

An Event Structure Analysis of Object-oriented Adverbial Clauses*

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Abstract—In Mandarin Chinese, there exists such adverbial clause as “*Li Zhen cuicuide zhale yipan huashengmi*” (Li Zhen fried a dish of peanuts crispy), in which the adverbial modifies the predicate verb but semantically orients to the object. This kind adverbial clause can be formulated as “NPs+APo+De+VP+NPo=NP+VP+O and O is characterized by the adverbial”. The object-oriented adverbial clause is a mismatched syntax-semantics phenomenon, with the mapping between form and meaning distorted. Many previous studies have proposed not fully identical analyses for the syntactic distribution, pragmatic motivation and constraints. However, few researches have made syntactic and semantic analyses from the perspective of event structure in the framework of formal linguistics, which leaves wide space for further study.

Event structure theory is adopted in this paper to make analysis of object-oriented adverbial clauses in event semantics perspective. This paper aims to examine the syntactic structure from the perspective of event semantic structure and explore how event structure is represented in syntactic structure of object-oriented adverbial clause.

Index Terms—object-oriented adverbial clauses, event structure, semantic representation, syntactic representation

I. INTRODUCTION

In syntax, adverbials are used to modify predicates, but when adjectives work as adverbials, the analysis of semantic orientation seems to become quite complicated. Some adverbials semantically refer to predicate verbs, but others may semantically orient to subjects or objects, etc. For example,

- (1) a. Li Zhen zaozao de zhale (yi)pan huashengmi.
李振早早地炸了 (一) 盘花生米。
Li Zhen early DE fry LE a dish peanuts
Li Zhen fried a dish of peanuts early.
- b. Li Zhen baobao de chile (yi)dun jiaozi.
李振饱饱地吃了 (一) 顿饺子。
Li Zhen full DE eat LE dumplings.
Li Zhen got full from eating dumplings.
- c. Li Zhen cuicui de zhale (yi)pan huashengmi.
李振脆脆地炸了 (一) 盘花生米。
Li Zhen crispy DE zha LE (yi)pan huashengmi.
Li Zhen fried a dish of peanuts crispy.
- d. Li Zhen rere de hele (yi)beicha.
李振热热地喝了 (一) 杯茶。
Li Zhen hot DE drink LE a cup of tea.
Li Zhen drank a cup of tea hot.

Among the three sentences in (1), the adverbial “*zaozao de*” (early) in (1)a semantically refers to the predicate verb “*zha*” (fry). The adverbial “*baobao de*” (full) in (1)b semantically refers to the subject “*Li Zhen*”, moreover, sentences such as (1)b are often called “subject-oriented adverbial clauses”. The adverbial “*cuicui de*” (crispy) in (1)c semantically refers to the resultative state of the direct object “*yipan huashengmi*” (a dish of peanuts). Similarly, the adverbial “*rere de*” (hot) in (1)d semantically denotes to the depictive state of the direct object “*yibeicha*” (a cup of tea). Moreover, sentences in (1)c and (1)d are two types of the “object-oriented adverbial clauses”.

Since this paper has a limit to words, it only touches on object-oriented adverbial clauses, which can be formally represented as “NPs+APo+De+VP+NPo=NP+VP+O and the object is characterized by the adverbials”. In this expression, NPs refers to the subject while NPo denotes the object, moreover, NPo is an indefinite quantified noun phrase without numerals. VP as the predicate verb, is often followed by the perfective aspect marker “*LE*”, and APo, in the adverbial position, is always followed by the state adjective marker “*DE*” and semantically orients to the object.

* This paper is sponsored by “Scientific Research Foundation for Masters in Zunyi Medical University (FS-2015-20)”

II. LITERATURE REVIEW

This part mainly presents the current research on object-oriented adverbial clauses, followed by a general review of studies on adverbials, studies on semantic orientation and analyses from the perspective of syntax.

A. Previous Studies on Adverbials

“The phenomenon of object-oriented adverbial clauses is not exclusive to Chinese, it also exists in languages such as English and Germany” (Yang Yongzhong, 2014). This paper insists that object-oriented adverbial clauses, in general, are cross-linguistically interesting because they encode complex events.

The adverbial study abroad mainly centers on adverbs. Ernst (2001) proposed “scopal approach”, which rules out the unaccepted adverb order or position by semantic selection or in morphological perspective. In addition, FEO (Fact-Event Object Calculus) is adopted to explain why the position of adverbs is rather flexible. According to Ernst, some adverbs can only modify VP, while others can modify event, proposition or fact. Cinque (1999) put forward “cartographic” theory, which strictly regulates the order that adverbs and the modified part should follow and finally makes the proper word order realized by some syntactic means, such as movement.

In China, studies on object-oriented adverbial clauses can be divided into three stages: the identifying stage, the describing stage and the explaining stage of adjective adverbials.

B. Previous Studies on Semantic Orientation

The semantic orientation study abroad mainly focuses on secondary predicate and predicate adverbs. Rothstein (2004) made event semantics analysis of the depictive secondary predicate and the resultative secondary predicate. Besides, Geuder (2002) made a research on the classification of predicate adverbs in English.

In terms of studies on semantic orientation at home, there exist disagreements among scholars. The most obvious disagreement lies in whether semantic orientation is single-oriented or multiple-oriented.

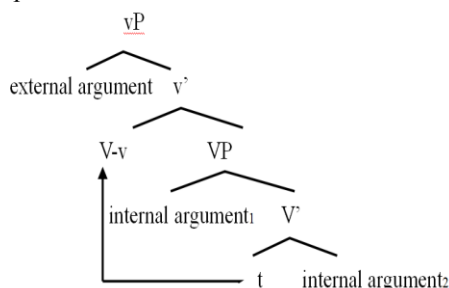
Lu Jianming (1995) gave the definition of semantic orientation, “in the narrow sense, semantic orientation defines which two syntactic constituents are semantically related”; Shen Yang (1994) agreed with Lu Jianming and he enriched the early version as “on one hand, semantic orientation not only touches on nouns’ reference but also other kinds of content words’ reference, such as verbs, adjectives and adverbs etc. On the other hand, semantic orientation particularly defines which constituents are related”.

However, scholars, such as Lu Yingshun and Zheng Guiyou pointed out that semantic orientation should be multiple-oriented. Lu Yingshun (1995) held that “semantic orientation refers to the possibility that the meaning of one constituent in syntactic structures corresponds with that of other constituents (one or a couple of constituents)”; Zheng Guiyou (2000), with the theoretical background of “clause center theory”, classified adverbial adjectives into four kinds and he insisted that, “except the single relation of predicate which expresses actions and changes, the other relations are all multiple-oriented”.

C. Previous Studies on Object-oriented Adverbial Clauses from the Perspective of Syntax

The foreign researches on object-oriented adverbial clause are mainly made in the framework of vP-shell, secondary predicate and voice theory.

