Serial verb constructions in Chinese: A HPSG account

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Abstract

This paper gives an account of Serial Verb Constructions (SVCs) in Mandarin Chinese. After a typological presentation of the phenomenon, we give an overview of the Chinese data. The inventory of SVC types is classified according to causal and temporal relations between the components. We discuss pragmatic conditions on the use of SVCs and alternative, semantically equivalent constructions. An HPSG analysis is proposed for marked SVCs which uses the interaction between aspect marking and the set of possible subordinative relations to deduce the extra-lexical meaning of the construction. Particular attention is paid to the syntactically peculiar SVC with shared internal arguments, which is accounted for by a non-cancellation approach to valence requirements.

1 Introduction

This paper proposes an account of Serial Verb Constructions with special focus on Chinese. The Serial Verb Construction is a complex predicate structure formed by two or more verbal phrases which select for the same subject. There is no syntactic marking available for the specification of the relation between the verbs. Semantically, a specific relation holds between the described events:

(1) a. Sranan: mi teki a nefi koti a brede
I take the knife cut the bread
'I cut the bread with a knife.'

b. Saramaccan: Kofi bay soni da di mujee
Kofi buy something give the woman
'Kofi bought something for the woman.'

The SVC has a complex event meaning, which is composed of the meanings of the single VP components and the extra-lexical causal relation between the subevents.

SVCs are a typical example for syntactic underspecification in Chinese which results from the surface indeterminacy of the language. Thus, Chinese shows a high degree of context-sensitivity, which necessitates the systematic involvement of world and context knowledge for interpretation.

We present the Chinese data after a cross-linguistic consideration of general characteristics and types of SVCs in Section 4; we will see that, compared to other languages with strongly lexicalized and less productive SVCs, Chinese imposes weaker restrictions on the semantic properties of SVCs which are discussed in Section 3.2. The meaning of SVCs in Chinese is determined by semantic compositionality on the one hand and extra-lexical meaning components on the other

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hand. Together with the syntactic underspecification of the relation between the VP constituents, this represents the basic problem for their interpretation: Chinese SVCs are ambiguous with respect to the causal semantic relation between their VP components. This relation can be deduced on the basis of four interacting devices: on the level of surface structure, aspect markers can be used to mark a temporal relation between the events, which allows for the deduction of a subordinative relation manifesting the relevant temporal structure. On the other hand, the ordering of the VPs also indicates the relationship between the subevents. Semantically, combinations of specific, SVC-typical verbs may impose a fixed interpretation of the construction. Finally, context and world knowledge are often necessary for a correct understanding of the SVC; thus, SVCs for which an interpretation cannot be derived on the basis of syntactic and semantic constraints are apparently only used in situations in which the speaker assumes the receiver to be able to interpret the SVC correctly based on world and context knowledge.

The HPSG analysis proposed in Section 5 treats the SVC as syntactic coordination. The additional causal relation between the constituents is added on the mother node with the C-CONT (constructional content) feature. It is deduced based on semantic constraints on the aspect marking constellations for possible SVC types. A separate constraint is posited for the SVC with shared internal arguments. As it is assumed that a semantic role cannot be assigned twice to different arguments, we propose the projection of already satisfied selectional requirements up to the mother node. Thus, verbs with syntactically unrealized arguments can access already satisfied complements at phrase level.

2 Typological situation and cross-linguistic studies of SVCs

2.1 Typological situation

SVCs are found in four groups of languages distributed in geographically delimitable areas: West Africa, Central America, South-East Asia, and Oceania. These languages manifest structural similarities: SVCs are mostly used in SVO languages, although a few VSO and SOV languages (Ijo, Kwa, Ravüa) also allow for serialization ((Kroeger, 2004, p. 237), Seuren (1990)). On the other hand, serializing languages show deficient systems for the expression of semantic relations. They often manifest poor inflectional and prepositional components, which might represent an argument for the motivation of SVCs. An explanation for this correlation is proposed by Schiller (1990), who states the Semantic Case Instantiation Principle claiming that a language uses the most concrete mechanism available to express semantic relations. He posits the following preference hierarchy:

(2) Inflectional marking → Prepositional phrases → Serial verb constructions

Following this line, the existence of SVCs is explained by the incomplete systems of semantic specification in certain types of languages. These restrictions in semantic expressiveness are typical for creole and pidgin languages; besides, they also appear in isolating languages like Chinese, which, according to Tai (1989), exhibits a number of grammatical properties of child language, but also of creoles and pidgins. Thus, SVCs are semantically underspecified and context-dependent constructions which seem to occur as provisional grammatical structures in languages evolving towards more elaborated states. They are often subject to grammaticalization and lexicalization processes and develop into prepositional or coverbial expressions and lexical compounds.

Cross-linguistically, SVCs can have different formal and functional instantiations. Syntactically, we distinguish between two basic forms of SVCs: on the one hand, the SVC can be constructed out of two canonical verbal phrases directly adjoined to each other, as is the case in the examples in (1). On the other hand, in some languages, the different VPs are reordered: the SVC consists of two clusters, one containing the verbs and the other containing the objects of these verbs (Kroeger, 2004, p. 239-240). This is illustrated in the following examples:

(3) a. Jeh: Mi ruat doh au phei.
you buy give me rice
'You buy rice for me.'

b. Barai: Fu burede ije sime abe ufu.
he bread the knife take cut
'He cut the bread with the knife.'

