since the extent role ranks lower than the theme, as Her hypothesizes, the *ag-ext* composite role is realized as the object (or OBJ$_\theta$, adjunct-like object). The two mapping patterns are represented as follows (bold letters are used to indicate the thematic roles that are responsible for argument realization):

(7.29)   a.   *<**ag-ext**→*SUBJECT, *th*→OBJECT*>*
         b.   *<th*→SUBJECT, ***ag-ext**→*OBJECT*>*

Although the composite role theory is able to account for how the canonical construction and the inversion construction arise, it gives no explanation of the difference of aspect marker selection and the difference of aspectuality between the canonical construction and the inversion construction.

What is more, Her claims that the suppressed composing role in a composite role is bound to the unsuppressed composing role and is still part of the semantic interpretation of the sentence. However, the subject in the canonical construction does not have an extent reading even if it is quantified. The extent reading usually goes with a postverbal quantification. It is doubtful whether the canonical construction involves the composite role *ag-ext* with the extent role suppressed but bound to the agent role. If the canonical construction does involve the composite role at issue as Her claims, it is puzzling as to why the extent reading is not available to the quantified agent expression in the canonical construction.

7.5 The Inversion Construction as an RVC Family Construction

To unify these different but related intuitions about the inversion construction, I hypothesize that the inversion construction expresses a complex event composed of two subevents: one is an eating subevent (or other events expressed by inverting verbs) and the other subevent is expressed by the construction but is not explicitly encoded by any single verb. Thus, the semantic constitution of the inversion construction is similar to that of RVC. The subevent expressed by the verb is the first event and the subevent that is inferred (in the sense that it is not encoded by a single verb) is the resultative subevent. It is upon this assumption that the agentive inversion construction is called an RVC family construction. It will be shown that assuming the agentive inversion construction is an instance of RVC with a resultative subevent not being independently lexicalized, we can account for all the restrictions on and characteristics of the inversion construction at issue. The work

that needs to be done is to pin down the semantic content of the implicit resultative subevent.

7.5.1 The Semantic Content of the Inversion Construction

Let's recall the three different opinions about the ontological property of the inferred event. Her (2006; 2009) indicates that the inferential reading concerns extent. Charters suggests (Helen Charters p.c. in Her 2009) that the unexpressed event is a *gou* 'enough' event. Ren (2005) expresses this event as a *gei* 'give' event. My own intuition is that when taking *le* 'PFT', the construction expresses a satisfaction relationship between the subject and the object. To paraphrase, the subject can potentially meet the need of the object. The Chinese verbs that can express the satisfaction relationship include *manzu* 'satisfy' or *gou* 'be enough for'. Consider the following examples.

(7.30) a.   *Zheixie chanpin manzu le putong ren   de xuyao.*

these   product satisfy PFT average person PRT need

'These products satisfy average people('s need).

b.   *Zhei-ge hezi gou   da.*

this-CL box enough big

'This box is enough in bigness' ('This box is big enough.)

However, neither verb can accurately express the meaning that one entity it meets the need of some people, which is part of the semantic content of the agentive inversion construction. Take the *eat*-inversion construction for example. The construction expresses the meaning that the food is so much that it can meet or actually meets the need of a particular number of people through an eating activity. This implicit subevent cannot be straightforwardly expressed by any available individual words in Chinese. On the basis of this analysis, I assume that the implicit subevent is equivalent to the synthesis of the meanings of the verbs *manzu* 'satisfy',

gou 'enough.for' and *gei* 'give'; the actual interpretation depends on the linguistic content and is inferred pragmatically

Suppose that the implicit subevent involves two participants, the satisfier (agent-like) and the satisfied (theme-like) and the former is realized as the subject and the latter is realized as the object, just as the two arguments of *manzu* 'satisfy' or *gou* 'be enough for' do. This constitutes the semantic motivation for the inversion construction: the subject and the object are the syntactic realization of the two participants in the resultative subevent that is not expressed by a single verb. Through pragmatic inference, the subject and the object are respectively understood as the internal argument and the external argument of the explicit predicate, i.e. the only verb in the inversion construction.

Given that the inversion construction is an RVC family construction and its resultative subevent is fixed, then the semantic property of the construction lays a constraint on the access of verbs to this construction. Only the verbs that can hold a resultative semantic relationship to the fixed resultative predicate can enter this construction. The verbs like *chi* 'eat', *chuan* 'wear' and *he* 'drink' and *xi* 'wash' (in its consumption manner sense) are more likely to be related to the fixed resultative subevent (in some cultures) and therefore they are better accepted by the inversion construction than other verbs. For instance, some of my informants are impressed by the *wear*-inversion construction, which reminds them of the days when a poor family with several children but little means could not afford to buy new clothes for every child and the younger children have to wear the old clothes that have been worn by their elder sisters or brothers. This example may sound a bit weird for the younger generation who have little experience of this kind.

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The semantic constraint of the RVC family construction does not constitute an absolute filtering mechanism. Some formerly disallowed verbs may be allowed and the set of the verbs that can enter this construction may be enlarged.

7.5.2 A Semantic Account of the Obligatory Quantification Restriction

I take advantage of *gou* 'be enough for' to explain the obligatory quantification of the object in the inversion construction since the meaning of *gou* is integrated in the implicit subevent. Semantically, *gou* 'be enough for' denotes a relationship between two arguments: one is the theme; the other is the magnitude in some physical domain (such as weight, height or temperature among others) that the theme amounts to[51]. The following examples involving the predicate *gou* can illustrate the semantic relationship between the two arguments of *gou*. In (7.31a) and (7.31b), the quantified expressions respectively express the magnitude in height and that in portion.

(7.31) a. *Zhei-ge haizi hai bu gou yi mi.*

     this-CL child still NEG enough.for one meter

     'This child is not enough for one meter'

     (This means 'the height of the child does not amount to one meter'.)

   b. *Fan yijing gou duo le, bie zai gei wo cheng la.*

     rice already enough much PRT NEG.IMP again for I ladle PRT

     'The rice already got enough. Please do not add any more for me.'

The objects of *gou* in (7.32a) and (7.32b) express the magnitude of colour and that of weight.

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[51] Another meaning that *gou* expresses is an activity which is similar to that expressed by the English verb *reach* in the sense of *extend*.

(7.32) a.   *Zhangsan gou   bai   le.*

                      enough white PRT

                'Zhangsan is already enough for the standard of being white.'

                (This means 'Zhangsan is already white enough.)

      b.   *Zhangsan-de tizhong bu gou   100 gongjin.*

             Zhangsan's weight   NEG enough 100 kilogram

             'Zhangsan's weight is not enough for 100 kilogram.'

             (This means 'Zhangsan weighs less than 100 kilogram.')

Furthermore, the object of *gou* 'enough for' must be a quantified if it is a noun, which is shown in (7.33).

(7.33) a.   **Zhei-ping jiu   gou   ren   he.*

             this-CL   alcohol enough person drink

             'This bottle of alcohol is enough for people to drink.'

      b.   *zhei-ping jiu gou   san-ge ren   he.*

             this-CL alcohol enough three-CL person drink

             'This bottle of alcohol is enough for three people to drink.'

The example in (7.33) provides the negative evidence for the obligatory presence of the numerical quantifier as part of the object of *gou* 'enough for'. The meaning *gou* 'enough for' is part of the meaning of the implicit resultative predicate, which explains why the object of this implicit predicate must be numerically quantified.

7.5.3 Revisiting the Aspect and Aspectuality of the Inversion Construction

Now we can turn attention to the aspect marker selection restriction and the aspectuality properties of the inversion construction. It has been shown that the aspect and aspectual characteristics of this construction are similar to those of a sentence that involves a single individual-level state. These characteristics of the

inversion construction can be explained if we assume that the implicit subevent is the foreground part in the complex event. If the implicit subevent expressed by the inversion construction is a satisfaction event, which is a relationship between the satisfier and the satisfied, this relationship is taken to be an individual-level state about the satisfier. For example, the inherent amount of a pot of meat does not change as the situation changes. This amount is an individual-level state of the entity concerned. This resultative predicate determines the aspect and aspectuality characteristics of the agentive inversion construction.

7.5.4 Summary

This section looks into the semantic complexity of the agentive inversion construction. This construction expresses a complex event which consists of two subevents. The two subevents have asymmetrical statuses in determining the argument realization patterns and the aspect and aspectual properties of the construction. Just as V_2 in RVC is the decision-maker of the argument realization patterns in RVC sentences, the implicit resultative predicate in the meaning of the inversion construction determines the argument realization pattern and the aspect and aspectual properties of the construction. Thus, the inferential reading, the verb selection restriction, the aspect marker restriction, and the aspectual characteristic of the agentive inversion construction are uniformly accounted for.

7.6 Two Constructions as Two Dynamic Processes

This section shows how the two constructions on the agentive alternation paradigm, particularly the inversion construction, arise out of dynamic parsing processes.

7.6.1 The Dynamics of the Canonical Construction

The canonical construction is a typical transitive sentence in Chinese. Its parsing is very simple. I take *San-ge ren chi-le yi-wan fan* 'three-CL person eat one-CL rice' for example. The rule of *Adjunction is applied first to construct an unfixed node

annotated with ?Ty(e) that triggers lexical input. Since this semantic content occurs on an unfixed node, its semantic relationship to the rest of the sentence is yet to be established through Merging with some fixed node created by the parse of the verb or other syntactic components in the upcoming parsing process.

(7.34) a.   Step 1: Parsing *san-ge ren*[52]

$$\text{Tn (0), ?Ty (t),}$$

$$\langle\uparrow_*\rangle \text{ Tn (0), Ty(e), Fo}(\varepsilon, w, \text{Ren'}(w)) , \Diamond$$
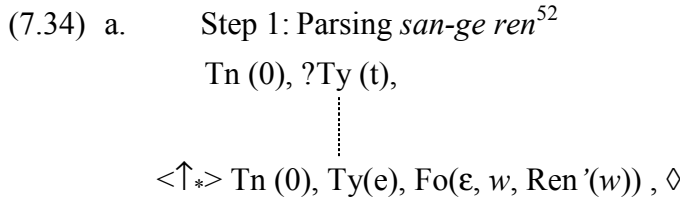
Fig-7.1

b.   Step 2 Parsing s*an-ge ren chi-le*

$$\text{Tn(0), ?Ty(t)}$$

$$\langle\uparrow_*\rangle\text{Tn(0)} \quad \text{?Ty}(e_s) \qquad\qquad \text{?Ty}(e_s\rightarrow t)$$
$$\text{Ty(e), Fo}(\varepsilon, w, \text{Ren'}(w))$$

$$\text{?Ty(e)} \qquad \text{?Ty}(e\rightarrow(e_s\rightarrow t))$$

$$\text{?Ty(e) , }\Diamond \qquad \text{Ty}(e\rightarrow(e\rightarrow(e_s\rightarrow t))),$$
$$\text{Fo}(\lambda y\lambda x\lambda t.\text{Chi'}(t, x, y)), [\downarrow]\bot$$
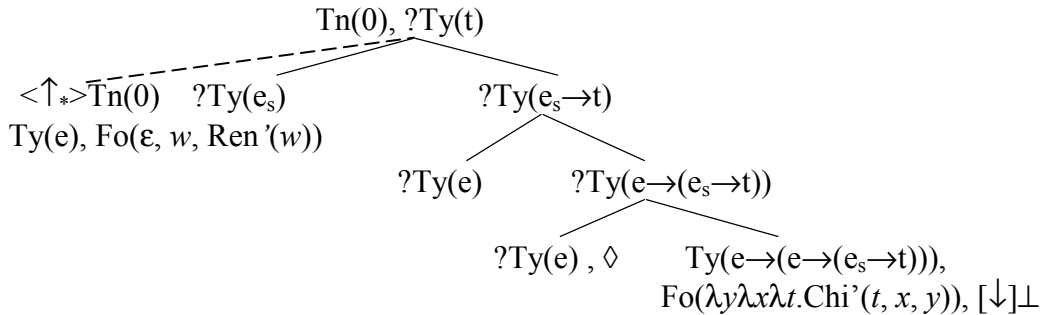
Fig-7.2[53/54]

Suppose the pointer moves down to the internal argument node first through the application of Anticipation. Potentially, ?Ty(e) at the internal argument node can be satisfied in two ways: the unfixed node can Merge with this node; or ?Ty(e) triggers α-actions. But in the current case, the internal argument node can only obtain a formula through the standard α-actions, i.e. lexical input because if the unfixed node

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[52] The internal structure of a quantified expression is not given to simplify the demonstration.

[53] This is a simplified treatment; theoretically, the verb first projects a propositional template which stand in a *<U>* relationship to the topnode and this underspecified modality is updated when the object is parsed.

[54] The aspectual information is not treated in this demonstration.

Merges with the internal argument node, the parse of the object under the triggering requirement ?Ty(e) on the external argument node will lead to the failure of the parsing process according to my definition of the standard α-actions, i.e. the actions taken are 'Abort'. As the open requirement triggers the parse of the object and is satisfied, the pointer moves upward to the external argument node. The unfixed node, at this moment, Merges with the external argument node. A situation metavariable **S** inserted onto the event argument node, about which I do not go into detail. The situation metavariable is instantiated by a situation variable s finally. Through the above operations, the partial tree is updated as follows.

c.   Step 3: Parsing *san-ge ren chi-le yi-wan fan*

Tn(0), ?Ty(t), ◊

Ty(e_s),Fo(s)   ?Ty(e_s→t)

Ty(e), Fo(ε, w, Ren'(w))   ?Ty(e→(e_s→t))

Ty(e),   Ty(e→(e→(e_s→t))),
Fo(ε, v, Fan'(v))   Fo(λyλxλtChi'(t, x, y)), [↓]⊥
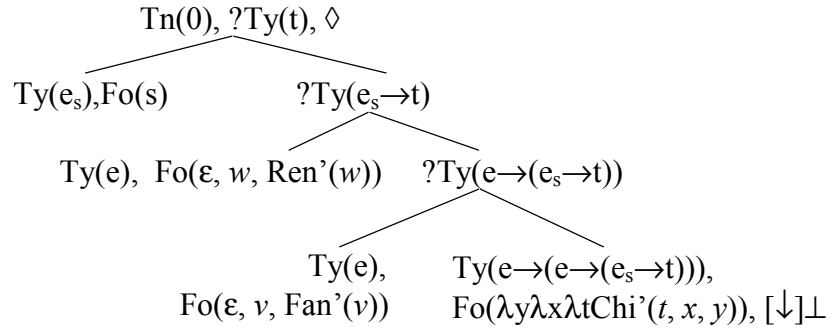
Fig-7.3

Applying the rules of Completion and Elimination to the nodes on the partial tree, we obtain a propositional formula at the top node: Fo(Chi'(s, ((ε, w, Ren'(w)), (ε, v, Fan'(v)))).

To repeat, argument realization refers to the dynamic process where argument nodes obtain formulae. The external argument and the internal argument on the propositional template obtain their respective formulae through different actions. As Merge happens between the unfixed argument node and the external argument node, the effect of the agent being realized as the subject is produced. The obtainment of a

formula by the internal argument node through α-actions gives rise to the effect of the patient being realized as the object.

7.6.2 The Dynamics of the Inversion Construction

The semantic interpretation of the agentive inversion construction is similar to that of an RVC sentence but this construction only involves a single verb; therefore the parsing process is different from that of parsing an RVC sentence. Particularly, abductive inference plays an important, and in fact indispensable, part along with on-line parsing in constructing the final semantic representation. I take *yi-guo rou chi san-ge ren* 'one-CL meat eat three-CL people' for example.

First, the *Adjunction rule is applied to create an unfixed node with ?Ty(e), which triggers the parse of *yi-guo rou* (=one pot of meat).

(7.35) a.   Parsing *Yi-guo rou*

$$\text{Tn}(0), ?\text{Ty}(t)$$

$$<\uparrow_*>, \text{Tn}(n)$$
$$\text{Ty}(e), \text{Fo}(\varepsilon, w, \text{Rou'}(w)), \Diamond$$

Fig-7.4
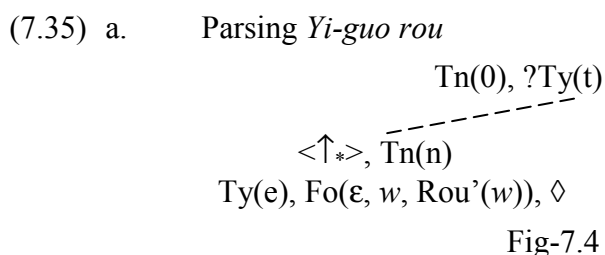
With the pointer returning to the topnode, the verb is parsed under the condition ?Ty(t). We assume that the parse of the verb directly projects a complex propositional template, just like that built through parsing V_1 and V_2 in RVC, and the pointer is finally located as the internal argument node on the resultative propositional template.