Chomsky (1995) proposed the vP-shell theory. According to the vP-shell theory, there exists a light verb “v” in the upper verb phrase. This light verb “v” is a functional clitics with strong features, which can trigger “V” in the lower verb phrase to incorporate with “v” and have features checked. To make it more clear, the following diagram shows the incorporation of “V” with “v”:



(2)

Irimia (2005) classified secondary predicate into four types, resultatives, depictives, circumstantials and absolutes. As far as the object-oriented adverbial clause is concerned, this paper only takes the resultatives and depictives into consideration.

Furthermore, voice theory is employed to analyze object-oriented adverbial clauses. Kratzer (1994) proposed the voice theory. Kratzer argues that the external argument is introduced not by the verb but by a separate predicate, which Kratzer called “Voice”. “Voice” is a functional head denoting a thematic relation that between the external argument and the event described by the verb.

III. THEORETICAL FRAMWORK

This section briefly introduces relevant theories employed in this paper, event structure, event semantics and event syntax theory.

A. Event Structure

It is generally acknowledged that the event structure analysis starts with Vendler (1967). Vendler proposed a four-way classification of verbs: states, activities, achievements and accomplishments. The corresponding features can be summarized as follows:

(3)

verb classification	telic	durative	homogeneous	intermittent
states	-	+	+	-
activities	-	+	+	+
achievements	+	-	-	-
accomplishments	+	+	-	-

The four types of verbs are respectively represented by *know*, *run*, *die* and *build*. Moreover, the four types of verbs correspond to four types of events.

B. Event Semantics

In 1967, Davidson mentioned events in *The Logical Form of Action Sentences* the first time. The event semantics theory goes through two stages: Davidson's stage and neo-Davidsonian stage. Compared with the traditional logical expressions, Davidson adds an argument "e" representing event to the predicate expressing an event in his version of logical expressions and combines the argument structure of predicate with the argument introduced by prepositions together by conjunctive operations.

The event semantics theory follows the principle of compositionality of meaning in classic logic semantics. Babara H. Partee (2014) expressed this principle as "the meaning of an expression is a function of meanings of its parts and the way they are syntactically combined".

C. Event Syntax Theory

The study of event structure in semantics also promotes the development of syntax. Syntacticians set off to consider the internal structures of events, the interrelation between events and the corresponding syntactic representations. The proposal of vP-shell, light verb and various functional categories have made it possible to represent even structure in syntax.

It is not until Hale & Keyser (1993) that the encoding of event structure appears. They aim to reduce thematic roles to syntactic configurations involving lexical items and functional elements. They regard argument structure as "the syntactic configuration projected by a lexical item. Argument structure is the system of structural relations between heads and arguments linked to them". Technically, this is a further advance of Larson's (1988) vP-shell analysis.

IV. THE SEMANTIC ANALYSIS OF EVENT STRUCTURES IN OBJECT-ORIENTED ADVERBIAL CLAUSES

In this section, whether the relation between atomic events in the object-oriented adverbial clause is coordinate or not is taken into consideration. Under the predication formation rule and existential quantifier closure rule, the corresponding semantic derivations are given.

A. Event Structures in Object-oriented Adverbial Clauses

Among the examples given in sentence (1), only (1)c "*Li Zhen cuicuide zhale yipan huashengmi*" and (1)d "*Li Zhen rerede hele yibeicha*" are object-oriented adverbial clauses. Take sentence (1)c into consideration, (1)c conveys two meanings, firstly, Li Zhen fries a dish of peanuts, and secondly, the peanuts are crispy. Here, the adverbial adjective "*cuicui de*" semantically refers to the object "*yipan huashengmi*" rather than the predicate verb "*zha*", it is generally called "syntax-semantics mismatch". This part aims to make an event description and analysis of "*Li Zhen cuicuide zhale yipan huashengmi*" from event semantics perspective. According to Rothstein's predication theory, simple sentence with complicated structures can be regarded as a singular event. As for singular event, the relationship between events varies. Generally speaking, it includes two kinds of relationships, one is embedded relation and the other is coordination. Then, curiosity drives us to ask the following question, "what is the relationship between the two events "Li Zhen fries a dish of peanuts" and "the peanuts are crispy"? Is it kind of embedded relation or coordinate relation?"

1. Coordinate Relation between the Two Atomic Events

In the sentence "*Li Zhen cuicuide zhale yipan huashengmi*", there are two sub-events, firstly, Li Zhen fries a dish of peanuts, secondly, the peanuts are crispy. If the two sub-events are coordinate, then we can describe the event structures as the following semantic expression, $\exists e[\exists e_1[\exists e_2[e=e_1 \cup e_2 \wedge zha(e_1) \wedge Agt(e_1)=Li\ Zhen \wedge Th(e_1)=yipan\ huashengmi \wedge cuicuide(e_2) \wedge Th(e_2)=yipan\ huashengmi]]]$. This semantic expression conveys that, there exists such an event and this event is a conjunction of the two sub-events mentioned above, moreover, the first sub-event is parallel to

the second one, that is to say, the two sub-events enjoy equal status. Therefore, if one sub-event is deleted, then the original event structure will be no longer in existence.

2. Embedded Relation between the Two Atomic Events

In the framework of event semantics, the embedded event is often expressed as e' . As for the sentence “*Li Zhen cuicuide zhale yipan huashengmi*”, if there exists an embedded relation between the two events mentioned above, then we can describe the event structures as the following semantic expression, $\exists e[zha(e) \wedge Agt(e)=Li\ Zhen \wedge Th(e)=yipan\ huashengmi] \wedge \exists e'[cuicuide(e') \wedge Th(e')=Th(e)=yipan\ huashengmi]$. This semantic expression expresses that, there exists such an event e “*Li Zhen cuicuide zhale yipan huashengmi*”. There is only one event in this singular event and this event is an embedded event, “*yipan huashengmi cuicuide*” is the embedded part. The singular event and the embedded part is joined together by the shared argument “a dish of peanuts”.

Two semantic expressions of “*Li Zhen cuicuide zhale yipan huashengmi*” in coordinate relation and embedded relation have already been displayed. But which relation is more suitable for the analysis of object-oriented adverbial clauses?

According to the theory of event syntax, the number of events depends on the number of predicate (predicate in terms of syntactic category). Sometimes, the role adjectives take is similar to that of predicate verbs. Irimia (2005) argues that there exists “secondary predicate” similar to the main verbs and Irimia classifies the secondary predicate into four groups: resultatives, depictives, circumstantials and absolutes, which enable adjectives, kind of predicate verbs, to express some event information.

Wu Ping is a pioneer applying the event semantics theory to analyze object-oriented adverbial clauses, such as “Mary painted the house red”. In Wu Ping (2009), he gave the following semantic expression: $\exists e[\exists e1[\exists e2[e=e1 \cup e2 \wedge paint(e1) \wedge Agt(e1)=Mary \wedge Th(e1)=the\ house \wedge red(e2) \wedge Th(e2)=the\ house]]]$. In this expression, the adjective “red” is regarded as one secondary predicate, moreover, the sub-event expressed by the adjective “red” is parallel to the sub-event expressed by the main verb “paint”. At the first sight, as far as semantic orientation is concerned, the sentence “Mary painted the house red” is similar to the sentence “*Li Zhen cuicuide zhale yipan huashengmi*”, because both the two adjectives semantically orient to the objects. Just as its name implies, the theory of event syntax also requires paying enough attention to the syntactic aspect. The reason why the adjective “red” in the sentence “Mary painted the house red” can work as the secondary predicate is that “red” is located in the complement position, which meets the syntactic demands of secondary predicate. However, “*cuicui de*” (crispy) is in the adverbial position of the sentence “*Li Zhen cuicuide zhale yipan huashengmi*”, which fails to conform to the syntactic conditions required by the secondary predicate. Therefore, the sentence “Mary painted the house red” and the sentence “*Li Zhen cuicuide zhale yipan huashengmi*” should be dealt with differently. The former displays the coordinate relation between two sub-events while the latter shows the embedded relation.

B. The Semantic Derivation of Object-oriented Adverbial Clauses

In the framework of event semantics, descriptions of event structures are always joined together by conjunctive operations. According to the rules of event structure descriptions, only one argument expressing the event is allowed to follow the predicate verb, other constituents, such as agent, theme, experiencer in event structures should take the form of independent propositions. The derivation of event structures follow the principle of compositionality, in other words, the construction of meaning in sentences is facilitated by the type-driven approach. Rothstein (2004), combining the essentials that he carried forward in neo-Davidsonian analysis with the government and binding (GB) theory in generative grammar, put forward the predication theory.

1. The Object-oriented Adverbial Clauses (Depictive)

Zheng Guiyou (2000) classified the adjectives in object-oriented adverbial clauses into three kinds: make-type, present-type and perceive-type. The following points are taken into full account, firstly, the semantic characteristics of verbs in object-oriented adverbial clause, secondly, the different semantic restrictions imposed on adjective adverbials by predicate verbs. In this paper, the criterion of differentiating events lies in the time-participant connected (TPCONNECT) between the event “ e ” and the embedded event “ e' ”.

(4) a. 李振厚厚地穿了 (一) 件毛衣。

Li Zhen houhou DE chuan LE yijian maoyi.

Li Zhen thick wear a piece sweater

Li Zhen wore a piece of thick sweater.

*李振把(一)件毛衣穿得厚厚的。

Li Zhen BA yijian maoyi chuan DE houhou DE.

b. 李振热热地喝了 (一) 杯茶。

Li Zhen rere DE he LE yibeicha.

Li Zhen hot drink a cup tea.

Li Zhen drink a cup of tea hot.

*李振把一杯茶喝得热热的。

Li Zhen BA yibeicha he DE rere DE.

Observing the examples displayed in (4)a and (4)b, it's not hard to find that the conversions between object-oriented

adverbial clauses and “Ba” constructions are sometimes blocked. Why? As is often the case, the adjective is used to describe the property of the object in the process of an event, in other words, there should be a change of state. However, the adjective adverbials mentioned here are homogeneous.

Zhang Lijun (1990) divided adjective adverbials in object-oriented clauses into three types:

- (5) a. Object’s forms: *xixiDE*, *baobaoDE*, *yuanyuanDE*, *maomaozaozaoDE*
- b. Object’s colors: *baibaiDE*, *lvyouyouDE*, *huangchengchengDE*, *hongpupuDE*
- c. Object’s other characteristics: *chouchouDE*, *cuicuiDE*, *nennenDE*, *yanyanDE*

Chen Yi (1987) classified adjective adverbials into two kinds: the depictive one and the resultative one.

- (6) a. depictive adjective: *sheng*, *shu*, *wanhao*
- b. resultative adjective: *luan*, *jian*, *bian*, *bao*

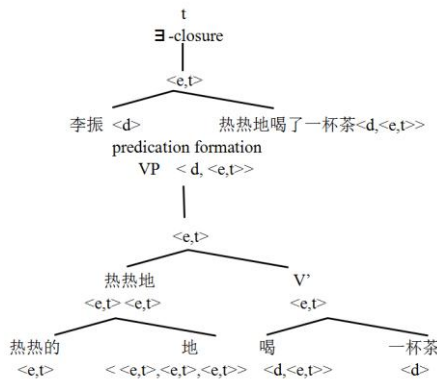
- (7) a. 李振热热地喝了一杯茶。
- b. $\exists e[\text{喝}(e) \wedge \text{Agt}(e)=\text{李振} \wedge \text{Th}(e)=\text{一杯茶} \wedge \exists e'[\text{热热地}(e') \wedge \text{Th}(e')=\text{Th}(\text{一杯茶})]] \wedge \text{TPCONNECT}(e, e', \text{一杯茶})]$

The $\text{TPCONNECT}(e, e', \text{一杯茶})$ in this semantic expression means that there are two events which take place at the same time and they have one shared argument “yibeicha” (a cup of tea). In the event of “he” (drinking), “cha” (tea) is an incremental theme. The event of e' “rere de” (hot) is incorporated into the event of “drinking”. With the event of “drinking” moving forward, the amount of tea decreases but the event of “rere de” in the complex event remains homogeneous. In other words, there is no causation between the two events. To make it more clear, the definition of “homogeneous” in Borer (2005) is provided as follows:

- (8) a. P is homogeneous iff P is cumulative and divisive
- i. P is divisive
- iff $\forall x[P(x) \rightarrow \exists y[P(y) \wedge y < x]] \wedge \forall x, y[P(x) \wedge P(y) \wedge y < x \rightarrow P(x-y)]$
- ii. P is cumulative
- iff $\forall x[P(x) \wedge P(y) \rightarrow P(x \cup y)]$
- b. P is quantity iff P is not homogeneous.

As for the analysis of object-oriented adverbial clauses from the perspective of event semantics, the sentence “Li Zhen rere de hele yibeicha” is taken into consideration. The corresponding functional application is as follows:

(9)



Similarly, the above structure shows the core semantic derivations of predication formation and \exists -closure in the process of sentence construction. And the corresponding semantic derivations from the bottom to the top are as follows:

(10)