(7.35) b.   *chi* 'eat'

IF   ?Ty(t)

THEN make ($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e_s));
      make ($<\downarrow_1>$); go ($<\downarrow_1>$); put (Ty(t→e_s), put(Fo(λP.(ε, **S**, P))); go($<\uparrow_1>$);
      make ($<\downarrow_0>$); go ($<\downarrow_0>$); put (?Ty(t));
      make ($<\downarrow_0>$); go ($<\downarrow_0>$); put (Ty(e_s), Fo(**S**)); go($<\uparrow_0>$);
      make ($<\downarrow_1>$); go ($<\downarrow_1>$); put (?Ty(e_s→t));
      make ($<\downarrow_0>$); go ($<\downarrow_0>$); put (?Ty(e)); go($<\uparrow_0>$);
      make ($<\downarrow_1>$); go ($<\downarrow_1>$); put (?Ty(e→(e_s→t)));
      make ($<\downarrow_1>$); go ($<\downarrow_1>$);
      put (Ty(e→(e→(e_s→t))), Fo($\lambda y \lambda x \lambda t$.Chi'(t, y, x)), [$\downarrow$]⊥); go($<\uparrow_1>$);
      make ($<\downarrow_0>$); go ($<\downarrow_0>$); put (?Ty(e)); go$_{first}$↑ (?Ty(t)); go$_{first}$↑ (?Ty(t));
      make ($<\downarrow_1>$); go ($<\downarrow_1>$); put (?Ty(e_s→t);
      make ($<\downarrow_0>$); go ($<\downarrow_0>$); put (?Ty(e)); go($<\uparrow_0>$);
      make ($<\downarrow_1>$); go ($<\downarrow_1>$); put (?Ty(e→(e_s→t)));
      make ($<\downarrow_1>$); go ($<\downarrow_1>$);
      put (Ty(e→(e→(e_s→t))), Fo(($\lambda x \lambda y \lambda t$.MGG'(t, y, x)), [$\downarrow$]⊥); go($<\uparrow_1>$);
      make ($<\downarrow_0>$); go ($<\downarrow_0>$); put (?Ty(e))

ELSE Abort

It should be noted that a predicate $\lambda x \lambda y \lambda t$.MGG'(t, y, x) appears at the matrix function node through these lexical actions. MGG here is the shortening for a predicate integrating the meanings of *manzu* 'satisfy', *gou* 'enough for' and *gei* 'give'.

The ?Ty(e) at the current internal argument node induces lexical input and the internal argument node obtains the formula *san-ge ren* 'three-CL person (=three people) through the standard α-actions. The unfixed node Merges with the external argument node on the resultative propositional template. The situation metavariable **S** is instantiated by a situation variable s. The update of the partial tree is given below.

$Tn(0), ?Ty(t), \Diamond$

$?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

$?Ty(t)$ $Ty(t \rightarrow e_s)$ $Ty(e), Fo(\varepsilon, z, Rou'(z))$ $?Ty(e \rightarrow (e_s \rightarrow t))$

$Fo(\lambda P.(\varepsilon, s, P))$

$Ty(e_s), Fo(s)$ $?Ty(e_s \rightarrow t)$ $Ty(e), Fo(\varepsilon, w, Ren'(w))$ $Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t)))$,

$Fo(\lambda x \lambda y \lambda t.\text{MGG}'(t, y, x)), [\downarrow]\bot$

$?Ty(e)$ $?Ty(e \rightarrow (e_s \rightarrow t))$

$?Ty(e)$ $Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t)))$,

$Fo(\lambda y \lambda x \lambda t.\text{Chi}'(t, y, x)), [\downarrow]\bot$
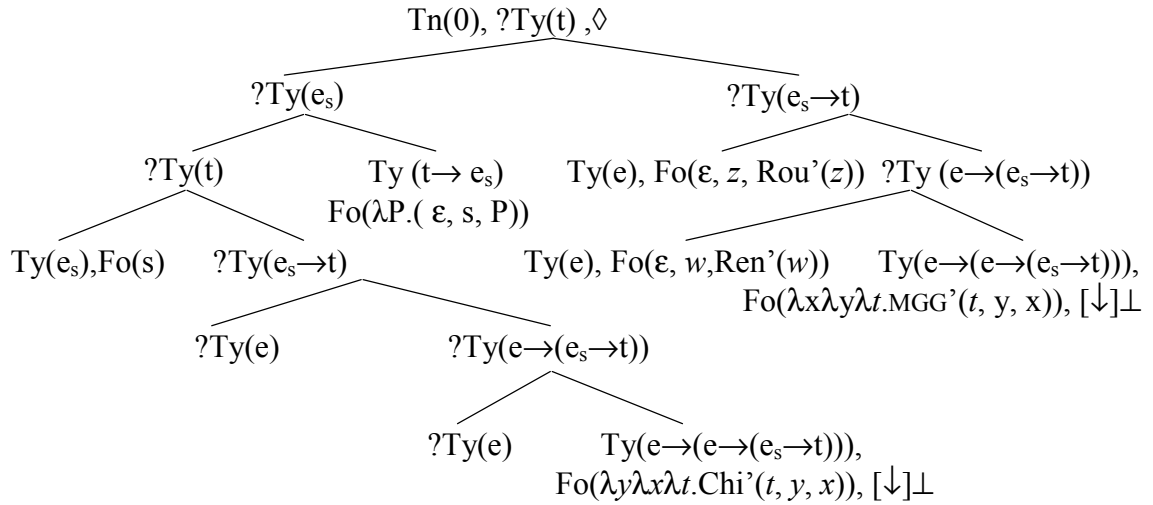
Fig-7.5

Finally, the formulae on the two individual arguments of the resultative propositional template are copied onto the two individual argument nodes through Metavariable Insertion and Substitution according to the semantic relationship between the two argument structure and the speaker's pragmatic knowledge of what are qualified as the agent and patient of the *eating* predicate.

(7.35) c.   *Yi-guo rou chi san-ge ren*

$Tn(n), ?Ty(t), \Diamond$

$?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

$?Ty(t)$ $Ty(t \rightarrow e_s)$ $Ty(e), Fo(\varepsilon, z, Rou'(z))$ $?Ty(e \rightarrow (e_s \rightarrow t))$

$Fo(\lambda P.(\varepsilon, s, P))$

$Ty(e_s), Fo(s)$ $?Ty(e_s \rightarrow t)$ $Ty(e), Fo(\varepsilon, w, Ren'(w))$ $Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t))$

$Fo(\lambda x \lambda y \lambda t.\text{MGG}'(t, y, x)),$

$\cancel{?Ty(e),}\ Ty(e), Fo(\mathbf{U})$ $?Ty(e \rightarrow (e_s \rightarrow t))$ $[\downarrow]\bot$

$\Uparrow$

$Ty(e), (\varepsilon, w, Ren'(w)$ $Ty(e), Fo(\mathbf{V})$ $Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t),$

$\Uparrow$ $Fo(\lambda y \lambda x \lambda t.\text{Chi}'(t, y, x)), [\downarrow]\bot$

$Ty(e), Fo(\varepsilon, z, Rou'(z))$

Fig-7.6

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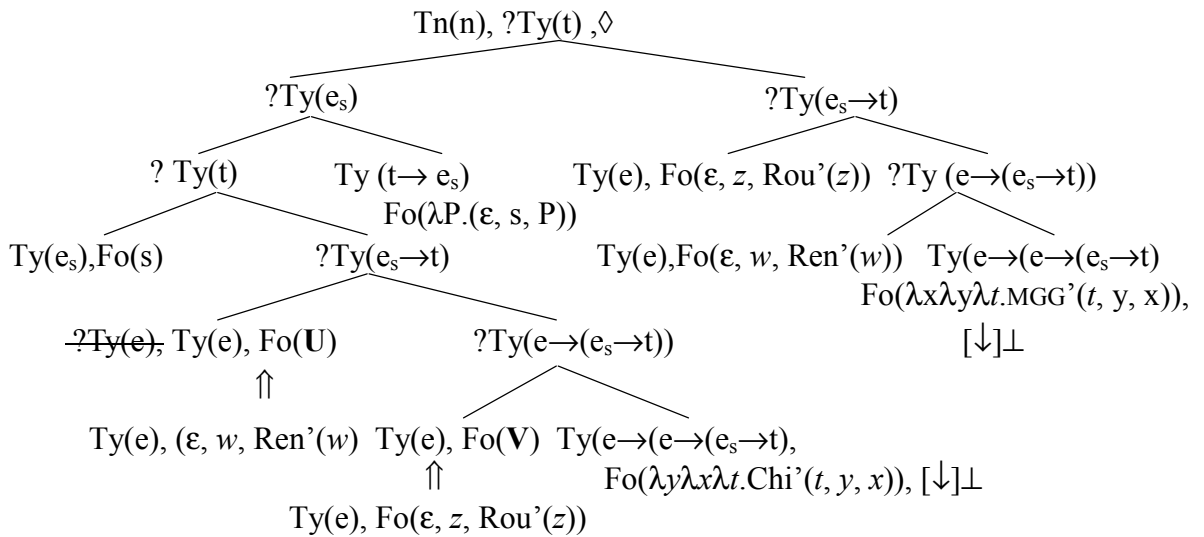
The formulae at the daughter nodes are combined in a bottom-to-top way through the application of Completion and Elimination, yielding the following propositional formula at the topnode.

(7.35) e. Fo (MGG' ((ε, s, (Chi' (s, (ε, x, Ren'(x)), (ε, w, Rou'(w))))), (ε, w, Rou' (w)),

(ε, x, Ren'(x)))))

To recapitulate, the semantics of the inversion construction is similar to that of an RVC sentence. However, the two constructions are constructed differently. The resultative predicate in the agentive inversion construction is not encoded by an independent verb but rather is integrated in the lexical semantics of the only verb, for example *chi* 'eat' in the exemplary sentence.

The canonical construction and the inversion construction involve one and the same verb. This verb encodes two disjunctive packages of information. I have pointed out that only a limited number of verbs can undergo agentive inversion in Mandarin. These verbs are special in terms of lexical semantics. Their lexical semantics allow them to undergo what is known as argument alternation. Of course, the agentive inversion construction can also be parsed as the canonical construction. That is, the verb projects a simple propositional template but such a parsing process yields an absurd reading.

7.7 Conclusion

In the current analysis of the agentive inversion construction in Mandarin, I take advantage of a clue from the inferential reading and assume that this inferential reading is a resultative subevent following the first subevent expressed by the verb. In other words, the inversion construction is semantically similar to RVC. Viewed in a traditional way, the subject and the object are the syntactic realization of the

semantic roles in the resultative subevent and their semantic relationships to the verb expressing the first subevent are established through pragmatic inference, which gives rise to the impression that the agent is realized as the object and the patient as the subject.

The Dynamic Syntax account provides a straightforward characterization of the parsing process through which the complex semantic representation is constructed, particularly the construction of the inferred meaning. The process of constructing the semantic representation of the agentive inversion construction is similar to that of constructing the semantic representation of a transitive RVC. The difference between them lies in the fact the resultative predicate in the semantic representation of the agentive inversion construction does not obtain a separate phonological form while the resultative predicate in the semantic representation of an RVC always receives one separate phonological form.

Since my account of the agentive inversion construction relies on the account of RVC, two constructions that have never been considered related in the literature are now theoretically unified. Additionally, the successful theoretical account of the agentive inversion construction strengthens the claim that the semantic status of a single verb varies across different argument realization patterns. This exploration of agentive inversion also gives case-specific answers to the three broad questions about argument realization that Levin and Rappaport (2005: 194) raise:

First, do the variants, despite their obvious relatedness, differ in meaning? The answer is yes. Second, what mechanism gives rise to the variant? The answer is that the semantic variation motivates argument alternation. Third, what determines which variant is chosen in a given context? The answer is that different variants,

which are different meaning-constructing processes, yield different semantic interpretations to meet contextual needs.

Chapter Eight
Locative Alternation Paradigm

8.1 Introduction

In Chapter seven, it is argued that the agentive inversion construction is an RVC family construction and that inverse argument realization arises from the pragmatically established semantic relationships between the semantic arguments of the resultative predicate with the first predicate. In this chapter, I will show that the locative inversion construction can be accounted for similarly. This chapter explores three constructions that involve the location and theme roles. In the three locative constructions, the location is alternatively realized as the subject, the object or the adjunct in traditional terms, and the theme is alternatively realized as the subject or the object. The verbs that can enter all the three constructions are called locative-alternating verbs, which constitute a restricted set. The three locative constructions are illustrated by the following sentences.

(8.1)   *Na-ge ren   zai keting-(li)   zuo -zhe.*

          that-CL person LOC living room-(inside) sit -PROG

          'That person is sitting/singing/shouting in the living room'

(8.2)   *Keting-(li)   zuo-zhe   yi-ge ren.*

          living room-(inside) sit-PROG one-CL person

          'In the living room is sitting a person.'

(8.3)   *Na-ge ren zuo zai   keting-(li).*

          that-CL person sit LOC living room-(inside)

          'That person is sitting in the living room.'

In this chapter, I will give a thorough comparative description of the three constructions, in which I highlight the difference in obligatoriness and optionality of locative NPs, the difference in verb selection, and the difference in aspect marker selection between the these constructions. The central goal of this chapter is to provide a Dynamic Syntax account of how the three constructions come into being through two different parsing processes.

This chapter unfolds as follows: in section 8.2, the syntactic structures of the three constructions, the verb selection restriction, and the aspect marker restriction on the three constructions are described in a traditional way. In section 8.3, I analyze the aspectual properties of all the locative constructions and discuss their relationships to the aspect marker restriction. In section 8.4, I review some earlier works on the locative constructions in Chinese. In section 8.5, I hypothesize that two of the three locative constructions are RVC family constructions. This hypothesis can give a unified account for the restriction of verb selection and aspect marker selection on the locative constructions. In section 8.6, the dynamic processes of parsing the various locative constructions are demonstrated. Section 8.7 is the conclusion of this chapter.

8.2 Basic Locative Constructions

I use three theory-neutral terms: the preverbal-*zai* construction, the postverbal-*zai* construction and the *zai*-less construction to refer to these three constructions respectively.

[PREVERBAL-ZAI CONSTRUCTION]
(8.4) a. *Zhangsan zai zhongjian pa-zhe.*

    LOC middle   lie-PROG

    'Zhangsan was lying in the middle.'

[POSTVERBAL-ZAI CONSTRUCTION]

b.   *Zhangsan pa zai zhongjian.*

lie LOC middle

'Zhangsan is/was lying in the middle.'

[ZAI-LESS CONSTRUCTION]

c.   *Zhongjian pa-zhe   yi-ge ren.*

middle   lie-PROG one-CL person

'In the middle was lying a person.'

Example (8.4a) is an instance of the preverbal-*zai* construction, wherein *zai* plus a locative NP appears in a preverbal position. (8.4b) is an instance of the postverbal-*zai* construction wherein *zai* plus a locative NP occurs in the immediate postverbal position. (8.4c) is an instance of the *zai*-less construction, wherein a locative NP occurs in a preverbal position and a theme NP occurs in a postverbal position and there is no *zai* in this construction. Among the three locative constructions, the postverbal-*zai* construction is usually taken, in the literature, to be the canonical locative construction, the *zai*-less construction is taken to be the locative inversion construction.

The naming of the canonical construction and the inversion construction has to do with a recognized hypothesis of argument realization: by default the theme becomes the subject and the location becomes the object/oblique (c.f. Bresnan and Kanerva 1989). Under this hypothesis, the *zai*-less construction presents a case of inverse argument realization, in which the theme is realized as the object and locative is realized as the subject. What is interesting and puzzling is that the word *zai* does not turn up in the inversion construction but it is present in the other two constructions. Next, I describe the syntactic and semantic characteristics of the three locative constructions.

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8.2.1 Verb Selection Restriction

The three locative constructions are not equally accessible to all verbs. The preverbal-*zai* construction selects verbs freely. The verbs that can enter the preverbal-*zai* construction cannot necessarily enter the other two constructions. (8.5) is a tiny sample of the examples for the verbs that have access to the preverbal-*zai* construction.[55]

(8.5) a. *Zhangsan zai bangongshi-li pa -zhe.*

   LOC office-inside lie-PROG

   'Zhangsan lay in the office.'

   b. *Zhangsan zai bangongshi-li chang-ge.*

   LOC office-inside sing-song

   'Zhangsan sang in the office.'

   c. *Zhangsan zai bangongshi-li mang-zhe.*

   LOC office-inside   busy-PROG

   'Zhangsan was busy in the middle.'

   d. *Zhangsan zai bangongshi-li fang-le yi-ge   qiu.*

   LOC office-inside   put-PFT one-CL ball

   'Zhangsan put a ball in the office.'

The postverbal-*zai* construction selects a restricted set of verbs (c.f. Li and Thompson 1981), including verbs of physical configuration (e.g. *zhan* 'stand', *zuo* 'sit', *shui* 'sleep', *pa* 'lie', *dun* 'crouch' among others), physical movement (e.g. *pao* 'run', *tiao* 'jump' and so on), (dis)appearance (e.g. *fasheng* 'happen', *xiaoshi* 'disappear etc), and placement and creation (e.g. *xie* 'write', *hua* 'draw', *fang* 'put

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[55] Verbs expressing individual-stage properties such as *bing* 'sick', *gaoxing* 'happy', *piaoliang* 'pretty' cannot appear in any locative constructions. Since these verbs are excluded by all the locative constructions, I leave them aside in this research. But the question of why they are incompatible with all the locative constructions is left open for future research.

etc.). These are illustrated by (8.6a)-(8.6d). Other verbs cannot enter this construction, which is illustrated by (8.6e). The verbs such as *han* 'shout', *xiao* 'laugh', *shuo* 'speak', *kan* 'look', *xiang* 'think', *hen* 'hate', *ai* 'love' among other cannot enter the postverbal-*zai* construction.

(8.6)   a.   *Zhangsan <u>zhan</u> zai malu-shang.*

                     stand LOC road-top

               'Zhangsan stood on the road.'

       b.   *Zhangsan <u>zou</u> zai malu-shang.*

                    walk LOC road-top

              'Zhangsan walked on the road.'

       c.   *Keben   <u>fang</u> zai zhuozi-shang.*

              course-book put LOC table-top

              'The course-book was put on the table.'

       d.   *Na-jian shi   fasheng zai Shanghai.*

              that-CL incident happen LOC Shanghai

              'That incident happened in   Shanghai.'

              'Zhangsan disappeared in the crowd.'

       e.   * *Zhangsan <u>chang</u> zai malu-shang*

                    sing   LOC road-top

              'Zhangsan sang on the road.' (intended)

The *zai*-less construction selects almost the same sets of verbs as postverbal-*zai* construction, for example (8.7a)- (8.7c); this construction can also accept some verbs of processing, such as *dian* 'light' in (8.7d); other similar verbs are *zhu* 'boil', *kao* 'roast', *zhong* 'plant' and so on. In contrast to the postverbal-*zai* construction, the *zai*-less construction marginally accepts verbs of movement, for example (8.7e).