- a. 喝: $\lambda y[\lambda e[\text{喝}(e) \wedge \text{Agt}(e)=x \wedge \text{Th}(e)=y]]$
 喝一杯茶: $\lambda e[\text{喝}(e) \wedge \text{Agt}(e)=x \wedge \text{Th}(e)=\text{一杯茶}]$
- b. 地: $\lambda Q[\lambda P[\lambda e[P(e) \wedge \text{Th}(e)=x \wedge \exists e'[Q(e') \wedge \text{Th}(e')=\text{Th}(e) \wedge \text{TPCONNECT}(e, e', x)]]]]$
 热热的: $\exists e'[\text{热热的}(e') \wedge \text{Th}(e')=x]$
 热热地: $\lambda P[\lambda e[P(e) \wedge \text{Th}(e)=x \wedge \exists e'[\text{热热的}(e') \wedge \text{Th}(e')=\text{Th}(e) \wedge \text{TPCONNECT}(e, e', x)]]]$
- c. 热热地喝一杯茶: $\lambda e[\text{喝}(e) \wedge \text{Agt}(e)=x \wedge \text{Th}(e)=\text{一杯茶} \wedge \exists e'[\text{热热的}(e') \wedge \text{Th}(e')=\text{一杯茶}]] \wedge \text{TPCONNECT}(e, e', \text{一杯茶})]$
- d. predication formation:
 $\lambda x[\lambda e[\text{喝}(e) \wedge \text{Agt}(e)=x \wedge \text{Th}(e)=\text{一杯茶} \wedge \exists e'[\text{热热的}(e') \wedge \text{Th}(e')=\text{一杯茶}]] \wedge \text{TPCONNECT}(e, e', \text{一杯茶})]$
- e. 李振热热地喝一杯茶: $\lambda e[\text{喝}(e) \wedge \text{Agt}(e)=\text{李振} \wedge \text{Th}(e)=\text{一杯茶} \wedge \exists e'[\text{热热地}(e') \wedge \text{Th}(e')=\text{一杯茶}]] \wedge \text{TPCONNECT}(e, e', \text{一杯茶})]$
- f. \exists -closure:

$\exists e[\text{喝}(e) \wedge \text{Agt}(e)=\text{李振} \wedge \text{Th}(e)=\text{一杯茶} \wedge \exists e'[\text{热热的}(e') \wedge \text{Th}(e')=\text{一杯茶}] \wedge \text{TPCONNECT}(e,e',\text{一杯茶})]$

2. The Object-oriented Adverbial Clauses (Resultative)

Here are two examples of object-oriented adverbial clauses which show the resultative state of the objects.

- (11) a. 李振脆脆地炸了(一)盘花生米。
 Li Zhen cuicui DE zha LE (yi)pan huashengmi.
 Li Zhen crispy fry a dish peanuts
 Li Zhen fried a dish of peanuts crispy.

- b. 李振把花生米炸得脆脆的。
 Li Zhen BA huashengmi zhade cuicui DE.

- (12) a. 李振酽酽地沏了(一)壶茶。
 Li Zhen yanyan DE qi LE (yi) hucha.
 Li Zhen strong make a pot tea
 Li Zhen made a pot of strong tea.

- b. 李振把茶沏得酽酽的。
 Li Zhen BA cha qiDE yanyan DE.

The above two sentences are typical object-oriented adverbial clauses, which can be converted into the corresponding “Ba” constructions. What are the characteristics of this sentence pattern? The event semantic structure of (11)a can be expressed as (13) below:

(13) $\exists e[\text{炸}(e) \wedge \text{Agt}(e)=\text{李振} \wedge \text{Th}(e)=\text{一盘花生米} \wedge \exists e'[\text{脆脆地}(e') \wedge \text{Th}(e')=\text{一盘花生米}] \wedge \text{TPCONNECT}(\text{Cul}(e),e',\text{一盘花生米})]$

The specific interpretation of this event semantic structure is that there is an event of “frying a dish of peanuts” which embeds an event of “peanuts become crispy”. Moreover, the “frying” event is an activity event with procedures, Li Zhen is the agent and a dish of peanuts is the theme. There exists TPCONNECT between the “frying” event and the “crispy” event. The whole event comes to an end when the peanuts are crispy enough to meet the subjective evaluation criteria. In this event, the dish of peanuts undergoes the process from being spongy to being crispy, which plays a significant role in the complex event. The incremental process indicates that the crispy degree varies at different stages in the “frying” event. Because of the incremental property that peanuts obtain, themes similar to peanuts in such event structures are called “incremental theme”.

Enough attention has already been paid to such sentences. Zhu Dexi (1982), Dai Haoyi (1982) and Zheng Guiyou (2000) all reached an agreement. They summarized this kind of verbs as “make-type” verbs and they all noticed that verbs like this can be followed by some accomplishment complements like “wan” “hao” “cheng” etc.

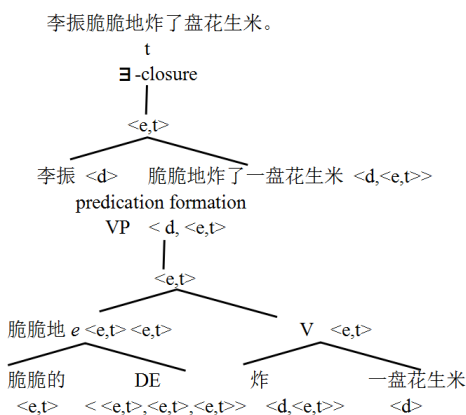
- (14) 农民工们方方正正地打(完/好/成)了一个背包。
 Nongmingongmen fangfangzhengzhengDE da (wan/hao/cheng) LE yigebeibao.
 Migrant workers boxy pack a bag
 Migrant workers packed the backpacks into boxy shape.

In sentence (14), verbs like “da” (hit) are “make-type” verbs. The addition of accomplishment complements “wan/hao/cheng/le” to the verbs makes actions come to an end.

Lu Jian (2003) concluded the verb features in this kind of sentence as [+autonomous] [+ make-type] [+continuous] and he insisted that the subject should be very agentive while the object should be an affected object, moreover, some objects should be incremental.

The corresponding functional application of (11)a is as follows:

(12)



With the functional application displayed above, the relevant semantic derivations could be given as follows:

(13)

- a. 炸: $\lambda y[\lambda e[\text{炸}(e) \wedge \text{Agt}(e)=x \wedge \text{Th}(e)=y]]$
- b. 地: $\lambda Q[\lambda P[\lambda e[P(e) \wedge \text{Th}(e)=x \wedge \exists e' [Q(e') \wedge \text{Th}(e')=\text{Th}(e) \wedge \text{TPCONNECT}(\text{Cul}(e), e', x)]]]]$
脆脆的: $\exists e' [\text{脆脆的}(e') \wedge \text{Th}(e')=x]$
- c. 脆脆地: $\lambda P[\lambda e[P(e) \wedge \text{Th}(e)=x \wedge \exists e' [\text{脆脆的}(e') \wedge \text{Th}(e')=x] \wedge \text{TPCONNECT}(\text{Cul}(e), e', x)]]$
- d. 脆脆地炸了一盘花生米: $\lambda e[\text{炸}(e) \wedge \text{Agt}(e)=x \wedge \text{Th}(e)=\text{一盘花生米} \wedge \exists e' [\text{脆脆的}(e') \wedge \text{Th}(e')=\text{一盘花生米}]] \wedge \text{TPCONNECT}(\text{Cul}(e), e', \text{一盘花生米})]$
- e. predication formation:
 $\lambda x[\lambda e[\text{炸}(e) \wedge \text{Agt}(e)=x \wedge \text{Th}(e)=\text{一盘花生米} \wedge \exists e' [\text{脆脆的}(e') \wedge \text{Th}(e')=\text{一盘花生米}]] \wedge \text{TPCONNECT}(\text{Cul}(e), e', \text{一盘花生米})]$
- f. 李振脆脆地炸了一盘花生米: $\lambda e[\text{炸}(e) \wedge \text{Agt}(e)=\text{李振} \wedge \text{Th}(e)=\text{一盘花生米} \wedge \exists e' [\text{脆脆的}(e') \wedge \text{Th}(e')=\text{一盘花生米}]] \wedge \text{TPCONNECT}(\text{Cul}(e), e', \text{一盘花生米})]$
- g. \exists -closure:
 $\exists e[\text{炸}(e) \wedge \text{Agt}(e)=\text{李振} \wedge \text{Th}(e)=\text{一盘花生米} \wedge \exists e' [\text{脆脆的}(e') \wedge \text{Th}(e')=\text{一盘花生米}]] \wedge \text{TPCONNECT}(\text{Cul}(e), e', \text{一盘花生米})]$

V. REPRESENTATION OF EVENT STRUCTURES IN OBJECT-ORIENTED ADVERBIAL CLAUSES

Croft (1999) explains that “there is a parallelism between syntactic structure and semantic structure, and that semantic structure determines or, better motivates syntactic structure”. That is, syntactic structure reflects semantic structure, whereas the semantic structure corresponding to a syntactic construction represents a conceptualization of experience.

This paper claims that there exists an isomorphism between event structure and syntactic structure. Specifically speaking, events are composed from primitive functional elements in syntax. It is not possible that verbs can introduce complete, well-formed lexical semantic structures into the derivation process, moreover, verbal roots represent abstract concepts that acquire meaning from the surrounding syntactic environment. Therefore, event syntax theory could provide a quite reasonable explanation for the mismatched phenomenon between syntactic structures and semantic structures.

A. Framing the Syntactic Structures with Verbalizing Heads

Having explored the semantic representation of event structure appearing in object-oriented adverbial clauses. This section focuses on how to encode arguments in event structure syntactically and attempts to reduce argument structure to event structure, which is itself syntactically encoded. Then an inventory of three verbalizing heads and two verbal roots is employed to construct events in object-oriented adverbial clauses.

Before introducing verbalizing heads and verbal roots, one feature of Chinese verbal system proposed by Jimmy Lin (2004) should be stated in advance. According to Jimmy Lin (2004), “for the most part, activity and state are the only two primitive verbal types in Mandarin Chinese. As a general rule, change of state predicates (accomplishments and achievements) are derived syntactically”. To make this statement more straightforward, the organization of the Mandarin verbal system is schematically represented as follows:

- (14) primitive event types in Mandarin Chinese: activity, state
state+LE→achievement
activity+achievement→accomplishment

In the framework of primitive event types mentioned above, it's time to find out the meaning of “framing the syntactic structures with verbalizing heads”.

According to Hale & Keyser (1993), the head of each VP represents an implicit conceptual primitive notions such as agentivity and inchoativity. This chapter follows Jimmy Lin (2004) and renders explicit the semantics of verbalizing heads, which correspond to semantic primitives drawn from a conceptual inventory determined by Universal Grammar.

Additionally, this paper agrees with ideas of Distributed Morphology (Marantz, 1997). It is assumed that syntax does not deal with the total lexical items consisting of syntactic, semantic and phonological information, but rather a series of abstract morphosyntactic and semantic features relevant to the derivation process. Following the “late insertion” principle, phonological properties are inserted at the articulatory interface.

Moreover, leaving the distinction between syntactic derivation and morphological derivation aside, distributed morphology regards syntax as the only generative engine of human language faculty. Since distributed morphology holds that all derivations occur uniformly, it is unnecessary to take the separate lexical process, morphological process and syntactic process into considerations. An explanatory theory should account for the relationship between lexical processes and morphosyntactic processes.

On the basis of Marantz (1997), Jimmy Lin (2004) regards “verbs” as verbal roots with abstract category-less concept. In addition, in order to gain verbal categorical status, those verbal roots should combine with verbalizing heads from conceptual primitives. Then those verbalizing heads introduce event types in accordance with Vendler's aspect

classification. Moreover, verbal roots play the role of event modifiers explicating the basic event readings introduced by those verbalizing heads. The key elements involved are as follows:

- (15) VDO [+dynamic, -inchoative] = Do (denotes activities)
 V δ [+dynamic, +inchoative] = BECOME (denotes the beginning of state-change)
 VBE [-dynamic] = BE (denotes states)

VDO, V δ and VBE represent the notions of activity, inchoativity and stativity respectively.

At this point, it is worthwhile to address one issue: “why decompose verbs into verbalizing heads and verbalizing roots”?

The distinction between verbalizing heads and verbal roots originates from Grimshaw (1993), who draws a distinction between semantic structure and semantic content. Verbs that share the same syntactic behavior have the same semantic structure. On the contrary, semantic content is the actual “meaning” component of the verb, or what distinguishes a verb from other verbs sharing the same syntactic behavior. Take “jog” and “run” as a minimal pair, they are both intransitive verbs indicating motion, but the manner of motion differs from “jog” to “run”.

In short, verbalizing heads provide “syntactic structures” for appropriate events while verbal roots modify basic event types and introduce particular meaning component.

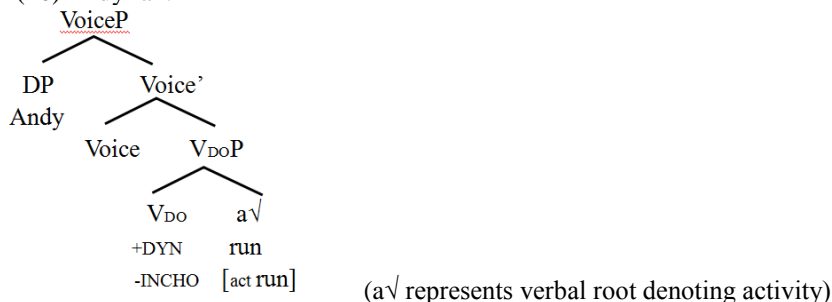
B. Syntactic Encoding of Arguments in Event Structures

According to our hypopaper, each verbalizing head, as a functional element, is a real syntactic element that enters into the derivation process. Owing to those verbalizing heads, events and arguments within verbal projections can be licensed.

C. Syntactic Encoding of Arguments in Basic Structures

First of all, a brief introduction of the verbalizing head VDO. According to Jimmy Lin (2004), VDO can license activities and is compatible with verbal roots denoting activity.

(16) Andy ran.



One point should be emphasized that the relationship between the verbalizing head VDO and the verbal root is head-adjunct, rather than head-complement. The reason is simple, because verbal root is an event modifier.