The verbs that cannot enter the postverbal-*zai* construction cannot enter the *zai*-less construction either; for example (8.7f). I will not give a full list here.

(8.7)   a.   *Jiaoshi-li*   *zhan*-*zhe*   *yi-ge ren*.

         classroom-inside stand-PROG one-CL person

         'In the classroom stood a person.'

    b.   *Zhuozi-shang fang*-*zhe   keben*.

         table-top   put-PROG course-book

         'On the table was put a course-book.'

    c.   *Shanghai fasheng*-*le   yi jian shi*.

         Shanghai happen-PFT one-cl   incident.

         In Shanghai happened an incident.'

    d.   *Jiaoshi-li*   *dian*-*zhe   yi-zhan deng*.

         classroom-inside light-PROG one-CL lamp

         'In the classroom was lit a lamp.'

    e.   ?*Jiaoshi-li*   *zou*-*zhe   yi-ge   ren*.

         classroom-inside walk-PROG one-CL person

    f.   *_Jiaoshi-li_   *chang*- *zhe yi-ge ren*.

         classroom-inside sing-PROG one-CL person

8.2.2 Locative Constructions with Verbs of Placement and Creation

Special attention should be given to the fact that verbs of placement, creation and processing can appear in the three basic constructions only when the agent of these verbs is not realized as the subject. In the preverbal-*zai* construction, the theme is the subject, followed by a *zai*-phrase and the verb in turn; for example (8.8a). In the postverbal-*zai* construction, the theme is the subject and the location is the object; for example (8.8b). In the *zai*-less construction, the location is the subject and theme is the object. If the agent is expressed, it is the subject of the sentence. In this case, the theme is realized as the object and the location is realized as the preverbal-*zai*

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phrase; for example, (8.8d). Sometimes, the location can also be realized as the postverbal-*zai* phrase, which, however, does not appear in the immediate postverbal position; e.g. (8.8e).

(8.8) a. *Na-ben shu zai zhuozi-shang fang-zhe*.

that-CL book LOC table-top   put-PROG

'That book was (put) on the table.'

   b. *Na-ben shu fang zai zhuozi-shang*.

that-CL book put LOC table-top

'That book was put on the table.'

   c. *Zhuozi-shang fang-le yi-ben shu*.

table-top   put-PFT one-CL book

'A book was put on the table.'

   d. *Zhangsan *(zai) zhuozi-shang fang-le yi-ben shu*.

                    LOC table-top   put-PFT one-CL book

'Zhangsan put a book on the table.'

   e. *Zhangsan fang-le yi-ben shu   zai zhuozi-shang*.

                 put-PFT one-CL book LOC table-top

'Zhangsan put a book on the table.'

Example (8.8d) deserves more explanation. There are two alternative conditions under which the sentence can be well-formed: i) the agent expression is the subject and *zai* is present; ii) the agent expression is absent and *zai* is absent as well, i.e. the location expression directly appears in the subject position. Put simply, the *zai*-less construction does not accept the presence of the agent expression as the subject[56].

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[56] The agent expression and the *zai*-less location expression can co-occur in the passive locative construction (a.k.a. the *bei* construction); for example:

   i)   *Zhuozi-shang bei Zhangsan fang-le yi-ben shu* .

       table-top   bei   put-PFT one-CL book

8.2.3 Summary

To sum up, the set of the verbs selected by the preverbal-*zai* construction subsumes the set of the verbs selected by the postverbal-*zai* construction and the set of the verbs selected by the *zai*-less construction. This relationship between the three locative constructions is summarized in the following table.

CONSTRUCTIONS	SEMANTIC CLASSES	
preverbal-*zai*	unrestricted	
postverbal-*zai*	Movement	Physical configuration,
zai-less	Processing	Creation, Placement

Table-8.1

8.3 Aspects and Aspectualities of the Locative Constructions

The postverbal-*zai* constructions and the *zai*-less construction are similar to each other and different from the preverbal-*zai* constructions not only in terms of verb selection but also in terms of aspect marker selection and aspectual characteristics.

8.3.1 Aspect Marker Selection Restriction

The three aspect markers in Mandarin do not occur equally in the three constructions. The preverbal-*zai* construction selects aspect markers freely. The progressive marker *zhe*, the perfect marker *le* and the experiential markers *guo* are all acceptable in the preverbal-*zai* construction, which is illustrated by (8.9a). But it should be noted that the occurrence of *le* requires a postverbal temporal phrase (see (8.9b)); otherwise, the sentence sounds unnatural (see 8.9c)).

? 'On the table was put by Zhangsan a book'

The sentence involves the *bei* construction which causes much controversy in the literature. In this thesis I do not go into details about the *bei* construction but I will discuss this in the the concluding chapter.

(8.9) a.   *Zhangsan zai zhongjian zhan-zhe/guo.*

                          LOC middle   stand-PROG

       b.   **Zhangsan zai zhongjian zhan-le.*

                          LOC middle   stand-PFT

       c.   *Zhangsan zai zhongjian zhan-le   yi-ge   zhongtou.*

                          LOC middle   stand-PFT one-CL hour

       'Zhangsan stood in the middle for an hour.'

The postverbal-*zai* construction does not allow the progressive marker *zhe*, for example (8.10a) and (8.10b). But it allows the perfect marker *le* and the experiential marker *guo*, for example (8.10d) and (8.10f). Note that when an acceptable aspect marker occurs in the postverbal-*zai* construction, it does not immediately follow the verb but follows *zai*, which is illustrated by (8.10a), (8.10c) versus (8.10e).

[CANONICAL LOCATIVE CONSTRUCTION]

(8.10) a.   * *Zhangsan zhan-zhe   zai zhongjian.*

                          stand-PROG LOC middle

       b.   * *Zhangsan zhan zai zhe   zhongjian.*

                          stand LOC PROG middle

       c.   * *Zhangsan zhan-le   zai   zhongjian.*

                          stand-PFT LOC middle

       d.   *Zhangsan zhan zai le   zhongjian*

                          stand LOC PFT middle

       'Zhangsan stood in the middle.'

e. * *Zhangsan zhan guo zai zhongjian.*

        stand EXP LOC middle

f.   *Zhangsan zhan zai guo zhongjian.*

        stand LOC EXP middle

        'Zhangsan had the experience of standing in the middle.'

Du (1999: 340) cites some examples of the postverbal-*zai* construction in which the aspect marker *zhe* or *le* optionally appears between the verb and *zai*, similar to (8.10a), (8.10c), and (8.10d). Du takes these examples to be acceptable; however, they sound totally unacceptable to my informants. In this research, my own intuitive judgement and that of my Beijing Mandarin informants leads me to claim that no aspect marker is allowed to appear between the verb and *zai* in the postverbal-*zai* construction.

The *zai*-less construction has its own characteristics of aspect marker selection. This construction can accept all the three aspect markers, e.g. (8.11).

LOCATIVE INVERSION CONSTRUCTION

(8.11) a.   *Jiaoshi-li zhan-le yi-ge ren.*

        classroom-inside stand-PFT one-CL person

        'In the classroom stood a person.'

   b.   *Jiaoshi-li zhan-zhe yi-ge ren.*

        classroom-inside stand-PROG one-CL person

        'In the classroom was standing a person.'

   c.   *Jiaoshi-li zhan-guo yi-ge ren.*

        classroom-inside stand-EXP one-CL person

        'In the classroom stood a person once.'

8.3.2 Aspectuality Diagnoses

The three locative constructions also differ in their aspectuality properties. I use preverbal *yihui'er* (=in a moment) and its postverbal counterpart (=for a moment) as the diagnostics for the aspectual properties of the locative constructions.

The postverbal *yihui'er* is compatible with the preverbal-*zai* construction, but incompatible with the postverbal-*zai* construction and the *zai*-less construction. The examples from (8.12) to (8.13) illustrate these differences among the three constructions.

(8.12). a. *Na-ge ren   zai zhongjian zhan-le   yihui'er.*
           that-CL person LOC middle   stand-PFT a.moment
           'That person stood in the middle for a while.'

     b. * *Na-ge ren   zhan zai zhongjian yihui'er.*
           one-CL person stand LOC middle   a.moment

     c. * *Zhongjian zhan- guo yi-ge ren   yihui'er.*
           middle   stand-EXP one-CL person a.moment

(8.13) a. *Na-dui shu zai zhuozi-shang bai-le   yihui'er.*
           that-CL book LOC table-top   place-PFT a.moment
           'That pile of books were placed on the table for a moment.

     b. * *Na-dui shu bai   zai-le   zhuozi-shang yihui'er.*
           that-CL book place LOC.PFT desk-top   a moment

     c. * *Zhuozi-shang bai-le yi-dui   shu yihui'er.*
           desk-top   put-PFT that-CL.PL book a.moment

The diagnostic sentences above show that the preverbal-*zai* construction is aspectually different from the postverbal-*zai* construction and the *zai*-less construction. The latter two constructions are aspectually similar to each other.

The preverbal *yihui'er* is incompatible with the preverbal-*zai* construction, but compatible with the postverbal-*zai* construction and the *zai*-less construction. The following examples illustrate this difference among the three constructions.

(8.14) a.   **Na-ge ren   yihui'er zai zhongjian   zhan-le*

        that-CL person a.moment LOC middle   stand-PFT

     b.   *Na-ge ren   yihui'er jiu zhan zai-le   zhongjian.*

        that-CLperson a.moment then stand LOC-PFT middle

        'That person got into the middle, standing, in a moment.

     c.   *Zhongjian yihui'er jiu zhan-le   haoji-ge   ren.*

        middle   a.moment then stand-PFT a.number-CL person

        'In there middle appeared several people (standing) in a moment.'

(8.15) a.   * *Na-dui shu   yihui'er jiu   zai zhuozi-shang bai-le.*

        that-CL book a.moment then LOC table-top   place-PFT

     b.   *Na-dui shu   yihui'er   jiu   bai zai-le   zhuozi-shang.*

        that-CL book a.moment then place LOC-PFT table-top

        'The pile of books were placed on(to) the table just in a moment.'

     c.   *Zhuozi-shang yihui'er jiu bai-le   yi-dui   shu.*

        table-top   a.moment then place-PFT one-CL book

        'On the table was placed a pile of books just in a moment.'

The a-sentences in (8.14)-(8.15) show that the preverbal duration adverbial is basically incompatible with the preverbal-*zai* construction. In contrast, as the b and c-sentences in (8.14)-(8.15) show, the postverbal-*zai* constructions and the *zai*-less construction can co-occur with the preverbal duration phrase. This contrast is evidence that the post-*zai* construction and the *zai*-less construction express a telic event but the preverbal-*zai* construction does not (unless it has a quantified object).

8.3.3 Interim Conclusion

The preverbal-*zai* construction is compatible with the postverbal duration phrase but incompatible with the preverbal duration phrase (unless the verb takes a quantified object). Based on these diagnostic results, I conclude the aspectuality of the sentence is insensitive to the presence of the preverbal *zai* phrase. In contrast, the postverbal-*zai* construction and the *zai*-less construction are generally compatible with the preverbal duration adverbial but incompatible with the postverbal duration adverbial. On this diagnostic basis, I conclude that the postverbal-*zai* construction and the *zai*-less construction express a telic event. Then we are faced with the question of why there is such a difference between the postverbal-*zai* construction and the *zai*-less construction on the one hand and the preverbal-*zai* construction on the other. We are also faced with the question of what relationship holds among the aspectual characteristics, the aspect-marker selection restriction, and the verb selection restriction. I will argue that these characteristics and restrictions arise from the semantic properties of the three locative constructions. Before I give my own account of these constructions, I first review some existing works on locative constructions in Chinese.

8.4 A Review of the Literature on the Locative Constructions

The previous works on the locative alternation in Mandarin pay special attention to the syntactic distribution of the locative expression. Some of these works take a derivational approach; others account for locative inversion in the framework of LFG.

8.4.1 Gu's Derivational Account

Gu (1992) comes up with a derivational account of the syntactic distribution of the location role. She compares the following two sentences. The two sentences both involve a preverbal location expression (a *zai*-less phrase) and a postverbal location expression (a *zai*-phrase) but the verbs in the two sentences are different. The verb

in (8.16a) is *fang* 'put', which is a three-place predicate and the verb in (8.16b) is *tang* 'lie', which is a one-place predicate.

(8.16) (Adapted from Gu (1992: 189:: 23)

      a.   *Zhuozi-shang fang yi-ben shu <u>zai na'er</u>*

             table-top   put one-CL book LOC there

             'On the table was put a book'.

      b.   *Wuzi-li   tang yi-ge   ren   <u>zai chuang-shang</u>*.

             room-inside lie   one-CL person LOC bed-top

             'In the room, a person lay in the bed.'

Gu assumes that sentence (8.16a) and sentence (8.16b) have the same deep structure, which is given in (8.16c). The postverbal-*zai* expression is the predicate in a small clause taken by the verb *tang* 'lie' as a second complement. The theme argument is base-generated in the Spec of VP. The preverbal location expression is base-generated in the IP Spec position.

c.　　The Deep Structure

```
                    IP
               ┌────┴────┐
             NPᵢ          I'
              │       ┌────┴────┐
              │       I         PrP
              │           ┌─────┴─────┐
              │          NPᵢ          Pr'
              │           │      ┌─────┴─────┐
              │           │     Prⱼ          VP
              │           │      │      ┌─────┴─────┐
              │           │      │     NPₖ          V'
              │           │      │      │      ┌─────┴─────┐
              │           │      │      │     Vⱼ          PrP
              │           │      │      │      │      ┌─────┴─────┐
              │           │      │      │      │    NPₖ          PP
              │           │      │      │      │      │          ╱ ╲

 zhuozi-shang  t  fang  yi-ben shu   t   PRO      zai na'er
 Wuzi-li       t  tang  yi-ge ren    t   PRO      zai chuangshang
 (outer location)      (theme)                    (inner location)
```
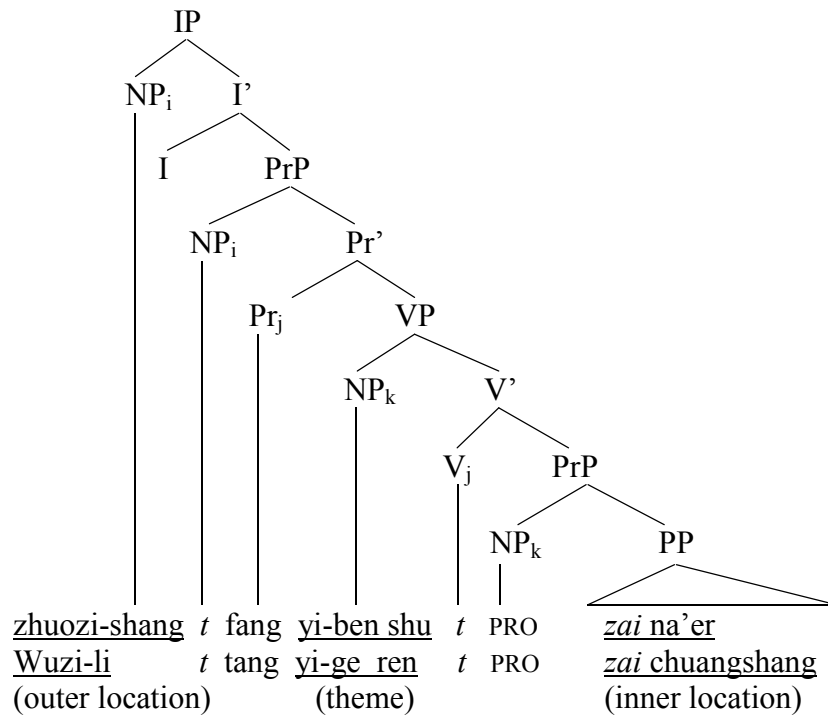
Fig-8.1

Leaving aside the theoretical discussion for the moment, I must point out that my native informants of Beijing Mandarin report that the co-presence of two locative phrases in a sentence is totally unacceptable. Such a sentence seems to be acceptable only when the 'inner location' expression is preceded by a pause; for example (8.17).

(8.17) a.　*Zhuozi-shang fang yi-ben shu, zai na'er*.

　　　　 table-top　　 put　one-CL book LOC there

　　　　 'On the table was put a book, (and it) was over there'.

　　 b.　*Wuzi-li　 tang yi-ge ren,　　 zai chuang-shang*.

　　　　 room-inside lie　one-CL person　LOC bed-top

　　　　 'In the room lay a person lay, (he) is in the bed.'

The sentences in (8.17) are used when there is a need for the speaker A to gesturally point out the specific position of the theme within the location expressed by the preverbal NP. And the postverbal *zai na*'er 'LOC there' is the demonstrative expression which is used simultaneously as the speaker gives a gestural sign. This can be best seen in the following dialogue with the relevant context.

(8.18) Context: A and B are peeping into a room. The following dialogue
     happens between A and B:
  A: *Shenme ye kan bu qing.*
    What also see NEG clear
    'Nothing can be seen clearly.'
  B: <u>*Wu-li*   *tang-zhe yi-ge ren*</u>, *zai chuang-shang.*
    room-inside lie-PROG one-CL person LOC bed-top
    'In the room was lying a person, on the bed.'

In the above dialogue, B's utterance is clearly separated into two parts. The 'inner' locative expression follows a pause. In the following dialogue, B's reply is interrupted; the 'inner' locative expression is added later in a second round of the dialogue.

(8.19) Context: the same as that in (8.18).
  A: *Shenme ye kan bu qing.*
    What also see NEG clear
    'Nothing can be seen clearly.'
  B: <u>*Wu-li*   *tang-zhe yi-ge ren,*</u> …
    room-inside lie-PROG one-CL person
    'In the room was lying a person...'

A: *Na'er ne?*

   where PRT

   'Where (specifically)?'

B: *Zai chuang-shang*!

   LOC bed-top

   'On the bed!'