Obviously, the meaning of sentence (16) can be paraphrased as “here is an activity of running, of which Andy is the agent”. Similarly, the logical form could be achieved:

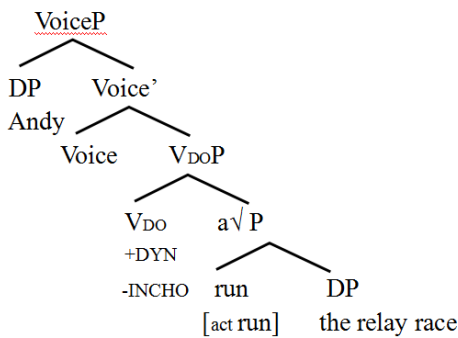
(17) $\exists e$ [ARGext (Andy)(e) \wedge Do([activity run])(e)]

This representation has something common with that of Parsons, they both make explicit references to the underlying event variables. To denote the external argument (introduced by Voice), a generic label ARGext is employed. Similarly, to indicate the arguments relevant with VDO, V δ and VBE respectively, ARGdo, ARG δ and ARGbe are employed. In this way, thematic roles can be finally assigned to structural configurations.

Chomsky (1981) suggested that the external argument is not directly licensed by the verb itself. That is to say, the external argument is an argument licensed by the whole verb predicate, rather than the verb solely. According to Davidson, the external argument is linked to the verb phrase by the event variable only. Later, Kratzer (1994) proposed the theory of *voice*. Voice, as a functional element can relate an external argument (the specifier) to the complement. In this way, the semantic role, such as agent, is assigned to the external argument by the functional element *voice* in the structural configuration. The VoiceP theory proposed by Kratzer (1994) captures the essence in Travis’ Event Syntax (1994) as mentioned in the theoretical framework section.

On some occasion, an activity root can license DP independently to bring about a transitive sentence:

(18) Andy ran the relay race.



This representation can be interpreted as “there is an activity of running the relay race, in which Andy is the agent”. The corresponding logical form can be translated as:

(19) $\exists e [\text{ARGext}(\text{Andy})(e) \wedge \text{Do}([\text{activity run}(\text{the relay race})](e)]$

It is obvious that the verbal root can license DP under some constraints of semantic selection. For example, “run the relay race” is available while “run the wall” is absolutely unaccepted. Attention should be paid that the argument is licensed solely by the specific semantics of the verbal root.

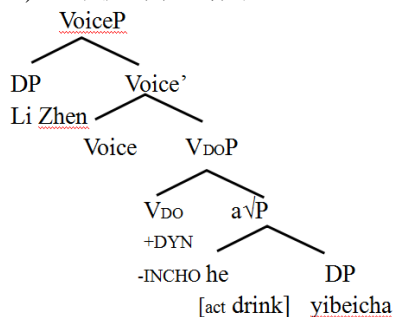
D. Syntactic Encoding of Arguments in Object-oriented Adverbial Clauses

However, Levin (1999) observed a subtle difference among verbs: some verbs are licensed by the event template, in other words, verbs may cause the change of state of the theme or patient, whereas others may be licensed by some constants, that is to say, there only exist some surface contact between the manner verb and the object. Levin (1999) proposed a distinction between core-transitive verbs and non-core transitive verbs. The former refers to verbs which enable the causative change of state, such as *fry*, *destroy*, *kill* etc. Those verbs can be translated as “agents act on and cause an effect on patients” and they are “highly transitive”. The latter denotes verbs like *sweep*, *kick*, *pound* etc, because objects of those verbs lack a unified and independent semantic characterization.

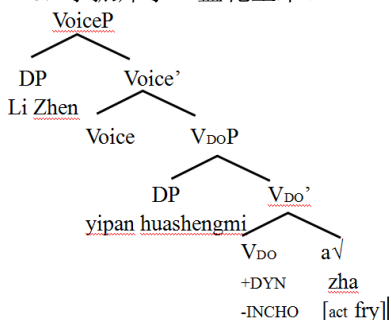
According to Lu Jian (2003), in sentence “*rerede hele yibeicha*”, the adjective adverbial “*rere de*” (hot) accompanies with the action “drinking” all the time. Therefore, in a sense, it is synchronic. However, in sentence “*yanyande paole yibeicha*”, the adjective adverbial “*yanyan de*” (strong) is a change of state caused by the brewing-activity. Similarly, in sentence “*Li Zhen cuicuide zhale yipan huashengmi*”, the adjective adverbial “*cuicui de*” (crispy) denotes the change of state caused by the frying-activity.

Therefore, as far as Levin (1999) is concerned, the depictive one, such as “*he*” (drink) belongs to the non-core transitive verb, whereas, the resultative one, such as “*zha*” (fry) belongs to the core transitive verb.

(20) a. 李振喝了一杯茶。



b. 李振炸了一盘花生米。



To make it more clear, the sentence “*Li Zhen hele yibeicha*” makes nothing new in people’s mind. However, the sentence “*Li Zhen zhale yipan huashengmi*” leaves a new impression of peanuts in people’s mind from shriveled peanuts to crispy ones. Then, the depictive one and the resultative one differs in representations given above.

The structure in (20)a parallels to the structure in (18), and can be translated as “there is an activity of drinking a cup

of tea, of which Li Zhen is the agent”. Under this circumstance, “yibeicha” (a cup of tea) is not an affected argument, in other words, Li Zhen is interpreted as engaging in the activity of “tea-drinking” rather than “juice-drinking” activity.

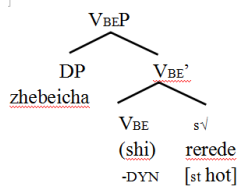
On the contrary, “yipán huashengmǐ” (a dish of peanuts) is an affected argument in the structure shown in (20)b. This structure can be paraphrased as “there is an activity of frying a dish of peanuts that acts on and causes an effect on the dish of peanuts, of which Li Zhen is the agent”. The specifier DP of VDOP is interpreted as the affected argument of the activity. In addition, the effect is dependent on the verbal root.

In short, the sentence such like “Li Zhen hele yibeicha” is a pure activity. Whereas, the sentence such like “Li Zhen zhale yipan huashengmi” involves an activity acting on an affected argument “a dish of peanuts”. The two representations could be rewritten in the following logical forms given below:

- (21) a. $\exists e [\text{ARGext}(\text{Li Zhen})(e) \wedge \text{Do}([\text{activitydrink}(\text{a cup of tea})](e)]$ (pure activity)
- b. $\exists e [\text{ARGext}(\text{Li Zhen})(e) \wedge \text{ARGdo}(\text{a dish of peanuts})(e) \wedge \text{Do}([\text{activity fry}](e))]$
 (activity with affected argument)

The verbalizing head VBE licenses static situations and is only compatible with verbal roots referring to states. The specifier of VBE indicates the entity whose state is being described.

(21) 这杯茶 (是) 热热的。

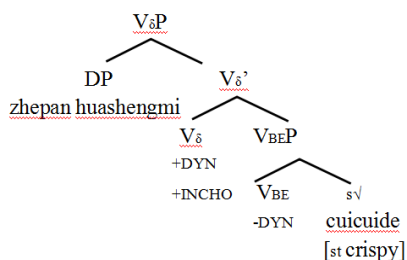


This structure could be interpreted as “there is a state of tea being hot” with the corresponding logical representation below:

- (22) $\exists e [\text{BE}(\text{state hot})(s) \wedge \text{ARGbe}(\text{tea})(s)]$

Moreover, a state can be embedded under the verbalizing head V δ to bring about an inchoative event. It goes without saying that the entire V δ P is supposed to be embedded under TP.

(23) 这盘花生米 (是) 脆脆的。



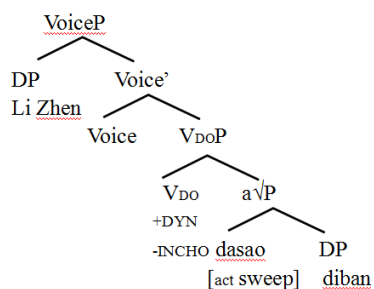
According to the above structure, it is clear that the specifier of V δ P is an entity that undergoes a change of state specified by the verbal root “s_v” associated with the inner VBE. The above structure could be paraphrased as “there is an inchoative event ending in the state of being crispy, where the dish of peanuts is the entity undergoing the change of state” with the following logical form:

- (24) $\exists e \exists s [\text{BE}(\text{state crispy})(s) \wedge \text{BECOME}(s)(e) \wedge \text{ARG}\delta(\text{the dish of peanuts})(e)]$

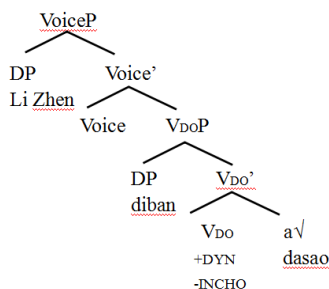
A distinction has been made above between core transitive verbs and non-core transitive verbs. Consequently, a differential treatment should be adopted for affected (selected) object and the non-affected argument. Two examples illustrated here with non-core transitive verb “dasao” (sweep) and core transitive verb “kan” (chop) are as follows:

- (25) 李振打扫了地板。
 Li Zhen dasao LE diban.
 Li Zhen sweep LE floor
 Li Zhen swept the floor.

(26) a.



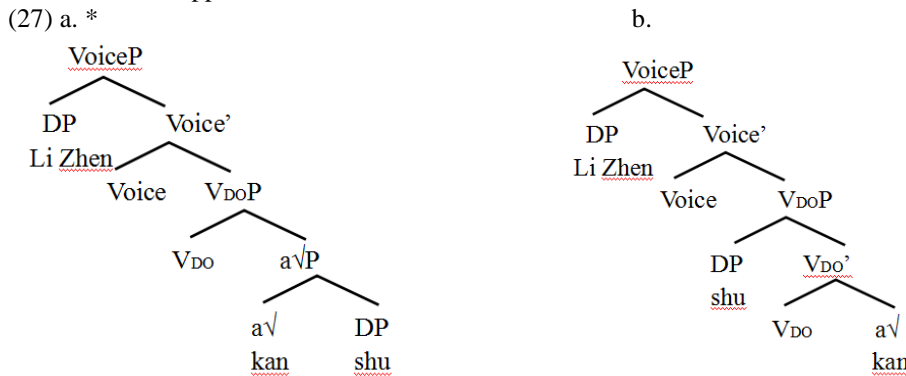
b. *



The structure in (26)a can be paraphrased as “there is an activity of sweeping the floor, of which Li Zhen is the agent”. On this occasion, “*diban*” (the floor) is not an affected argument. This structure only aims to emphasize that “Li Zhen is engaging in the activity of floor-sweeping”. This is the correct representation of (89). On the contrary, (26)b violates what is proposed earlier before. In (26)b, “*diban*” (the floor) is located in the specifier of VDO, and then interpreted as an affected argument in the event. But according to the definition of non-core transitive verb and non-affected argument, floor-sweeping activity does not necessarily bring about a change of state towards the floor.

Then it’s necessary to observe the structure displayed by the core transitive verb, such as “*kan*” (fell) . The detailed analyses are as follows:

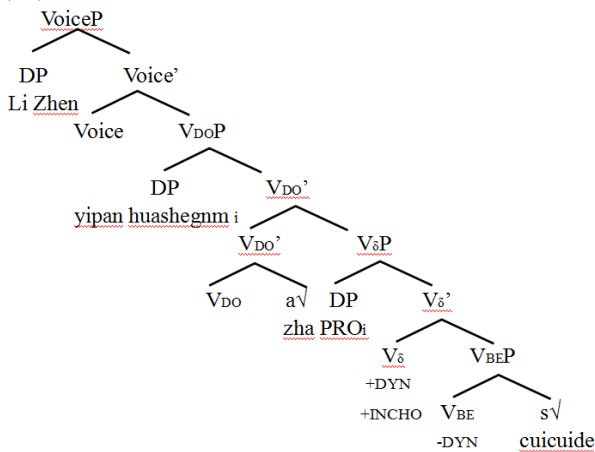
- (27) 李振砍了树。
 Li Zhen kan LE shu.
 Li Zhen chop LE shu
 Li Zhen chopped at trees.



In (27)a, the object “*shu*” (tree) is licensed by the verbal root ‘a√kan’ and this structure can be paraphrased as “there is an activity of tree-chopping”. Different from (27)a, the object “*shu*” (trees) is licensed by VDO in (27)b. Therefore, the object is interpreted as an affected argument. The structure in (27)b can be translated as “there is a tree-chopping activity that acts on and causes an effect on the tree”. In a word, (27)b is the proper representation of (26).

Up till now, it is easy to get the representations and logical form of the object-oriented adverbial clauses mentioned at the very beginning.

- (28) 李振脆脆地炸了 (一) 盘花生米。

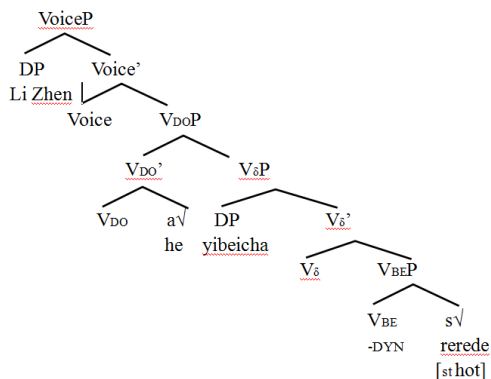


This structure can be paraphrased as “ there is an activity of which Li Zhen is the agent, and there is an inchoative event ending in the state of being crispy, of which a dish of peanuts is the entity undergoing the change of state, and the first event causes the second event ”. The corresponding logical form is given as below:

- (29) $\exists e_1[\text{ARGext}(\text{Li Zhen})(e_1) \wedge \text{Do}(\text{[activity fry]})(e_1) \wedge \exists e_2 \exists s[\text{BE}(\text{[state crispy]})(s) \wedge \text{BECOME}(s)(e_2) \wedge \text{ARG}\delta(\text{a dish of peanuts})(e_2) \wedge \text{CAUSE}(e_1)(e_2)]]$

This analysis agrees with Dowty’s analyzing causative sentences as being comprised of an outer activity shell and an inner inchoative event by an implicit causal relation. That’s to say, in this paper, causation is not directly in the syntax. As a matter of fact, causation is an implicit relation between two events. The most common treatment is referring causation to an activity which can cause a change of state. Specifically speaking, causation is a structural notion: the verbalizing head VDO and VδP display a head-complement relation.