Based on (8.18) and (8.19), I argue that with the preverbal locative phrase in a clause, the postverbal phrase *zai na'er* is a dangling locative expression that is contextually related to the preverbal locative phrase, which is why such a postverbal locative phrase is syntactically optional. In contrast, the preverbal locative NP is not optional for the locative inversion construction, e.g. (8.20).

(8.20) a.   *(*Zhuozi-shang*) *fang yi-ben shu*, (*zai na'er*).

   table-top   put one-CL book   LOC there

   'On the table was put a book, over there'.

   b.   * (*Chuang-shang*) *tang yi-ge ren*,   *zai chuang-shang*.

   bed-top   lie one-CL person LOC bed-top

   'In the room lay a person, on the bed.'

If my observation of the so-called 'inner' locative phrase is right, that is, it appears in a subsequent clause, the preverbal locative phrase and the postverbal locative phrase cannot co-occur within the boundary of a clause. Therefore, Gu's theoretical account loses its empirical foothold.

Even if we provisionally ignore the above problem with Gu's account, we still find problems with Gu's structural account of the canonical locative construction. Gu assumes that the canonical locative construction (8.21a) is an unergative

construction as (8.21b) shows. In this unergative construction, the postverbal-*zai* phrase is a prepositional phrase, and it is not predicated of the surface subject but is taken by the verb as its complement.

(8.21) a.   *Ta tang zai chuang-shang*. (Adapted from Gu (1992: 190: 24 & 25).

           he lie LOC bed-top

           'He lay on the bed.'

      b.   the deep structure tree of (8.21a)

```
                        IP
                     /      \
                  NPᵢ         I'
                   |        /    \
                   |       I       PrP
                   |             /     \
                   |          NPᵢ       Pr'
                   |           |       /    \
                   |           |     Prⱼ     VP
                   |           |      |       |
                   |           |      |       V'
                   |           |      |     /    \
                   |           |      |   Vⱼ      PP
                   |           |      |    |    /    \
                   ta          t    tang   t   zai  shuozi-shang
                  'he'              'lie'      'LOC'  'table-top'
```
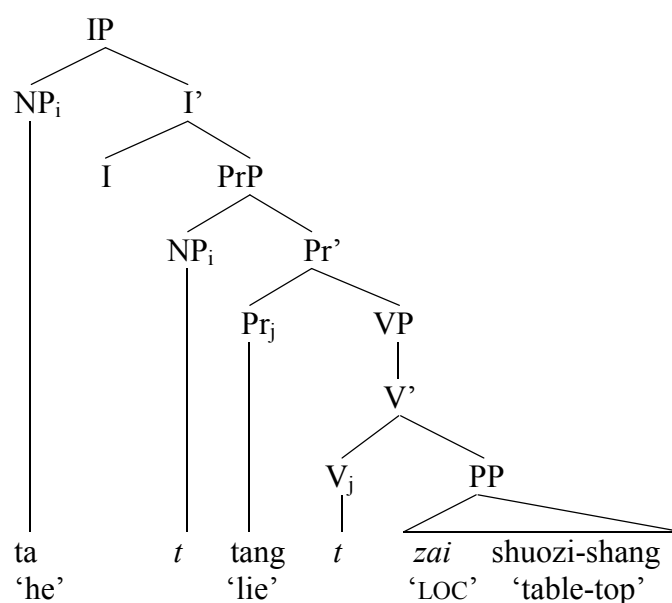
Fig-8.2

Gu correctly points out that the postverbal *zai* phrase expresses a resultant location; however she says nothing about how the aspect marker *le* follows the preposition *zai* rather than immediately following the verb. This issue has been addressed very little in the literature.

8.4.2 Three LFG Accounts

Lin (1990), Chang (1990) and Her and Huang (1998), all influenced by Bresnan and Kanerva's (1989) work, propose three different LFG accounts of locative inversion

in Mandarin. The three works all adopt the LFG hypothesis that the theme ranks higher than the location on the universal thematic hierarchy and that the two roles each have different encoding properties, which determine how they are realized syntactically. I review the three works below.

Lin (1990) assumes that the theme and location roles both have the disjunctive encoding feature [-r]/[+o], which means that these semantic roles can be realized either as any unrestricted (indicated by [-r]) grammatical functions such as the subject and the object, or specifically as the object (indicated by [+o]). The canonical construction has the mapping that the theme having the [-r] feature is realized as the subject and the location having the feature [+o] is realized as the object. In the inversion construction, the theme opts for the feature [+o] and is realized as the object; the location opts for the feature [-r] and it is realized as the subject.

Chang's (1990) LFG account of locative inversion also involves disjunctive intrinsic classification for the location role. In this account the location has the disjunctive feature [-o]/[+o], which means that the location can be mapped onto an object or a non-object function; the theme role consistently has the feature [-r] and it can be mapped onto either the subject or the object which is thematically unrestricted. In the canonical construction, the theme with the feature [-r] is mapped onto the subject and the location with the feature [+o] is mapped onto the object. In the inversion construction, the location opts for [-o] and it is realized as the subject; the theme opts for [-r] and it is finally mapped onto the object.

In Her and Huang's (1998) LFG account, by default the theme/patient always receive the feature [-r] and the agent always receives [-o], and all other thematic roles, including the location, receive no intrinsic feature values; instead, the location

is assigned some alternative syntactic feature through morphological operations on the verb. In the canonical construction, the location is assigned [+o] and is realized as the object and the theme, which has [-r], is mapped onto the subject. In the inversion construction, the theme is assigned [+o] in addition to the intrinsic [-r]. As a result the theme is mapped onto the object and the location, assigned [-r], is mapped onto the subject.

The common characteristic of the three LFG accounts of locative inversion is that they all attribute the syntactic variation to the syntactic features that thematic roles receive. They are different from each other in terms of how the thematic roles at issue obtain the syntactic features. Lin's and Chang's accounts are similar to each other since they both assume that the thematic roles carry inherent disjunctive features that license alternative syntactic realization. In contrast, Her and Huang's work assume that thematic roles can obtain different syntactic features through morphological operations that consequently give rise to argument alternation. Assuming that the syntactic variation of the location and theme roles arise from their inherent syntactic feature, these LFG accounts provide no explanation of the difference between the different locative construction in aspect marker selection and aspectual characteristics. The nature of the relationship between the alternative syntactic realization of location and the difference in aspect marker selection and aspectual characteristics remain as puzzles to be solved.

The LFG accounts of locative inversion are problematic with respect to the treatment of the word *zai*. Lin assumes that in the postverbal-*zai* construction, *zai* and the verb form a lexical compound, but Her and Huang point out that Lin's treatment of *zai* is empirically problematic. They raise two pieces of evidence against Lin's assumption: first, verb-*zai* cannot be a 'compound' because it cannot take an aspect marker. Her and Huang give an example of unacceptability where *zai*

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is followed by the aspect marker *zhe* for illustration. Second, the *zai*-phrase can also appear before the verb (the preverbal-*zai* construction) and so *zai* cannot be integrated into the verb. Instead, Her and Huang argue that *zai* is a preposition, a stance that Gu (1992) takes as well. I do not agree with Her and Huang's claim that verb-*zai* cannot take an aspect marker. Indeed, it cannot take the progressive aspect marker *zhe*, but it can take the perfect aspect marker *le*, as is clearly shown in my description. For example *Zhangsan zhan-zai-le zhongjian* 'Zhangsan stand-LOC-PFT middle' (=Zhangsan stood in the middle).

In short, the LFG theories of locative inversion can generate both the canonical construction and the inversion construction; but that's all that they can do. The questions of why *zai* in the inversion construction can take the perfect aspect marker, why the locative expression in the inversion construction does not involve *zai* and why there are such aspect and aspectual difference between various locative constructions remain to be answered.

8.5 An Alternative Hypothesis.

In contrast to the previous works on the locative construction in Mandarin, I hypothesize that the locative inversion construction and the canonical locative construction are two RVC family constructions, but that the preverbal-*zai* construction is not. The postverbal-*zai* construction (canonical) involves a resultative predicate *zai* whose theme argument is realized as the subject and the location argument as the object. The *zai*-less construction (inversion) involves a different resultative predicate, which is not syntactically expressed; this resultative predicate is synonymous with the verb *you* 'have' and its argument realization pattern is also similar to that of *you*: the possessor (experiencer-like) is realized as the subject and the possessum (theme-like) as the object. The RVC family hypothesis can not only explain the inverse argument realization at issue but also

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give a uniform account of the verb selection restriction, aspect marker selection restriction and aspectuality characteristics of the three locative constructions. I will explain this in the following space.

8.5.1 The *zai*-less Construction as an RVC Family Construction

The peculiarity of the *zai*-less construction is that it involves only one verb, unlike the postverbal-*zai* construction that involves a verb and *zai*. There is, however, evidence that the *zai-less* construction expresses two subevents, one is the event expressed by the verb and the other event is an event which is not encoded by any verb but is inferable in the construal of this construction. In some very formal, even somewhat archaic texts, the inferred event can be directly expressed by the verb *you*. Compare a and b sentences in (8.22) and (8.23).

(8.22) a. *Wuqi-shang ke-zhe   zhujianshi de mingzi.*
           weapon-top carve-PROG caster   PRT name
           'On the weapon was carved the caster's name.'

  b. *Wuqi-shang ke   you   zhujianshi de mingzi.*
      weapon-top carve have caster   PRT name
      'On the weapon was carved the caster's name.'

(8.23) a. *Feiye-shang xie   zhe   nian-yue-ri.*
           title.page-top write PROG year-month-day
           'On the title page was written year-month-day.'

  b. *Feiye-shang xie you   nian-yue-ri.*
      title.page-top write have year-month-day
      'On the title page was written year-month-day.'

(8.22a) and (8.22b) are semantically the same but (8.22a) involves only a single verb *ke* 'carve' whereas (8.22b) involves two verbs, *ke* 'carve' and *you* 'have'. This

semantic similarity and syntactic dissimilarity are also found between (8.23a) and (8.23b).

The instances where *you* 'have' is found expressing a locative event are not uncommon. The three examples below are idioms in which the verb *you* 'have' expresses a locative relation.

(8.24) a.   *Zhangsan xiong you cheng-zhu*

                 chest have ready-bamboo

       'Zhangsan seems to have got a well-thought-out plan.

       (Literally: Zhangsan, (his) heart has ready-bamboos.)

     b.   *Zhangsan xin-li   you gui*.

                 heart-inside have ghost

       'Zhangsan must have some wicked idea.'

       (Literally: Zhangsan, (his) heart has ghost.)

     c.   *Zhangsan duzi-li   you   huo*.

                 belly-inside have goods

       'Zhangsan has real learning.'

       (Literally: Zhangsan, (his) belly has goods.)

Literally, *cheng-zhu* 'ready-bamboo' in (8.24a) and *gui* 'ghost' in (8.24b) and *huo* 'goods' in (8.24c) are respectively possessed by *xiong* 'chest' and *xin* 'heart' and *duzi* 'belly'.

In passing, the idiom in (8.24a) has a variant involving *zai*, which is given in (8.25).

(8.25)   *Zhangsan <u>cheng-zhu   zai xiong</u>.*

                       ready-bamboo LOC chest

                       'Zhangsan seems to have got a well-thought-out plan.'

The correspondence between (8.24a) and (8.25) is only one of many instances of the correspondence between *you* and *zai*. The following examples are not idiomaticized expressions.

(8.26) a.   *Jiaoshi-li   you yi-qun   ren.*

                       classroom-inside have one-group person

                       'In the classroom there is a group of people.'

        b.   *Yi-qun   ren   zai jiaoshi-li.*

                       one-group person LOC classroom-inside

                       'A group of people are in the classroom.'

The semantic content of *you* is similar to that of *zai* but the arguments of the two predicates are realized in different ways. For *you* 'have', the theme argument is mapped onto the object position and the location argument on the subject position. For *zai*, the theme argument is mapped onto the subject position and the location onto the object position. I leave aside the question of why the two verbs have reverse argument structures although they seem to express the same event.

Coming back to the *zai*-less construction, we notice that an event expressed by *you* 'have' can also be expressed by a verbless construction; for example (8.27).

(8.27) a.   *gao-gao shan-shang   yi-ke   song*

                       tall-tall   mountain-top one-CL pine

                       'On the top of the high mountain there is a pine.'

b. *gao-gao shan-shang you yi-ke song-shu.*

tall-tall mountain-top have one-CL pine-tree.

'On the top of the high mountain there is a pine.'

Example (8.27a) consists of only two NPs but involves no verb indicating the conceptual relationship between them. This sentence is synonymous with example (8.27b), where *you* 'have' represents the conceptual relationship between two entities. The pair in (8.27) is not an isolated example. Another pair is given below.

(8.28) a. *Gao-gao shan-shang yi-ke song.*

tall-tall mountain-top one-CL pine

'On the top of the high mountain is a pine.'

b. *Tian-shang you yi-ge xiabing, di-shang you yi-ge xianjing.*

sky-top have one-CL pie ground-top have one-CL trap

'There is a pie in the sky and there is a trap on the ground.'

Example (8.28a) is a sentence of antithesis. The word *xian-bing* 'pie' and the word *xian-jing* 'trap' are a pair with both alliteration and rhyme. Changing the order of the argument expressions in (8.28) results in the unacceptable strings in (8.29).

(8.29) a. * *Yi-ke song gao-gao shan-shang.*

one-CL pine tall-tall mountain-top

b. * *Yi-ge xianbing tian-shang; yi-ge xianjing di-shang.*

one-CL pie sky-top one-CL trap ground-top

The Sentences in (8.29) are the negative evidence for the assumption that the unexpressed predicate and *you* 'have' share the same the semantics-syntax interface

property: the location argument must be mapped onto the subject position and the theme argument onto the object position.

More sentences are given below which demonstrate the interchangeability of *you* and the unexpressed predicate. When *you* is present syntactically, the sentence is an instance of RVC. When *you* is not present, the sentence is an instance of the *zai*-less construction.

[*YOU* CONSTRUCTION]

(8.30) a.　　*Zhentou-xiamian cang-you yi-zhi　qiang.*

　　　　　　pillow-bottom　　hide-have one-CL gun

　　　　　　'Under the pillow was hidden a gun.'

[ZAI-LESS CONSTRUCTION]

　　　b.　　*Zhentou-xia　cang-le yi-zhi　qiang.*

　　　　　　pillow-bottom hide-PFT one-CL gun

　　　　　　'Under the pillow was hidden a gun.'

Sentences (8.30a) and (8.30b) have the same subject and the same object and verbs of placement *cang* 'hide'. The only difference is that the predicate which takes the subject and the object as its two semantic arguments is expressed by *you* in (8.30a) but the same predicate is not expressed in (8.30b)[57].

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[57] Crosslinguistically, verbless constructions abound. In Russian the verb can be omitted in certain motion constructions (as well as in copular constructions), particularly when the manner of motion is not relevant, and when a telic goal of motion is expressed:

　　　i)　　*Kirill　　　v　magazine*　(Chidambara 2004)

　　　　　　Kirill-NON　to　store-ACC

　　　　　　'Kirill just got to the store.'

　　　ii)　　*Kirill　　iz　magazine*　(Chidambaram 2004)

　　　　　　Kirill-NOM　from　store-GEN

　　　　　　'Kirill just got back from the store'

To conclude, the *zai*-less construction is best analyzed semantically as an RVC family construction and it is similar to the agentive inversion construction in that the resultative subevent is not linguistically expressed by an independent verb. This implicit predicate in the semantic representation of the *zai*-less construction is conceptually equivalent to *you* 'have'. Next, I turn my attention to the question of why the argument structure of *zai* and that of *you* (and its unexpressed counterpart) are the reverse of each other.

8.5.2 The Postverbal-*zai* Construction versus the *zai*-less Construction

If we take the postverbal-*zai* construction and the *zai*-less construction as simple single-verb constructions, we are faced with a case of inverse argument realization: in the postverbal-*zai* construction, the location argument is realized as the object and the theme argument as the subject whereas in the *zai*-less construction, the location is realized as the subject and the theme as the object. The assumption that these two constructions are both RVC family constructions can easily account for this inverse argument realization phenomenon.

The postverbal-*zai* construction and the *zai*-less construction are two different RVC family constructions but these two constructions can share the same verb that expresses the first subevent and use different means to express the resultative subevent. The resultative subevent is expressed by *zai* in the postverbal-*zai* construction but it is expressed in a different way in the *zai*-less construction: the predicate for the resultative subevent only exists at the semantic level and its

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In German there is also an interesting verbless construction which conveys incredulity; it involves the morpheme *und*.

    iii)   *Larry und Arzt*?! (Sailer 2002)
              and doctor
              'Larry, a doctor?!'

argument structure is identical to that of the verb *you*, the location argument and the theme argument of which are respectively realized as the subject and the object. This explanation attributes inverse argument realization to different resultative predicates in two different RVC family constructions.

What remains unsaid about the inverse argument realization phenomenon is how one and the same resultative subevent can be semantically represented by two predicates that have inverse argument structures.

8.5.3 Same Event or Different Events: *you* versus *zai*

If we assume that *you* 'have' (and its unexpressed equivalent) and *zai* 'LOC' can both take location and theme arguments, they will have the following relationship (Fig-8.3).

(8.31)   A Comparison between *you* and *zai* (to be revised)

	SUBJECT	OBJECT
you	location	theme
zai	theme	location
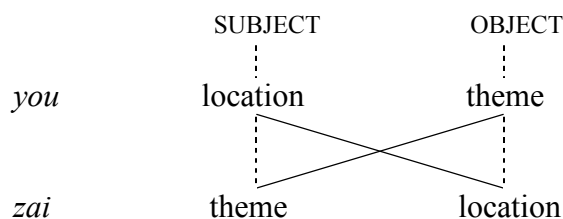
Fig-8.3

Two more examples are given to illustrate (8.31).

(8.32)   *Yi-zhi niao zai shu-shang.*

                one-CL bird LOC tree-top.

                'A bird was in the tree.'

(8.33)   *Shu-shang you yi-zhi niao.*

                tree-top   have one-CL bird

                'On the tree there was a bird.'