- (30) 李振热地喝了 (一) 杯茶。



Previously, we made a clear distinction between selected object and non-selected object. According to the distinction between core transitive verbs and non-core transitive verbs in Levin (1999), “he” (drink) belongs to the latter category. Therefore, there is no semantic selection between “yibeicha” (a cup of tea) and the activity root “a√ he” (drink). In other words, the direct object “yibeicha” (a cup of tea) is not selected for the predicate verb “he” (drink). Therefore, the direct object “a cup of tea” is placed in the specifier of Vδ instead of VDO.

The above structure can be paraphrased as “there is an activity of drinking a cup of tea, in which Li Zhen is the agent and a cup of tea is the theme, whose state is being hot” with the following logic representation:

$$(31) \exists e[\text{ARGext}(\text{Li Zhen})(e) \wedge \text{Do}(\text{[activity drink]})(e) \wedge \exists s[\text{BE}(\text{[state hot]})(s) \wedge$$

Hold(e,s,一杯茶)]

The sentence “Li Zhen rerede hele yibeicha” is a depictive instance of object-oriented adverbial clause. Because of the distinction of core-transitive verbs and non-core transitive verbs, the structure in (30) differs from that of resultative one. There exists the verbalizing head Vδ indicating the change of state of object in the representation of resultative one of object-oriented adverbial clauses, whereas there doesn’t in the depictive one in which the state is consistent.

E. Syntactic Encoding of Arguments in Ambiguous Sentences

The sentence “Nage huajia chiluluode huale yige nvren” is regarded as an ambiguous sentence. This section analyzes ambiguous sentences from the perspective of encoding argument syntactically.

As proposed in formal semantics, semantic ambiguity arises from the syntactic ambiguity. The semantic orientation of the the adjective adverbial “chiluluo” (naked) is dependent on how to deal with the direct object. Look at the following ambiguous sentence:

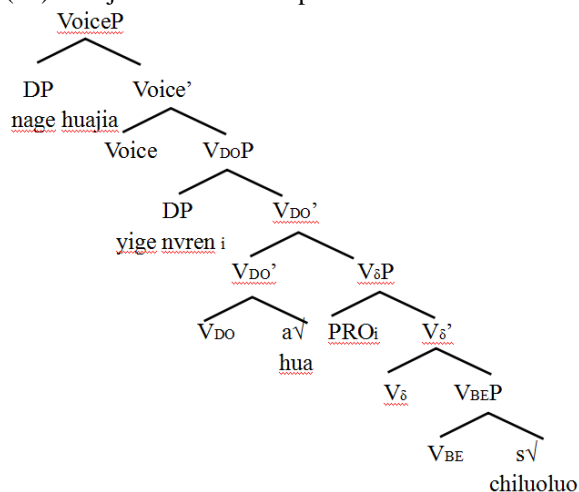
(32) Nage huajia chiluluode huale (yi)ge nvren.

那个画家赤裸裸地画了（一）个女人。

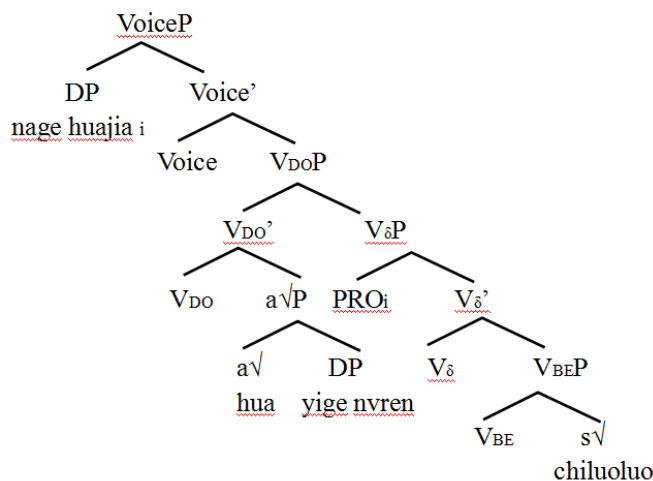
That artist nude DE paint a woman.

That artist paints a woman nude.

(33) a. object-oriented interpretation: A woman is nude.



b. subject-oriented interpretation: The painter is nude.



If the direct object, as an affected argument, is placed in the specifier position of VDO, then as the closest DP to the empty category PRO, it should command PRO. Then the object-oriented interpretation arises in (33)a. However, if the direct object is regarded as a specifically-licensed argument, then it is too far to c-command the empty category PRO, thus, the external argument, namely, that painter, should work as the controller. Therefore, the sentence gets a subject-oriented interpretation in (33)b.

To derive the surface structure of the sentence, the lowest verbalizing head VBE undergoes a successive movement from $V\delta$, VDO and Voice up to Aspect. Correspondingly, the verbal roots themselves should conform to the pied-piping principle along with the verbalizing heads.

The formation of object-oriented adverbial clauses is a productive process in Mandarin wherein verbs together with adjectives collectively denote a complex event involving an activity and its result or state.

To conclude the syntactic encoding of arguments in event structure, three key claims are summarized as follows:

Firstly, as far as the mapping from argument structure to event structure is concerned, argument structure can be reduced to event structure. Moreover, event decomposition depends on semantic primitives.

Secondly, event structure can be represented syntactically and compositionally constructed from some functional elements, such as verbalizing heads and verbal roots.

Thirdly, the basic components of event structure consist of activity, stativity and inchoativity. Therefore, VDO, VBE and $V\delta$ are adopted in the representations.

VI. CONCLUSION

This paper aims to analyze object-oriented adverbial clauses, a typical mismatched phenomenon between syntactic structures and semantic structures. In other words, this paper focuses on the phenomenon “NPs+APo+DE+VP+NPO=NP+VP+O and AP can be predicated of NPO” under the framework of event structure. On one hand, this paper manages to define the embedded relation between the two atomic events in this structure and present the semantic derivations of object-oriented adverbial clauses. On the other hand, the syntactic representations of event structure in such phenomenon are explored.

This paper presents a thorough analysis of object-oriented adverbial clauses, highlighting the important role that event structure plays. This study is followed by a semantics-syntax interface theory that successfully accounts for a broad range of empirical facts. In this paper, object-oriented adverbial clause not only serves as an illuminating probe into the event structure theory, but also relates to different stages of event structure theory. The higher level objective of this study, however, is to explicate the processes by which event structure is composed syntactically from a particular set of primitives and how these processes can be grounded in independently-motivated syntactic principles, such as control and movement. This paper not only accounts for the object-oriented adverbial clauses, but also supports transparent interpretation at syntax-semantics interface.

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