(8.32) and (8.33) are usually taken to be synonymous. Consequently, any theory that hypothesizes that location links to the subject and theme links to the object is supported by *you* but is challenged by *zai* and vice versa.

The problem about *you* versus *zai* with respect to their reverse argument structures is superficial since there is evidence that the arguments of *you* and those of *zai* do not bear the same semantic roles. The following examples show the difference between *you* and *zai* for expressing the 'same' event.

(8.34) a.   *Zhangsan you hen   duo   qian.*

                        have very much money

            'Zhangsan has a lot of money.'

    b.   * *Henduo qian   zai Zhangsan.*

           much   money LOC

    c.   *Zhei- zhuang loufang you   wu-ge chukou*

        this-CL   building have   five-CL exit

        'This building has five exits.'

    d.   * *Na wu-ge chukou zai   zhei-zhuang loufang.*

        that five-CL exit   LOC this-CL   building

In (8.34a), the subject *Zhangsan* is the possessor of the object *qian* 'money' and *you* 'have' expresses a possessive event. The possessive event cannot be expressed by the sentence (8.34b), which involves *zai*. The subject of (8.34c) is not a human or an animate entity but it is still understood as the possessor and the object is the possessum. The *zai* construction that is intended to express the same meaning is not acceptable, as is shown by (8.34d).

If *Zhangsan* (8.34) is replaced with *Zhangsan nai'er* 'Zhangsan there' (Zhangsan's place), the *you* sentence and its *zai* counterpart are both acceptable, e.g. (8.35b).

(8.35) a.   *Zhangsan na'er you hen duo   qian.*

                 there have very much money

         'In Zhangsan('s place) there is a lot of money.'

     b.   *Hen duo   qian   zai   Zhangsan na'er.*

         very much money LOC   there

         'A lot of money is in Zhangsan' place.'

To sum up, when *you* expresses a possessive event where , it cannot be paraphrased by *zai* but when *you* is used metaphorically to refer to a locative event, in which case when the a location is metaphorized as the possessor and the theme, as the possessum, the *you*-construction can be paraphrased by the *zai* construction. Since *you* and *zai* are two different verbs, there is no need to assume that the semantic roles that their respective arguments receive are the exactly same. The metaphoric relationship between *zai* and *you* are shown in Fig-8.4[58].

(8.36) A Comparison between *zai* and *you*
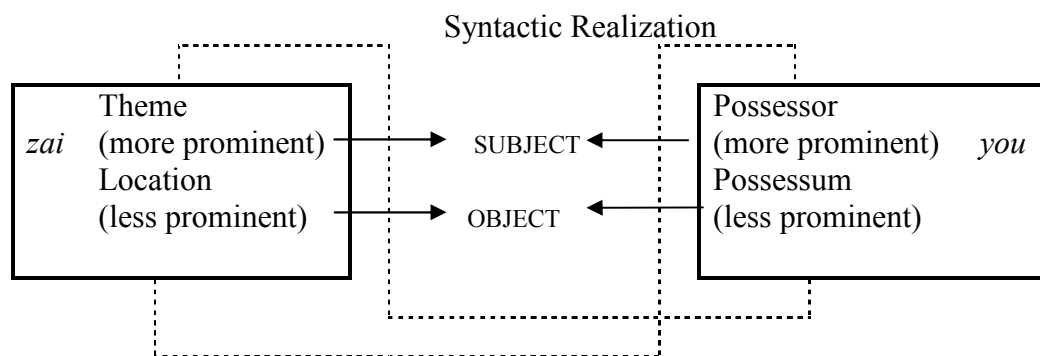
Fig-8.4

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[58] A similar example is the contrast between *please* and *like* in English (c.f. Grimshaw 1990). It is possible that these two verbs encode two different points of view on one and the same event; each of the two points of view establishes a pair of semantic roles.

8.5.4 A Unified Explanation of Two Restrictions

The assumption that the postverbal-*zai* construction and the *zai*-less construction are two different RVC family constructions provides a straightforward explanation of the verb selection restriction and the aspect marker selection restriction.

The postverbal-*zai* construction has a fixed V_2 *zai*, expressing a locative subevent, the *zai*-less construction has an implicit resultative predicate, representing a possessive subevent. The semantic relationship between the two subevents within a complex event constitutes the constraint over the selection of V_1. Only verbs that can express a proper first subevent can enter this construction. The first subevent can be a causative subevent, such as a placement, a creation or a processing, which can result in the appearance of an entity at a location or it can be a manner subevent, such as a physical configuration. A verb of physical configuration is ambiguous and has either manner construal[59] or causative construal; for example, *zuo* 'sit' can refer to either the manner that an entity takes at a location or a subevent that results in the appearance of the entity at a location. Plainly speaking, *zuo* 'sit' can mean either *sit* or *sit down*. The same explanation also holds for the inversion construction (the *zai*-less construction).

Under the hypothesis that the postverbal-*zai* construction and the *zai*-less construction are RVC family constructions, the aspect marker restriction can be explained. The explanation of the aspect marker restriction in the postverbal-*zai* construction is straightforward: no aspect marker can appear between the verb and *zai* but the aspect marker *le* can appear in the post-*zai* construction. Since *zai* is V_2, there is nothing strange about an aspect marker following it just as it does in a typical case of RVC. The fact that the aspect marker that follows *zai* can only be *le* (or *guo*) but cannot be *zhe* can be directly explained if this construction is analyzed

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[59] In this case, the relationship between the two subevent is coexistential rather than resultative.

as a type of RVC. The resultative subevent is a momentary event and therefore *zhe* cannot appear.

Another question is why both *le* and *zhe* can occur in the *zai*-less construction. My explanation is that the construction is an RVC family construction but does not have a lexicalized V_2 so the aspect marker can apply either to the resultative predicate or to the first predicate. If the verb is understood as a manner (such as *zhan* 'stand'), then the manner and the locative subevent is a simple state, it is not surprising that a manner verb can take the durative marker *zhe*. If the verb is understood as a causative subevent, still with *zhan* 'stand' as the example, then the presence of *le* indicates that the first subevent has been completed. In this case the verb of physical configuration *zhan* 'stand' is usually taken to express an activity, roughly similar to *step forward and stand*.[60] A verb of placement or creation such as *gua* 'hang' or *ke* 'carve' can also occur in the locative inversion construction. If it co-occurs with the perfect aspect marker *le*, it expresses a causative subevent that has already happened, resulting in a resultative-locative subevent. If it co-occurs with the progressive aspect marker *zhe*, it expresses a manner. For example, *gua* 'hang' can express an hanging event or a hanging manner, which is reflected in the adjectival use of *gua* 'hang' in *gua gou* 'hang hook' (= (a) hanging hook).

To summarize, the RVC family hypothesis uniformly explains the restrictions of verb selection and aspect marker selection on the postverbal-*zai* and *zai*-less constructions as well as inverse argument realization. What needs to be added is that

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[60] Levin and Rappaport-Hovav (1995: 127) distinguish two readings of the English verb *stand*. They propose that in a sentence *Yvonne stood alone* (*in the hallway*), the verb *stand* has a maintain position meaning but the same verb has an assume position meaning in the sentence *Yvonne stood* (*up*). The dynamic reading that I refer to in this thesis is not the assume position meaning but rather an occupy position meaning, that is, the agent of an activity comes to occupy a location, holding a standing configuration. The assume position meaning is expressed by *zhan-qilai* 'stand-rise' (=stand up) in Chinese.

there is a slight difference between the two RVC family constructions in verb selection. The verb of physical movement can not appear in the *zai*-less construction as freely as they do in the postverbal-*zai* construction. This difference is addressed in the next section.

8.5.5 Verbs of Physical Movement in the *zai*-less Construction

The verbs of physical movement such as *zou* 'walk', *pao*, 'run', *pa* 'crawl' can appear in the *zai*-less construction when the progressive aspect marker is *zhe* but they can rarely appear in this construction when the perfect aspect marker is *le*.

(8.37) a. ?? *Tianshang fei-le yi-zhi haiou.*

    sky-top   fly-PFT one-CL seagull

  b.   *Tianshang fei-zhe yi-zhi haiou.*

    sky-top   fly-PROG one-CL seagull

    'In the sky was flying a seagull.'

Sentences in (8.37) involve the co-occurrence of the verb *fei* 'fly' and the aspect marker *le* and so the sentence is unacceptable. (8.37b) involves a different aspect marker *zhe* and is acceptable.

The exclusion of these verbs from the *zai*-less construction when *le* is the selected aspect marker can be accounted for semantically. The co-occurrence of a verb of this semantic class and *le* results in the meaning of *departure*, for example:

(8.38) a$_1$.   *Zhangsan zou-le.*

      walk-PFT

    'Zhangsan went away.'

  b$_1$.   *Zhangsan pao-le.*

      run-PFT

'Zhangsan ran away.'

c₁.   *Niao fei-le.*

bird fly-PFT

'The birds flew away.'

The combination of this type of verb and *le* can also have a non-departure meaning when some conditions are met; for example, if there is a postverbal temporal phrase. This is illustrated by the following three sentences.

(8.38) a₂.   *Zhangsan zou-le   san-ge xiaoshi.*

walk-PFT three-CL hour

'Zhangsan walked for three hours.'

b₂.   *Zhangsan pao-le san-ge   xiaoshi.*

run-PFT three-CL hour

'Zhangsan ran for three hours.'

c₂.   *Niao fei-le san-ge xiaoshi.*

bird fly-PFT three-CL hour

'The birds flew for three hours.'

When a verb of physical movement co-occurs with *le*, a semantic incompatibility between the departure subevent and the locative subevent occurs. Put simply, the verb-*le* implies that something leaves a place but the locative subevent means something is at a place. This incompatibility explains why the verbs of physical movement are not possible to the *zai*-less construction if they are accompanied by the perfect marke *le*.

To digress, the verb *fei* 'fly' does not have any inherent meaning of *going away* nor does the aspect marker have anything to with *going away*. The question is how the

combination of *fei* 'fly' and *le* gives rise to the meaning of *going away*. The answer goes as follows.

Now we examine the semantic property of *le*. There are three views about the semantic information that this aspect marker gives according to Sybesma's (1997) literature review:

First, *le* expresses completion. This view is obviously problematic. The sentence in (8.38a$_2$) has *le* in it but the meaning is that the *walking* event has lasted three hours since its beginning and the event is not over.

Second, *le* must be interpreted as indicating something like inchoativity or inception. An example is given in (8.39) (c.f. Sybesma 1997:218).

(8.39)   *Zhangsan gao-le*

                      tall-PFT

               'Zhangsan has become tall.'

In the sentence (8.39), *le* does not signal the termination (Smith 1990) of the state of being tall but rather means that *Zhangsan* enters into the state of being tall, which implies the inception of a state, contra the claim that the aspect marker at issue expresses termination.

Third, *le* is interpreted differently with different types of predicates. It expresses completion when following verbs that denote an action which can be completed but expresses 'a change to a new situation' when following verbs expressing quality or a state of being (c.f. Sybesma 1997). When a bounded predicate takes *le*, the

completion reading arises. When an unbounded predicate takes *le*, the inception plus progression meaning arises.

What can be abstracted from the previous analyses of *le* is that this aspect marker expresses a critical point of time where one state of affairs ends and another state of affair starts, i.e. it expresses a change of state or achievement.

A verb of physical movement such as *fei* 'fly' expresses an unbounded event and *le* can impose the meaning of inception onto this verb - the inception of flying is taking off. It is predictable that if the subject is understood as a source rather than a location, the sentence may sound better. This prediction is empirically borne out. The sentences (8.40a) and (8.40b) are the same syntactically; it is a wellformed sentence for the meaning in (8.40b) but it is not for the meaning in (8.40a).

(8.40) a. **Wuding-shang fei-le   yi-zhi   niao.*

      roof-top   fly-PFT one-CL bird

    # 'A bird flew away and it was on the roof as a result'

    b. *Wuding-shang fei-le   yi-zhi   niao.*

      roof-top   fly-PFT one-CL bird

    'A bird flew away from the roof.'

A source can be understood as a former location from which an entity disappears after the first subevent. The obtainment of a source reading is a matter of pragmatics. In the following sentences, the locative NPs are not easy to be understood as source and the sentences are difficult to be judged as fully acceptable.

(8.41) a. ?? *Woshi-li   fei-le   yi-zhi   haiyou .*

      bedroom-inside fly-PFT one-CL seagull

'From the bedroom flew away a seagull.'

b. ?? *Woshi-li*　　　*pa-le*　*yi-tiao chong.*

　　　bedroom-inside crawl-PFT one-CL worm

　　　'From the bed room crawled away a worm.'

(8.41a) is difficult to accept since birds rarely occur in a bedroom and it is hard to imagine that a sea bird flies away from a bedroom. (8.41b) is difficult to accept since a worm crawling out of a bedroom is a rather unfamiliar scene. But if there is a proper context, these sentences may turn out to be fully acceptable.

The co-occurrence of a verb of movement and the progressive marker *zhe* in the *zai*-less construction is easier to accept. In the *zai*-less construction the resultative predicate is not syntactically realized, so I assume that the progressive marker *zhe* applies directly to the only verb that expresses the first subevent. In this case, an ongoing event can be viewed as a manner, just like a physical configuration.

(8.42) a. *Shucong-zhong fei-zhe　henduo mifeng.*

　　　bushes-middle fly-PROG　many　bee

　　　'In the bushes were flying many bees.'

b. *Tiankong-zhong fei-zhe　xueduo haiou.*

　　　sky-middle　　fly-PROG　many　seagull

　　　'In the sky were flying many seagulls.'

(8.43) a. *Yuanye-shang　benpao-zhe　lingyang he shizi.*

　　　wilderness-top　run-PROG　antelope and　lion

　　　'In the wilderness were running antelopes and lions.'

b. *Dimian-shang pa-zhe　　da-qun mayi.*

　　　ground-top　swarm-PROG big-CL　ant

　　　'On the ground were swarming a large number of ants.

To conclude, whether an instance of the *zai*-less construction with a verb of movement is acceptable or unacceptable is determined by the lexical semantics of the verb, the grammatical meaning of the aspect marker and the meaning of an RVC family construction.

8.5.6 An Echo of the Preceding Chapter

In the previous chapter it was said that the verbs of accommodation such as *zhu* 'reside' and *shui* 'sleep' can appear in the locative inversion construction. If we assume that these verbs express manners just as the verbs of physical configuration, it is easy to understand why they are involved in inverse argument realization.

The verbs of accommodation can appear both in the locative inversion construction and the agentive inversion construction. Their speciality lies in their lexical semantics. These verbs happen to be polysemous and they disjunctively encode simple events and two different types of complex events. In the latter cases, the subject and the object are the syntactic realizations of the participants of the resultative subevent, put in the traditional way (the subevent is either a satisfaction subevent or a YOU-locative subevent). The inverse argument realization effect arises out of pragmatic inference that establishes the semantic relationships between the subject, object and verb that expresses the first subevent. Next I will give a Dynamic Syntax account of the construction of the different patterns of argument realization through left-to-right parsing processes.

8.6 A Dynamic Syntax Account of Locative Alternation

The fine-grained semantic analysis of the locative constructions shows that the three basic locative constructions are semantically different from each other. Put in a parsing perspective, the three locative constructions are three different meaning-

constructing dynamic processes, which yield different semantic representations. I will now demonstrate the processes.

8.6.1 Parsing the *you*-Type Locative Constructions

I call the verbless locative construction, the *you* construction and the *zai*-less construction (locative inversion) collectively as the *you*-type locative constructions since I hypothesize that the semantic interpretations of these constructions all include a resultative predicate YOU. I will start with the verbless locative construction.

(8.44) *Tian-shang yi-ge   xianbing.*

sky-top   one-CL pie

'In the sky there is a pie.'

The locative expression is parsed just like an ordinary argument expression, i.e. the parse is triggered by ?Ty(e) on an unfixed node constructed through applying *Adjunction. But immediately after parsing the locative subject, a second argument expression is parsed. Attention should be paid to the fact that no verb is parsed between the two argument type expressions. The question is how the two argument expressions are logically connected. To solve this problem, I assume that an abductive inference is invoked, through which a propositional template is constructed.

(8.45) a. Parsing *Tianshan*

$$Tn(0), ?Ty(t) , \Diamond$$

$$<\uparrow_*>Tn(0),$$
$$Ty(e), Fo(Tian\_shang')$$

Fig-8.5

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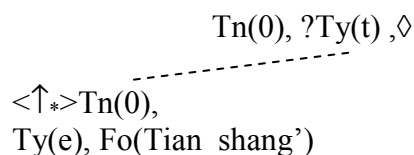
b. Abduction of Possessive Predication

IF	?Ty(t)
THEN	make($<\downarrow_0>$);go($<\downarrow_0>$); put(Ty(e_s)), freshput (s, Fo(s)); go($<\uparrow_0>$);
	make($<\downarrow_1>$); go($<\downarrow_1>$); put(?Ty($e_s{\rightarrow}t$));
	make($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e)); go($<\uparrow_0>$);
	make($<\downarrow_1>$); go($<\downarrow_1>$); put(?Ty(e${\rightarrow}$($e_s{\rightarrow}t$)));
	make($<\downarrow_1>$); go($<\downarrow_1>$);
	put(Ty(e${\rightarrow}$(e${\rightarrow}$($e_s{\rightarrow}t$))), Fo($\lambda y\lambda x\lambda t$.YOU($t, x, y$)), [$\downarrow$]$\perp$);
	go($<\uparrow_1>$); make($<\downarrow_0>$); go($<\downarrow_0>$); put(?Ty(e))
ELSE	1

Through the pragmatic actions, a propositional template is constructed. ?Ty(e) on the propositional template triggers the standard α-action. The unfixed node Merges with the external argument node.

(8.45) c. Parsing *Tian-shang yi-ge xianbing*

Tn(0), ?Ty(t) ,$\Diamond$

Ty(e_s), Fo(s)   ?Ty($e_s{\rightarrow}t$)

~~?Ty(e)~~, Ty(e), Fo(Tian_shang')   ?Ty(e${\rightarrow}$($e_s{\rightarrow}t$))

~~?Ty(e)~~, Ty(e), Fo(ε, v, Xianbing'(v))   Ty(e${\rightarrow}$(e${\rightarrow}$($e_s{\rightarrow}t$))),
Fo($\lambda y\lambda x\lambda t$.YOU($t, x,y$)), [$\downarrow$]$\perp$

Fig-8.6

The head functor node is annotated with a formula that weakly expresses the meaning of *you* 'have'. Suppose this abductive inference does not happen, there is only one result: the string is unintelligible as word salad.

Next, I look into the parse of the locative inversion construction (the *zai*-less construction). I take (8.46) for example:

(8.46)   *Qiang-shang xie-le   yi-ge zi*.

        wall-top   write-PFT one-CL character

        'On the wall was written a character.'

(8.47) a.   Parsing *Qiang-shang*

$$Tn(0),\ ?Ty(t)\ ,\Diamond$$

$$<\uparrow_*>Tn(0),\ Ty(e),$$
$$Fo(Qian\_shang')$$

Fig-8.7

What is parsed next is the explicit verb *xie* 'write'. The formula on the unfixed node is conceptually unsuitable for either of the two individual argument nodes on the propositional template projected by the verb if we assume that the verb projects a simple propositional template because the two argument nodes represent the agent and the theme role. I assume that the parse of the verb *xie* 'write' triggers the following lexical actions.

(8.47) b.   *xie* 'write'

IF $?Ty(t)$

THEN make $(<\downarrow_0>)$; go$(<\downarrow_0>)$; put$(?Ty(e_s))$;

        make $(<\downarrow_1>)$; go $(<\downarrow_1>)$; put $(Ty(t\rightarrow e_s), Fo(\lambda P.(\ \varepsilon, \mathbf{S}, P)))$; go$(<\uparrow_1>)$;

        make $(<\downarrow_0>)$; go $(<\downarrow_0>)$; put $(?Ty(t))$;

        make $(<\downarrow_0>)$; go $(<\downarrow_0>)$; put $(Ty(e_s), Fo(\mathbf{S}))$; go$(<\uparrow_0>)$;

        make $(<\downarrow_1>)$; go $(<\downarrow_1>)$; put $(?Ty(e_s\rightarrow t))$;

        make $(<\downarrow_0>)$; go $(<\downarrow_0>)$; put $(?Ty(e))$; go$(<\uparrow_0>))$;

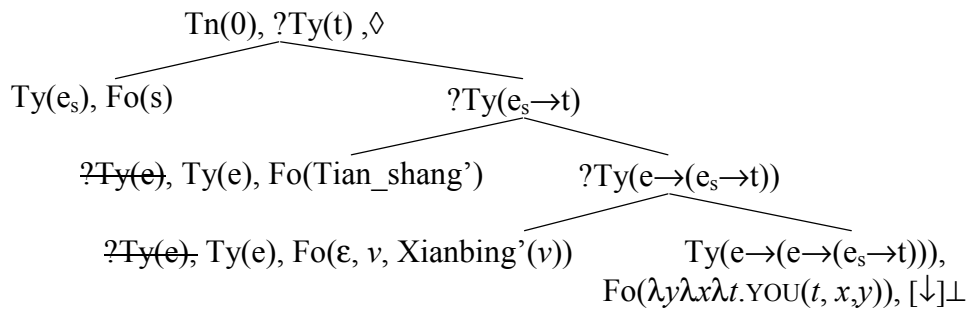   make $(<\downarrow_1>)$; go $(<\downarrow_1>)$; put $(?Ty(e\rightarrow(e_s\rightarrow t)))$;

        make $(<\downarrow_1>)$; go $(<\downarrow_1>)$;

        put $(Ty(e\rightarrow(e\rightarrow(e_s\rightarrow t))), Fo(\lambda y\lambda x\lambda t.Xie'(t, x, y)), [\downarrow]\bot)$; go$(<\uparrow_1>)$;

        make $(<\downarrow_0>)$; go $(<\downarrow_0>)$; put $(?Ty(e))$; go$_{first}\uparrow$ $(?Ty(t))$; go$_{first}\uparrow$ $(?Ty(t))$;

        make $(<\downarrow_1>)$; go $(<\downarrow_1>)$; put $(?Ty(e_s\rightarrow t))$;

        make $(<\downarrow_0>)$; go $(<\downarrow_0>)$; put $(?Ty(e))$; go$(<\uparrow_0>)$;

        make $(<\downarrow_1>)$; go $(<\downarrow_1>)$; put $(?Ty(e\rightarrow(e_s\rightarrow t)))$;

        make $(<\downarrow_1>)$; go $(<\downarrow_1>)$;

        put $(Ty(e\rightarrow(e\rightarrow(e_s\rightarrow t))), Fo((\lambda x\lambda y\lambda t.\text{YOU}'(t, y, x)), [\downarrow]\bot)$; go$(<\uparrow_1>)$;

        make $(<\downarrow_0>)$; go $(<\downarrow_0>)$; put $(?Ty(e))$

ELSE   Abort

(8.47) c.   Parsing *Qiang-shang xie*(-*le*)

$$\text{Tn(0), ?Ty(t)}$$

$\langle\uparrow_*\rangle$Tn(0)
Fo(Qiang_shang'), ?Ty(e_s)
Ty(e)

?Ty(t)   Ty(t→e_s)   ?Ty(e)   ?Ty(e→(e_s→t))
                   Fo(λP.[ε, **S**, P])

Ty(e_s), Fo(**S**)   ?Ty(e_s→t)   ?Ty(e) , ◊   Ty(e→(e→(e_s→t))),
                                                                                          Fo(λxλyλ*t*.YOU(*t*, y, x)),
                                                                                          [↓]⊥

?Ty(e)   ?Ty (e→ (e_s→t))

?Ty(e)   Ty(e→(e→ (e_s→t))),
                   Fo(λ*y*λ*x*λ*t*.Xie'(*t*, *x*, *y*)), [↓]⊥

Fig-8.8

As the complex propositional template is constructed, the pointer appears at the internal argument node on the resultative propositional template. The open requirement at this node triggers the standard α-actions and obtains the formula Ty(e), Fo(ε, *v*, Zi'(*v*)). The unfixed argument node Merges with the external argument node of the hypothetical resultative propositional template. The two argument nodes of the first propositional template obtain formulae respectively through Thematic Abduction, and Metavariable Insertion plus Substitution. The situation metavariable **S** is instantiated by a situation variable s. The effects of these operations are shown in Fig-8.9.

(8.47) e.   Parsing *Qiang-shang xie-le yi-ge zi*

$$?\text{Ty}(t)$$

$$?(\text{Ty}(e_s)) \qquad\qquad ?\text{Ty}(e_s{\rightarrow}t)$$

$$?\text{Ty}(t) \qquad \text{Ty}(t{\rightarrow}e_s) \quad \text{Ty}(e), \text{Fo}(\text{Qiang\_shang'}) \quad ?\text{Ty}(e{\rightarrow}(e_s{\rightarrow}t))$$
$$\text{Fo}(\lambda P\,[\varepsilon,\,s,\,P])$$

$$\text{Ty}(e_s),\text{Fo}(s) \quad ?\text{Ty}(e_s{\rightarrow}t) \qquad\qquad\qquad \text{Ty}(e), \qquad\quad \text{Ty}(e{\rightarrow}(e{\rightarrow}(e_s{\rightarrow}t))),$$
$$\qquad\qquad\qquad\qquad\qquad\qquad \text{Fo}(\varepsilon,\,v,\,\text{Zi'}(v)),\,\Diamond \quad \text{Fo}(\lambda x\lambda y\lambda t.\text{YOU}(t,\,\text{y},\,\text{x})),$$

$$\text{Ty}(e),\text{Fo}(\varepsilon,\,u,\,\text{Xiezhe'}(u)) \qquad ?\text{Ty}\,(e{\rightarrow}(e_s{\rightarrow}t)) \qquad\qquad\qquad\qquad\qquad [\downarrow]\perp$$

$$\text{Ty}(e),\,\text{Fo}(\mathbf{V}) \qquad \text{Ty}(e{\rightarrow}(e{\rightarrow}(e_s{\rightarrow}t))),$$
$$\Uparrow \qquad\qquad \text{Fo}(\lambda y\lambda x\lambda t.\text{Xie'}(t,\,x,\,y)),\,[\downarrow]\perp$$
$$\text{Ty}(e),\,\text{Fo}(\varepsilon,\,v,\,\text{Zi'}(v))$$
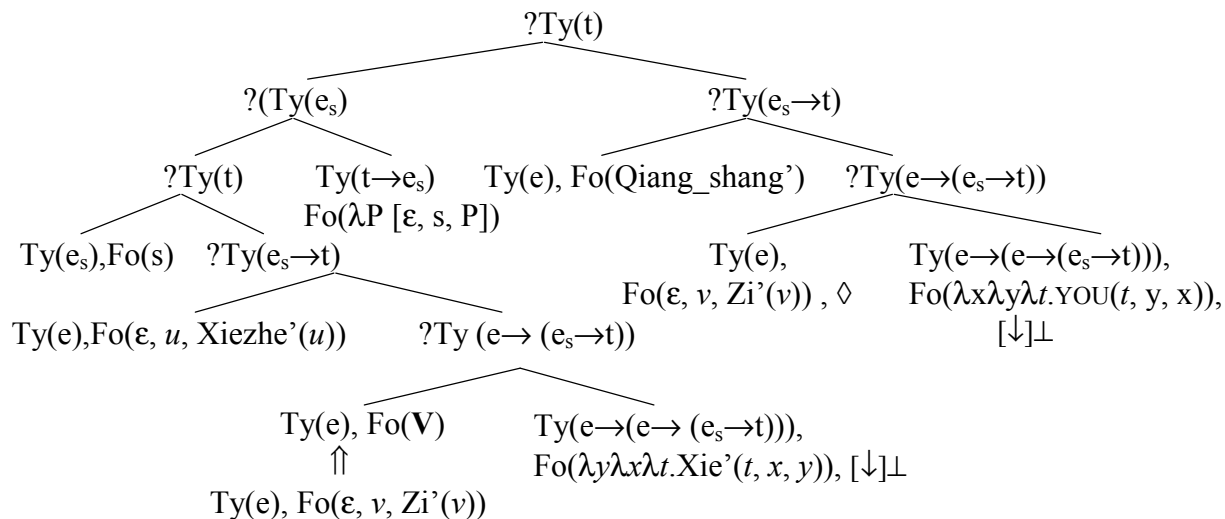
Fig-8.9

In this parsing process, the construction of the interpretation relies not only on the lexical input but also inference. If the verb projects a simple propositional template, ?Ty(e) at the internal argument on the propositional template directly trigger the standard α-actions, through which the node is annotated with the formula Ty(e), Fo(ε, *v*, Zi'(*v*)), and subsequently the unfixed node Merges with the external argument node of the propositional template; this Merge results in an unreasonable semantic interpretation, in which *qiang-shang* 'wall-top' is taken to be the agent, which is impossible. The assumption that a complex propositional template is constructed out of parsing a locative inversion construction avoids the occurrence of a conceptually problematic logical form.

8.6.2 Parsing the Locative Constructions with *zai*

The locative constructions with *zai* include the simple *zai* construction, the preverbal-*zai* construction, and the postverbal-*zai* construction. The *zai* construction is a simple transitive construction. The parsing process is so simple that I will not reproduce it here. The parse of the postverbal-*zai* construction is the same as that of a typical RVC sentence. I take the parse of the following sentence for example.

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(8.48)   *Zi   xie-zai   zhongjian*

       character   write-LOC middle

       'The character was written in the middle.'

(8.49) a.   Parsing *zi xie*

$Tn(0), ?Ty(t)$

$\langle\uparrow_*\rangle, Tn(0)$
$Ty(e), Fo(\varepsilon, x, Zi'(x))$

        $\langle U\rangle Tn(0), ?Ty(t), \Diamond$

   $?Ty(e_s)$ $?Ty(e_s \rightarrow t)$

        $?Ty(e)$ $?Ty(e\rightarrow(e_s\rightarrow t))$

             $?Ty(e)$ $Ty(e\rightarrow(e\rightarrow(e_s\rightarrow t))), Fo(\lambda x\lambda y\lambda t.Xie'(t, y, x)), [\downarrow]\bot$

                        Fig-8.10
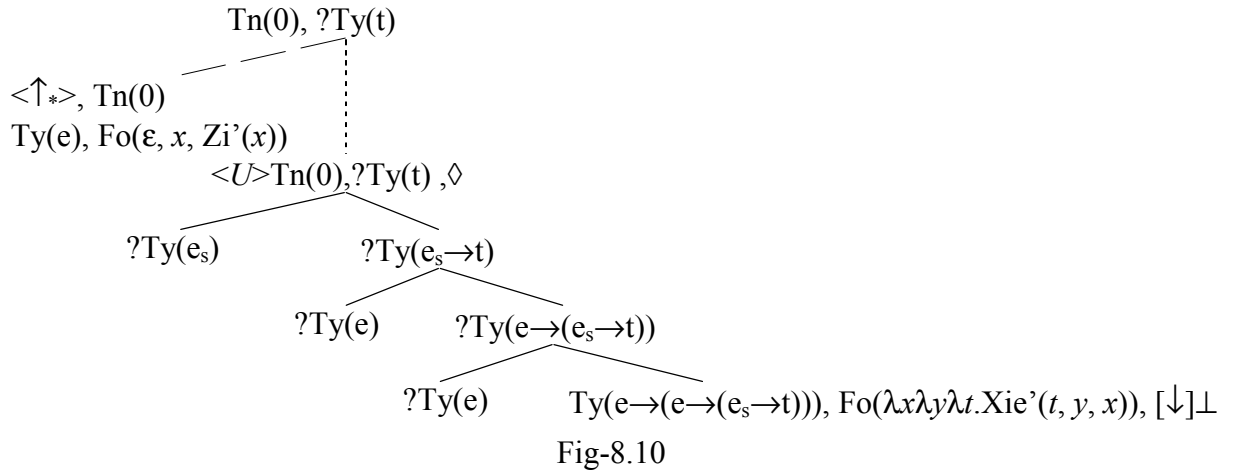
(8.49) b. *zai*

IF	$?Ty(t)$
THEN	IF $\langle\downarrow_0\rangle ?Ty(e_s)$
	THEN $go(\langle\downarrow_0\rangle); put(Ty(e_s)), \mathbf{S}); go(\langle\uparrow_0\rangle);$
	$make(\langle\uparrow_0\rangle; go(\langle\uparrow_0\rangle); put(?Ty(e_s));$
	$make(\langle\downarrow_1\rangle); go(\langle\downarrow_1\rangle); put(Ty(t\rightarrow e_s), Fo(\lambda P.[\varepsilon, \mathbf{S}, P])); go(\langle\uparrow_1\rangle);$
	$make(\langle\uparrow_0\rangle); go(\langle\uparrow_0\rangle); put(Tn(n), ?Ty(t));$
	$make(\langle\downarrow_1\rangle); go(\langle\downarrow_1\rangle); put(Ty((e_s\rightarrow t));$
	$make(\langle\downarrow_0\rangle); go\langle\downarrow_0\rangle); put(?Ty(e)); go(\langle\uparrow_0\rangle);$
	$make(\langle\downarrow_1\rangle); go(\langle\downarrow_1\rangle); put(?Ty(e\rightarrow(e_s\rightarrow t)));$
	$make(\langle\downarrow_1\rangle); go(\langle\downarrow_1\rangle);$
	$put(Ty(e\rightarrow(e\rightarrow(e_s\rightarrow t))), Fo (\lambda x\lambda y\lambda t.Zai'(t, y, x), [\downarrow]\bot); go(\langle\uparrow_1\rangle);$
	$make(\langle\downarrow_0\rangle); go(\langle\downarrow_0\rangle); put(?Ty(e))$
	ELSE Abort
ELSE	Abort

The pointer is located at the internal argument node on the resultative propositional template. $?Ty(e)$ triggers lexical input, through which the current node obtains the formula of the locative expression $Fo(Zhongjian')$, $Ty(e)$. The unfixed node then Merges with the external argument node on the resultative propositional template. The formula at the external argument node on the resultative propositional template

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is copied onto the internal argument node on the first propositional template through Metavariable Insertion plus Substitution. The external argument node on the first propositional template receives a thematic formula through Thematic Abduction. Through these actions, the partial tree is updated as follows.

(8.49) c.　　Parsing *zi xie-zai zhongjian*.

$$?Ty(t), \Diamond$$

$$?Ty(e_s) \qquad ?Ty(e_s \to t)$$

$$?Ty(t) \quad Ty(t \to e_s) \qquad Ty(e), Fo(\varepsilon, w, Zi'(w)) \quad ?Ty(e \to (e_s \to t))$$
$$Fo(\lambda P.[\varepsilon, \mathbf{S}, P])$$

$$Ty(e_s), Fo(\mathbf{S}) \quad ?Ty(e_s \to cn_s) \qquad\qquad Ty(e), Fo(Zhongjian') \quad Ty(e \to (e \to (e_s \to t))),$$
$$Fo(\lambda x \lambda y \lambda t. Zai'(t, y, x)),$$

$$Ty(e), Fo(\varepsilon, u, Xiezhe'(u)) \qquad ?Ty(e \to (e_s \to t)), \qquad\qquad [\downarrow]\bot$$

$$Ty(e), Fo(\mathbf{V}) \qquad Ty(e \to (e \to (e_s \to t))),$$
$$\Uparrow \qquad\qquad Fo(\lambda y \lambda x \lambda t. Xie(t, x, y)), [\downarrow]\bot$$
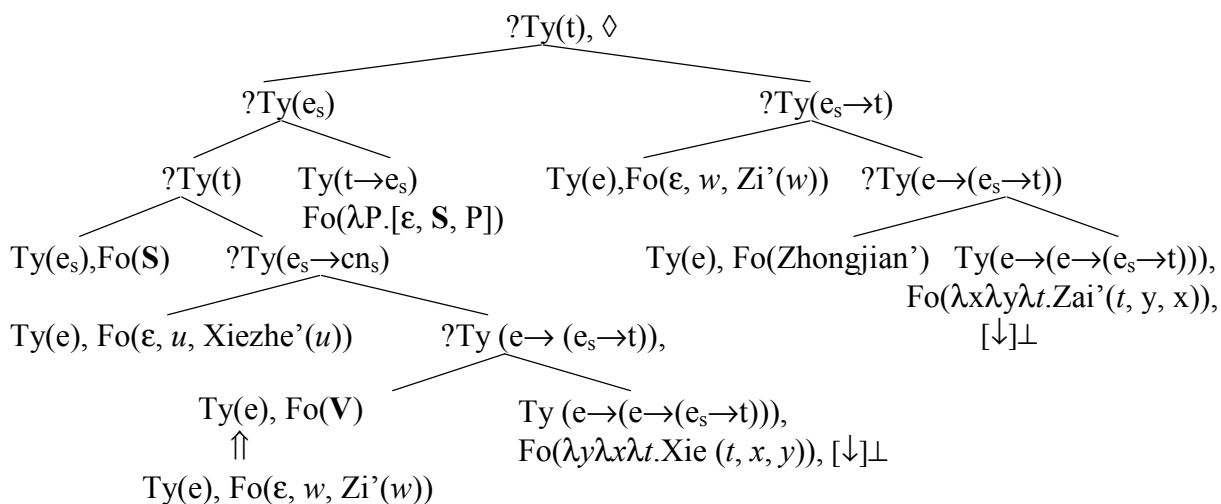$$Ty(e), Fo(\varepsilon, w, Zi'(w))$$

Fig-8.10

When no outstanding requirement is left on the complex tree, the formulae at the nodes are combined through function application. I will not go into details of these operations since they are like those in RVC (see Chapter 6).

Finally, I treat the preverbal-*zai* construction. In this construction, the locative phrase expresses a locative circumstance of the event expressed by the verb. We take the following sentences for example.

(8.50)　　　　*Zhangsan zai huanyuan-li　　kan　xingxing*.

　　　　　　　　LOC garden-inside look star

　　　　'Zhangsan watched stars in the garden.'

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(8.51)   *Zhangsan zai benzi-shang xie   zi.*

                    LOC book-top   write character

        'Zhangsan wrote a character on the book.'

The parse of this (8.50) goes as follows.

(8.52) a.   Parsing *Zhangsan*

$$Tn(0), ?Ty(t)$$

$$<\uparrow_*>Tn(0), Ty(e), Fo(Zhangsan'), \lozenge$$

Fig-8.11

The *zai* phrase in this construction is an adjunct, expressing the circumstance in which an event occurs. The *zai* predicate takes the event as whole as its theme argument. I assume that the parse of *zai* projects an independent propositional template, the external argument of which turns out to be the event argument of the propositional template projected by the verb parsed later on[61]. Then let's assume that the parse of *zai* triggers the following lexical actions.

(8.52) b.   *zai* (preverbal position)

IF $Tn(0), ?Ty(t)$
THEN   make($<\downarrow_0>$); go($<\downarrow_0>$); put ($Ty(e_s)$), put($s_i, Fo(s_i)$);
        make($<L>$); go($<L>$); put ($<L^{-1}><\uparrow_0>Tn(0), ?Ty(t)$);
        put($<\downarrow_*>, Fo(s_i), Ty(e_s)$)
        make($<\downarrow_0>$); go($<\downarrow_0>$); put($Ty(e_s)$, freshput ($s_j, Fo(s_j)$)); go($<\uparrow_0>$);
        make($<\downarrow_1>$); go($<\downarrow_1>$); put($?Ty(e_s \rightarrow t)$);
        make($<\downarrow_1>$); go($<\downarrow_1>$); put($?Ty(e \rightarrow (e_s \rightarrow t))$);
        make($<\downarrow_1>$); go($<\downarrow_1>$);
        put($Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t)))$,Fo($\lambda x \lambda y \lambda t.Zai'(t, z, x)$), $[\downarrow]\bot$); go($<\uparrow_1>$);
        make($<\downarrow_0>$); go($<\downarrow_0>$); put($?Ty(e)$)
ELSE   Abort

---

[61] Note that the status of *zai* in the preverbal position is ambiguous because in some cases *zai* is not followed by any verb but acts as a main predicate by itself. For example *Zhangsan zai huayuan-li* 'Zhangsan LOC garden-inside' (=Zhangan was in the garden.). In this case, the *zai* phrase obviously does not function as an adjunct. I assume that in real communication, the listener can always use contextual information to determine whether *zai* is an adjunct or a main predicate by itself.

The partial tree is updated as is shown below.

(8.52) c.　　　Parsing *Zhangsan zai*

$Tn(0), ?Ty(t)$

$<\uparrow_*>Tn(0),$　　$Ty(e_s),$　$Fo(s_i)$
$Fo(Zhangsan')$

$<L^{-1}><\uparrow_0>Tn(0), ?Ty(t), <\downarrow_*>, Ty(e_s), Fo(s_i)$

$Ty(e_s), Fo(s_j)$　　　$?Ty((e_s \to t))$

$?Ty(e)$　　　$?Ty(e \to (e_s \to t)))$

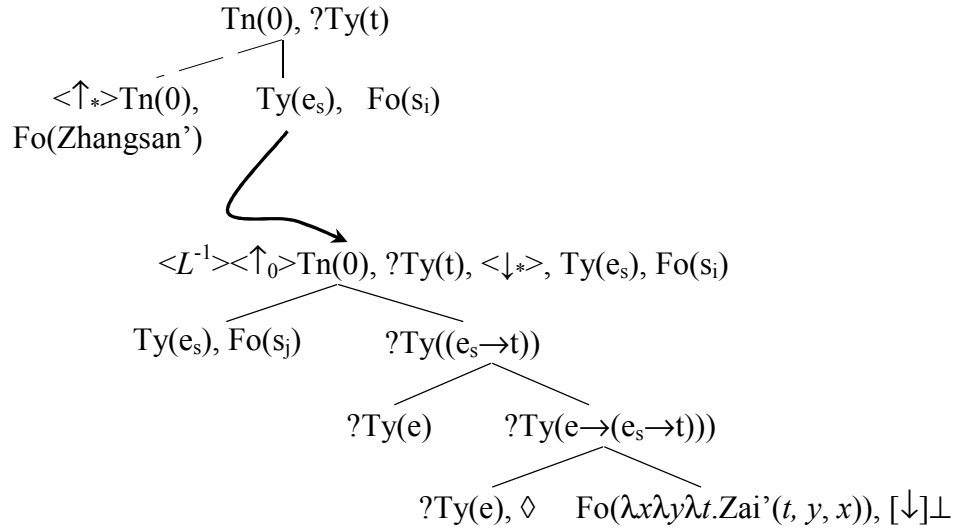$?Ty(e), ◊$　　$Fo(\lambda x \lambda y \lambda t.Zai'(t, y, x)), [\downarrow]\bot$

Fig-8.12

Simply, the information on the Link mother node is copied onto the Linked structure on an unfixed node, as is shown in Fig-8.12. The only fixed node that this unfixed can Merge with is the external argument node projected by the parse of *zai* (see Fig-8.13 below). As the information at issue appears on the external argument node, the situation is understood as a theme of *zai*.

Following *zai*, the locative expression *huayuan-li* 'garden-inside' is parsed. The situation variable at the event argument node on the matrix tree is directly copied onto the internal argument node on the Linked structure. The pointer is put in the internal argument node on the Linked structure. The requirement $?Ty(e)$ at the current node triggers the parse of the post-*zai* expression. Subsequently, the pointer returns to the matrix tree through the application of the Link Completion rule. The parse of the verb *kan* 'see' constructs a propositional template under the topnode of the matrix tree. The internal argument node on the matrix structure receives a

formula Fo(Xingxing'), Ty(e). The external argument node receives the formula Fo(Zhangsan'), Ty(e) through Merge.

(8.52) d.   Parsing *Zhangsan zai hua yuan-li kan xingxing*.

Tn(n), ?Ty(t)

Ty(e_s), Fo(s_i)   ?Ty($e_s \rightarrow$t)

Ty(e),   ?Ty(e$\rightarrow$($e_s \rightarrow$t)))
Fo(Zhangsan')

Ty(e),   Ty (e$\rightarrow$(e$\rightarrow$($e_s \rightarrow$t))),
Fo(Xingxing') , ◊   Fo($\lambda x \lambda y \lambda t$.Kan'($t$, y, x),
[↓]⊥

$<L^{-1}><\uparrow_0>$Tn(0), Ty(t), Fo(Zai'(s_j, s_i, Huayuan_li'))

Ty(e), Fo(s_j)   ?Ty(e$\rightarrow$t)

Ty(e),Fo(s_i)   ?Ty(e$\rightarrow$($e_s \rightarrow$t))

Ty(e),   Fo($\lambda x \lambda y \lambda t$.Zai'($t$, y, x)), [↓]⊥
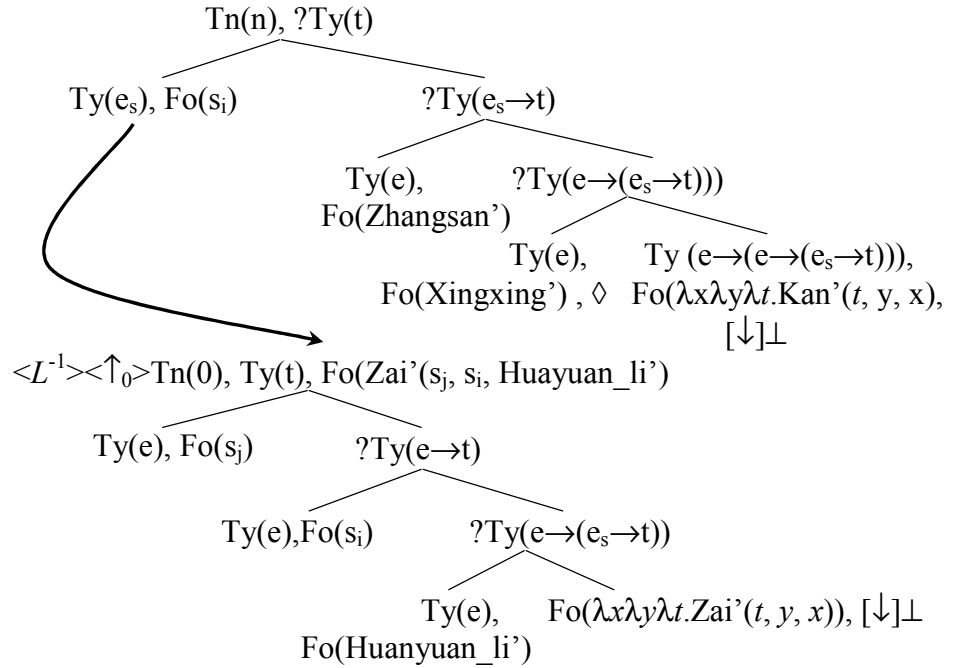Fo(Huanyuan_li')

Fig-8.13

The event argument of the matrix tree, it should be noted, is now copied as an individual argument onto the external argument node on the Linked structure. This means that the event argument s_i on the matrix tree as a whole is an individual argument of *zai*. In other words, the event s_i and the garden stand in a locative relation and this locative relation is taken to be an independent event s_j. The information on the two Linked trees needs to be combined through the application of the following Link Evaluation rule.

(8.52) e. Link Evaluation (Adjunct in Mandarin)

IF   Tn(n), Fo(φ), Ty (t), $<L^{-1}>$MODTn (n), Fo (ψ), Ty (t)
THEN   put(Tn (n), Fo (φ ∧ ψ) Ty (t), $<L^{-1}>$MOD Tn (n), Fo (ψ), Ty (t))
ELSE   1

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(8.52) f.　　　Completing the parse of *Zhangsan zai huayuan-li kan xingxing*.

$Tn(0)$, $?Ty(t)$, $Fo(Kan'(s_i, Zhangsan', Xingxing') \wedge Zai(s_j, s_i, Huayuan\_li'))$, ◊

$Ty(e_s)$, $Fo(s_i)$　　　　$?Ty(e_s \rightarrow t)$

$Ty(e)$,　　　$?Ty(e \rightarrow (e_s \rightarrow t)))$
$Fo(Zhangsan')$

$Ty(e)$,　　$Ty(e \rightarrow (e \rightarrow (e_s \rightarrow t)))$,
$Fo(Xingxing')$　$Fo(\lambda x \lambda y \lambda t.Kan'(t, y, x))$,
$[\downarrow] \perp$

$<L^{-1}><\uparrow_0>Tn(0)$, $Ty(t)$, $Fo(Zai'(s_j, s_i, Huayuan\_li'))$

$Ty(e)$, $Fo(s_j)$　　　　$?Ty(e \rightarrow t)$

$Ty(e)$,$Fo(s_i)$　　$?Ty(e \rightarrow (e_s \rightarrow t))$

$Ty(e)$,　　$Fo(\lambda x \lambda y \lambda t.Zai'(t, y, x))$, $[\downarrow] \perp$
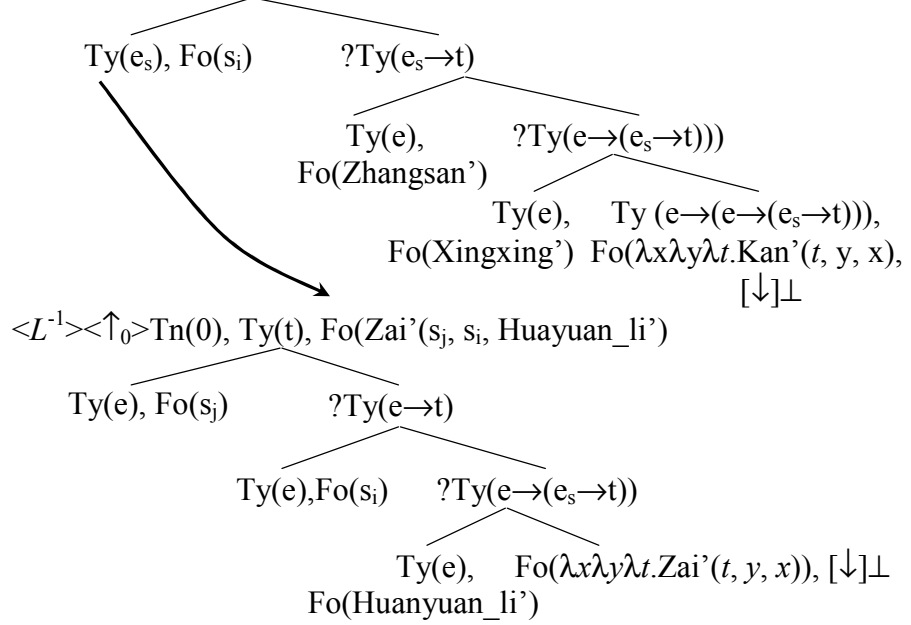$Fo(Huanyuan\_li')$

Fig-8.14

The formula $Fo(Kan'(s_i, Zhangsan', Xingxing') \wedge Zai(s_j, s_i, Huayuan\_li'))$ obtained through the above parsing process has the meaning that there is an event s_i that is a location relation between a location 'in the garden' and a theme which is a second event s_i, i.e. Zhangsan's watching stars.

8.7 Conclusion

The three basic locative constructions in Chinese have the following semantics-syntax interface characteristics. The *zai*-phrase in the preverbal-*zai* construction and the *zai*-phrase in the postverbal construction have different semantic relationships to the verb. The postverbal-*zai* construction only selects a limited number of verbs in that this construction is semantically an RVC family construction and the semantic relationship between the *zai*-phrase and the verb constitutes a constraint on the selection of the verbs that can enter this construction. The *zai*-less construction (locative inversion) is also a RVC family construction in semantics, in which the

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resultative predicate is not linguistically expressed by an independent lexical form. The parses of the three different constructions are dynamic meaning-building processes, yielding three different semantic representations.

Particularly, the locative inversion (*zai*-less) construction and the agentive inversion construction treated in the previous chapter are parsed in similar ways. The locative-inverting verbs and the agentive inverting verbs contribute a complex propositional template, which ensures the occurrence of conceptually sound logical forms. The two sub-propositions within a complex proposition do not have equal status: the resultative sub-proposition is the matrix assertion. To reiterate, both the locative inverting verbs and the agentive inverting verb constitute closed sets. These verbs have their own lexical semantic properties, i.e. they encode disjunctive packages of information, which are alternatively activated in different contexts. The lexical semantic properties of these verbs allow them to undergo argument alternation described in the literature.

Chapter Nine
Conclusions and Prospects

9.1 Retrospection of the Current Research

This thesis presents an exploration of argument alternation in Mandarin from a parsing perspective in the framework of Dynamic Syntax. It solves the puzzle of inverse argument realization in three cases: the inverse argument realization in the resultative verb construction (RVC), the locative inversion construction, and the agentive inversion construction. Inverse argument realization is linguistically important because it directly challenges the general principle of argument realization that various previous theories of argument realization agree upon: the more prominent (agent-like/proto-patient) argument is realized as the subject and the less prominent argument (patient-like/proto-patient) is realized as the object. The thesis argues that inverse argument realization is not a real violation of the principle but rather a superficial phenomenon. Standing in a parsing perspective, the thesis proposes that argument realization is the obtainment of semantic content of the arguments entailed by a verb through different parsing processes. Inverse argument realization arises out of pragmatic inference in a dynamic process of meaning construction; verbs that are involved in argument alternation make different contributions, i.e. projecting different propositional templates, when appearing in different patterns of argument realization.

In the Dynamic Syntax account of the argument realization patterns in RVC, I assume that different patterns of argument realization are diverse semantic relationships constructed through left-to-right parsing of RVC sentences. The parse of the second verb happens in the context that includes the information contributed

by the parse of the first verb. The parse of the second verb projects a complex event term of which the proposition headed by the semantics of the first verb is a restrictor.

The canonical and inverse argument realization patterns in RVC equally arise in these parsing processes where some semantic relationships are established through strict lexical actions while others are pinned down through pragmatic actions. Specifically, in parsing a sentence of RVC, a complex semantic tree is constructed step by step. The grammatical subject always contribute a formula whose semantic status is always unfixed preliminarily. The unfixed semantic status of the grammatical subject makes it possible that it can become a semantic argument of either the first or the second verb; and this special status of the grammatical subject makes it possible that a number of different patterns of argument realization can come into being since the unfixed node that accommodates the conceptual formula of the grammatical subject can potentially Merge with any fixed argument node to be created in later parsing stages.

Furthermore, the two verbs in RVC have different semantic statuses in the semantic representation of RVC; the arguments of the second verb must be syntactically expressed but those of the first verb do not have to be syntactically expressed. Based on these facts, I assume that the individual argument nodes on the propositional template projected by the second verb must obtain semantic formulae from the grammatical subject and/or the grammatical object; this can be ensured by stipulating a small number of constraints on the computational and lexical actions through which these argument nodes get annotated with semantic formulae. On the other hand, I assume that the semantic formulae on the propositional template projected by the second verb can be copied onto the individual argument nodes on the propositional template projected by the first verb as long as the copying does not result in weird semantics. In the cases where the semantic content of the

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grammatical subject happens to appear on the internal argument node on the propostional template projected by the first verb, whether through Merge or copying, and the semantic content of the grammatical object happens to appear on the external argument node on the propositional template projected by the first verb through copying, the phenomenon of inverse argument realization involving the first verb in RVC arises.

My explanation of the agentive inversion and loative constructions is based on the account of the argument realization of RVC. The parse of the inversion construction yields a complex propositional formula which represents a complex event that consists of two subevents. The complex proposition includes two predicates; one is the semantic representation of a first subevent and the other is the semantic representation of the second (resultative) subevent. Though having no independent linguistic form, the resultative predicate - like the resultative predicate in all instances of RVC - requires its arguments to be syntactically expressed, i.e. its referents are obtained through Merge and the standard α-actions, a set of actions that ensure that any noun phrase parsed after the verb is not construed as a matrix subject. The contents of the two arguments of the resultative predicate is copied to the arguments of the first predicate. In this way, the diverse inverse argument realization phenomena observed in Mandarin are theoretically unified.

Importantly, the Dynamic Syntax account of inverse argument realization invokes the assumption of lexical polysemy, namely, the inverting verb projects different propositional templates in different parsing processes, which gives rise to different patterns of argument realization. Lexical polysemy and context interact with each other to decide what contribution a polysemous verb makes to the construction of a proposition in a particular parsing process. The polysemy assumption well respects

native spearkers' intuition that canonical constructions and inverse constructions do not express exactly the same meanings.

To achieve the goal of accounting for the various properties of these constructions, it was necessary to extend the machinery of DS. In particular to develop the notion of the event argument, showing how different predicates may interact to decorate and extend different aspects of the propoisition: as primary predicate or as restrictor on an event variable. As part of this development, I have also shown that it is possible for the axiomatic definitions of general computational rules of Kempson et al. (2001) and Cann et al. (2005) to be stated in the procedural format of lexical entries, except for the rule of Merge. This rule, which fixes an unfixed node, is not statable procedurally as it involves unification of labels and their values. This implies that there is something intrinsically different about this rule whose properties ought to be further researched.

9.2   Argument Realization: Static Perspective versus Dynamic Perspective

To echo the beginning of this thesis, argument realization is a central issue in any grammar (c.f. Baker 1997). Nevertheless, this issue has long been examined in the frameworks where a grammar is hypothesized as a collection of static structures. Argument realization, therefore, is largely understood as the correspondence between semantic roles and the components of static syntactic structures in generative grammar frameworks, whether transformational or non-transformational. Generative grammars are closely related to traditional grammar. This link between generative grammars and traditional grammar is reflected in the fact that the former retain syntactic functions which come from the latter. For example, the concepts such as subject and object are adopted in Chomsky's earlier work (Chomsky 1965). Although subject and object are no longer theoretical primitives in the latest GB/MP

framework, the basic structural concepts formerly known as subject and object still play important parts. In LFG (c.f. Dalrymple 2001), subject and object are also adopted as part of some abstract static structures that are assumed to be a fundamental component in natural language. But it has never been made clear enough in what sense the abstract function structure is abstract. In my Dynamic Syntax account of argument realization in Mandarin, preverbal argument expressions and postverbal argument expression assume different semantic statuses the moment they are parsed. A preverbal argument expression preliminarily obtains an unfixed semantic status, a semantic underspecification that must be updated in the following parsing stages, especially when a verb is parsed; otherwise, the parsing process will be finally failed. A postverbal argument expression obtains its final semantic status immdiately when it is parsed since a full propositional template is already available thanks to the parse of a verb. This difference between preverbal and postverbal argument expression is also found between argument expressions taking different case-markers in those languages that have sophisticated case-marking systems, such as Latin and Greek. To my knowledge, in Greek and Latin, the nominative case does not directly indicate the semantic role that the argument taking such a case marker has, in contrast to many other case-markers (c.f. Cann 2001; Haspelmath 2006). The nominative case in Greek/Latin and the preverbal position in Mandarin are two different coding strategies of similar computational actions that can be activated in parsing: these actions establish underspecified semantic statuses of argument formulae. It is no wonder, now, why the preverbal position in Chinese and the nominative case in many Indo-European languages are both taken to be the coding strategies of the same syntactic function in traditional grammar. In this way, we obtain a fresh understanding of the abstractness of grammatical functions such as subject and object that many structuralist theories posit. The substance of the abstractness of different grammatical functions is the

dynamics that different argument expressions contribute to driving processes of constructing propositional formulae.

Correspondingly, argument realization is understood in Dynamic Syntax as how various argument nodes on propositional templates obtain referents through different meaning-building actions. Argument alternation, particularly inversion, turns out to be different parsing processes that yield different semantic representations. In a parsing process, the initial semantic statuses of some argument expression are underspecified and need to be fixed through pragmatic inference as more information is available. Other argument expressions may directly receive fixed semantic statuses. Importantly, verbs that are observed undergo argument alternation are polysemous, i.e. these verbs, as they are parsed in different contexts, project different propositional templates which represent different interpretations. In some cases, an alternative verb projects a simple propositional template but in other case the same verb projets a complex propositional template. Different propositional template represent the construction of different meanings. This Dynamic Syntax account of argument alternation, at least in Chinese, is successful because it adequately takes into account the semantic variation involved in argument alternation which has been shown to be real through many diagnoses. The semantic difference that motivates argument alternation has little been taken seriously in previous studies, which is reflected in the general hypothesis in those words that the meanings of alternating verbs remain the same across various alternative syntactic patterns in which they appear. On the other hand, Dynamic Syntax shows its advantage in demonstrating the contribution of pragmatic inference to language comprehension. To repeat, for example, the agentive inversion construction involves a subject which is the patient of the following verb. If the sentence is parsed just as its canonical counterpart, a weird reading will arise. On this occasion, it is the parser's world knowledge that helps him/her to realize that the verb at issue cannot

just project simple propositional template but instead it should project a complex propositional template through which a natural understanding is ensured. In this dynamic parsing process, the lexical semantics of the preverbal expression, the verb, the world knowledge of a parser are all involved so such a dynamic account of phenoemena of inverse argument realization is not only theoretically sound but also compatible with our intuition on how sentences are understood.

9.3 Prospects for Future Research on Argument Realization in Mandarin

This research successfully gives a unified explanation of different phenomena of argument alternation that have been long treated as distinct phenomena in previous works on Mandarin Chinese. While answering many questions, this work raises many others, both empirical and theoretical. These questions are simply left unaddressed in the thesis. In this section, I briefly outline some of these questions.

9.3.1 *Ba/Bei*-Construction and RVC in Mandarin

The *ba*/*bei* construction in Mandarin, which has caused much controversy in the literature, is closely related to RVC. The pre-*bei* argument expression and the post-*ba* argument expression are always understood as an argument of V_2 in the *ba/bei*-RVC construction. Here are some examples for a quick glimpse.

(9.1) a. *Zhangsan ba Lisi da-(pao)-le.*

             BA   hit-run-PFT

         'Zhangsan hit Lisi (and as a result Lisi ran away.)

    b. *Lisi bei Zhangsan da-(pao)-le.*

             BEI   hit-run-PFT

         'Lisi, (was) hit by Zhangsan, (and) ran away.'

In (9.1a), the post-*ba* expression *Lisi* must be understood as the argument of *pao* 'run'. Similarly, in (9.1b), the pre-*bei* expression *Lisi* must be understood as the argument of *pao* 'run'. As the bracketing annotations in the two examples indicate, the position that V₂ *pao* 'run' occupies can be empty, in which case, the *ba/bei* construction involves only a single verb. Since Wang (1943), it has been long claimed that the pre-*bei*/post-*ba* expression in a *ba/bei*-V construction must be the less prominent argument of a two-place verb. However, the following RVC examples show that this claim is wrong.

(9.2) a.   *Zhangsan ba shoujuan   ku-*(shi)-le.*

                      BA handkerchief cry-wet-PFT

        'Zhangsan made his handkerchief wet by crying.

      b.   *Shoujuan   bei Zhangsan ku-*(shi)-le.*

           handkerchief BEI   cry-wet-PFT

           'The handkerchief, (because) Zhangsan cried, became wet.

In (9.2), the two sentences are wellformed with the resultative verb *shi* 'wet'; however, they are illformed without the syntactic presence of the resultative predicate.

Based on (9.1) and (9.2), it is possible to hypothesize that all instances of the *ba/bei* construction are variants of the *ba/bei*-RVC, where the post-*ba*/pre-*bei* argument expression is the semantic argument of a resultative predicate. A simple *ba/bei*-V construction arises when the resultative predicate is not independently lexicalized but exists as part of the lexical semantics of a polysemous verb. A verbs that disjointly encodes a simple event and a complex event usually has such a characteristic that the simple event that it encodes is one that has a potential result. On the basis of this characteristic of alternating verbs, we can predict that a verb that

does not have this characteristic usually is not polysemous and cannot enter *ba/bei* construction. Given a verb like *xiang* 'resemble', we intuitively know that a 'resembling' event usually does not have a potential result and we expect that it cannot appear in the *ba/bei*-construction. This is true. See the following examples.

(9.3)   a.   *Zhangsan xiang   ta baba*.

                resmble he father

          'Zhangsan resembles his father.'

     b.   * *Zhangsan ba ta baba xiang-le*.

                 BA he father resemble

     c.   * *Zhang-de   baba bei ta xiang-le*.

              Zhangsan's father BEI he resemble

Furthermore, if the *ba/bei* construction is really a variant of RVC, we are faced with the question of how this variant is motivated and the question of what *ba/bei* contributes to constructing semantic interpretations of the *ba/bei* sentences. These questions are left open for future research.

9.3.2   A Reflection on Unrealized Arguments and Its Implication

In my Dynamic Account of argument realization, I stipulate that Thematic Abduction only applies to an argument node on a propositional template that falls in the domain of the restrictor of a term. This stipulation is made on empirical basis. With this stipulation, I account for many unattested patterns of argument realization in transitive RVC sentences. However, we should not forget that the verb in a single-verb sentence can also have an unrealized argument. At the moment we are forced to assume that the propositional template that this verb projects must also fall in the domain of an event term. In other words, a sentence of this kind must involve complex predication. Accordingly, we predict that the sentence *Zhangsan chi-le* 'Zhangsan eat-PFT', where the food is unspecifiable, should mean more than

Zhangsan's *having eaten something*. This prediction seems intuitively right since such a sentence is usually used to express such an event like *Zhangsan has eaten something and he is full* but the latter part of the meaning does not have an independent lexical form. Similarly the sentence *Chuanghu da-le* 'window hit-PFT' expresses the meaning that *the window was hit and it was broken*; the latter part of the meaning does not have an independent lexical form either. On the basis of these observations, we can further hypothesize that that all the verbs that undergo 'detransitivization' alternation must have the property that they express simple events when they are used transitively but they express complex events when they are used intransitively. Briefly, the verbs that can undergo transitive/intransitive alternation are similar to those verbs that can undergo inversion in the sense that they contribute different semantic information in different contexts. Many of these verbs in Mandarin are taken to express activity in the literature. If my analysis is right, we have to re-consider the semantic content of these verbs. They cannot just express activities; instead, they encode disjunctive packages of information that are activated in different contexts. Since so far there has not been a full-fledge theory about lexical semantics in the framework of Dynamic Syntax. The current research make a initiation of developing a theory of lexical semanticsin Dynamic Syntax but this is just a beginning and much further work is needed to establish such a theory.

9.3.3   Speculation on Crosslinguistic Generalization

In this thesis, I propose a Dynamic Syntax account of inverse argument realization in Mandarin Chinese and an essential point in my theory is that inverting verbs project different propositional templates in different patterns of argument realization. In this pentultimate section, I consider the prospects of extending the current analysis across languages. The language that I choose for this speculative discussion is English because it is the language that I am familiar with and because many data of inverse argument realization have been well described in the literature.

Bresnan (1994), based on Bresnan and Kanerva (1989), provides a thorough description of locative inversion in English, which involves two locative constructions. The postverbal locative construction is taken to be the canonical construction and the preverbal locative construction is taken to be the inversion construction. Two pairs of English examples are given in (9.4) and (9.5).

(9.4) a. *My friend Rose was sitting among the guests.*

b. *Among the guests was sitting my friend Rose.*

(9.5) a. *On that hill appears to be a located a cathedral.*

b. *Over my windowsill seems to have crawled an entire army of ants.*

c. *In these villages are likely to be found the best example of this cuisine.*

According to Bresnan (1994), English locative inversion construction has the following characteristics:

First, there is a verb selection restriction on this construction. The English verbs that can undergo locative inversion can be classified into three types. The first type includes *be*; the second type includes the verbs of physical configuration and movement, such as *sit*, *stand*, *lie*, *come* and so on; the third type includes some passivized transitive verbs, such as *be seated*, *be found*, *be placed* and so on. Second, the location is realized as a prepositional phrase in both the caonical construction and the inversion construction in English, unlike its Chinese counterpart: the location is alternatively realized either as a *zai*-phrase or as a *zai*-less phrase. Third, there exists grammatical agreement between the theme phrase and the verb in both the canonical construction and the inversion construction in English[62].

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[62] With respect to this phenomenon in English, many theories have been proposed, including Coopman's (1989) derivational account, Rochemont (1996) and Rochemont and Culicover's (1990) focus-based account among others and Birner's (1992, 1994 and 1996) discourse familiarity-based

In the light of my analysis of Chinese, the question arises as to whether it can be used to account for the English locative from a semantic point of view. Assume that the semantic representation of the locative inversion in English includes an abstract predicate in addition to the predicate lexicalized as the inverting verb. The abstract predicate, semantically similar to YOU 'have' in Chinese, has two arguments, which are respectively the possessor and the possessum; and they are mapped onto the subject and the object. What's more, there is crosslinguistic evidence that a possessor argument takes a locative case marker; for example in Estonian, the possessor takes the allative case; *Johnil on pliiats* 'John.ALL.SG have.PRS.3SG pen.NOM.SG' (=John has a pen); and the allative case marker is actually a locative case meaning on (Merilin Miljan p.c.via email); this piece of evidence supports the assumption that the prepositional phrase in the locative inversion construction is a possessor.

Along this line of thought, one may assume that a preposition in English has two different functions. It can be either a case marker or a predicate; in other words, a locative preposition in English is polysemous. In the locative inversion construction, a preposition is a case marker; in the canonical construction, a preposition is a predicate. This assumption is theoretically well fitted with Dynamic Syntax because the parse of one and the same word in different contexts can trigger different lexical actions. A preposition in the canonical locative construction and its counterpart in the locative inversion construction are parsed in different contexts. It is likely that two different sequences of lexical actions are induced. Additionally, I

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account and so on. Levin and Rappaport-Hovav (1995) also propose that the verbs that are favoured by the inversion construction have the semantic characteristics that can meet the discourse need of presentational focus. Due to space limit, I will not review all these works in this concluding chapter. Instead, I propose the following speculation of accounting for the locative inversion on a semantic basis.

argue that the 'presentation'meaning of the inversion construction, which has been widely recognized in the literature, is just the very conceptual content of the predicate HAVE. This meaning has long been treated as a pragmatic effect because it does not have a corresponding lexical form in the English language. In contrast, this meaning can be encoded by the lexical form *you* in Mandarin.

Assuming that an English locative-alternating verb projects a complex propositional template, just as a Chinese locatie-alternating verb does, we can easily capture the semantic subtleness of the inverse locative construction in English. Namely, the subject (the preverbal locative expression) and the object (the postverbal noun) in the inversion construction are understood as two arguments of the abstract predicate HAVE that heads the complex propostional template that is constructed out of the parse of an inverting verb in the inversion construction. This semantic representation, upon our current assumption, consitutes the motivation for the existence of the inverse locative construction in English and it also consitutes a semantic account of the 'presentation' meaning delivered by this construction, as is reported in the literature.

Clearly, this is nothing but a sketch of an analysis that needs to be persuaded and developed properly. But it does show that an analysis developed for one language may have significance for analysing semantically similar constructions in other languages.

9.4   Finale

To conclude, the Dynamic Syntax account of argument realization puts a central issue in traditional linguistic studies in a new perspective. A number of puzzling facts of argument alternation are accounted for uniformly. The hypotheses formulated in this research have exhibited their strong explanatory force in

Mandarin and and there is reason to hope that they will be extendible to other languages..

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