Semantically, SVCs manifest different degrees of productivity, which is mainly due to restrictions on verbal combinations which can be conceptualized as single events. A number of prototypical functions can be discerned. According to Seuren (1990), the following meanings are often instantiated by verbal constituents of SVCs:

- Instrumental ('take')
- Dative or benefactive ('give')
- Comparative ('surpass')
- Reported speech ('say')
- Aktionsart: termination of an event ('finish')
- Directional adjunct ('go'/'come')

2.2 Survey of the literature on SVCs

The SVC has been extensively discussed in the literature on African and Chinese linguistics. For African languages, early accounts have been proposed by Stahlke (1970), Schachter (1974), Sebba (1987), and Baker (1989). Their analyses and definitions were subsequently used as a basis for analyses of Chinese SVCs. However, analyses of African SVCs can only in part be projected onto Chinese data, as Chinese SVCs are differently motivated and also manifest a number of peculiar characteristics not found in African languages. In Chinese linguistics, the serial verb construction was first discussed in Li and Thompson, 1981. It should be noted that earlier grammars also include examples of SVCs which are, indeed, subsumed under other more canonical grammatical structures such as coordination or complementation. Initially, some difficulties arose with respect to the delimitation of the relevant constructions: in their account of SVCs, Li and Thompson (1981) consider all predicates containing more than one verb. Thus, focussing on the surface form of the constructions, they also include control verb structures, clausal subjects and objects as well as descriptive clauses. These problems left aside, most subsequent analyses (Dai, 1990; Chang, 1990; LIU, 1997) concentrated on the syntactic properties of SVCs. This again led to incomplete descriptions: the semantic composition and, particularly, the ambiguity of SVCs, which we take as basic characteristics distinguishing canonical SVCs from verbal coordination, were often disregarded. Thus, the status of the SVC as an autonomous construction was challenged by authors who attempted to subsume it under other syntactically similar structures (coordination in Wippermann, 1993, complementation in Paul, 2005; Seuren, 1990). This tendency is also manifested in African linguistics: Bodomo (1993) states that SVCs are usually categorized either as coordinative structures with suppressed conjunctions, or as subordinative constructions containing embedded clause complements with suppressed complementizers.

In the following, we will attempt to make a short synthesis of the SVC definitions proposed for Chinese. We will also refer to the extensive literature on African SVCs, hoping to provide a set of characteristics that delimits accurately a type of construction that can be well-handled in a constraint-based analysis. However, we will also see that SVCs are related to pragmatic, cultural and conceptual restrictions that cannot be completely captured in a formal account.

3 Overview of the Chinese data

3.1 Syntax

The Chinese SVC is composed of two verbal phrases. They follow each other without an overt syntactic marking of the semantic relation between the described events:

(4) Ta1 qi3 chuang2 chuan1 yi1fu4.
he get.up bed dress clothes
'He gets up and puts on his clothes.'

Whereas the conjunction *and* is used in English to mark a simple coordination or temporal succession between the VPs, Chinese simply adjoins the two VP constituents. The relation has than to be inferred from speech context, conceptual knowledge, and constructional meaning.

The VPs in an SVC share their subject. It is realized only once in sentence-initial position and understood to be the subject of the second VP.

Additionally, the verbs may also share their direct object:

(5) Ta1 zhong3 cai4 mai4.
he plant vegetables sell
'He plants vegetables to sell them.'

In this example, *cai4* is the object both of *zhong3* and of *mai4*. It is only realized in the first VP. In this type of SVC, a relation of purpose holds between the two events. LIU (1997) proposes an explanation for this structure in terms of Ross' directionality constraint (1967): deletion is directed forward if the identical elements are left-branching, but backward if they are right-branching.

3.2 Semantics

The SVC is used to describe a single overall event, which is composed of two subevents. This general description of the semantic composition of SVCs bears some degree of arbitrarity, as the possible conceptual combinations of events are often conditioned by cultural as well as individual perceptions of the world:

> [...] in order for SVCs to be grammatical, it must be possible for speakers of the language to interpret the various actions as comprising a single coherent event. It appears that different languages impose different restrictions as to which specific combinations of verbs are permissible, and that these restrictions are sometimes due to cultural factors. (Kroeger, 2004, p. 234)

SVCs are often translated by single mono-verbal clauses in non-serializing languages. As is pointed out in Durie, 1997, p. 321, the codification of a situation by a separate verb indicates that this situation is perceived as a salient event type: "the verbal system of a language evolves as a categorization of the event-types that are [...] communicatively in demand for the speech community." In serializing languages with poor verbal systems, SVCs are used as a means to enrich the inventory of possible event-types by verbal series with recurring components. The SVCs in these languages show a strong tendency towards lexicalization: on the one hand,

single verbs often develop distinct meanings when they are used in SVCs. On the other hand, verbal combinations often take semantically unanalyzable meanings.

In light of this close relation between SVC verbs in other serializing languages, the constituents of Chinese SVCs manifest a certain autonomy in that each of the VPs can occur on its own as an independent predicate (with limitations for the shared-object SVC, in which the object has to be overtly realized if the second VP is used independently). In this case, the isolated "subevent" can be perceived as a conceptual whole. However, the meaning of the SVC is not merely a combination of the two VP meanings. As a specific, but underspecified semantic relation holds between the two subevents, additional content is created at the level of the mother node. Therefore, a switch of the VP positions changes the meaning of the construction. This contrasts with instances of VP coordination, where an unspecified temporal relation holds between the events, allowing for the inversion of the constituents without significant change of the meaning:

(6) a. Ta1 xie3 xin4 hui4 ke4.
he write letter receive guest
'He writes letters and receives guests.'

b. Ta1 hui4 ke4 xie3 xin4.
he receive guest write letter
'He receives guests and writes letters.'

An unmarked SVC does not specify the relation between the two events. Thus, multiple interpretations are possible. The correct reading is to be inferred under consideration of world and context knowledge and the lexical semantics of the verbs. Figure 1 shows the possible relations between the subevents of an SVC.

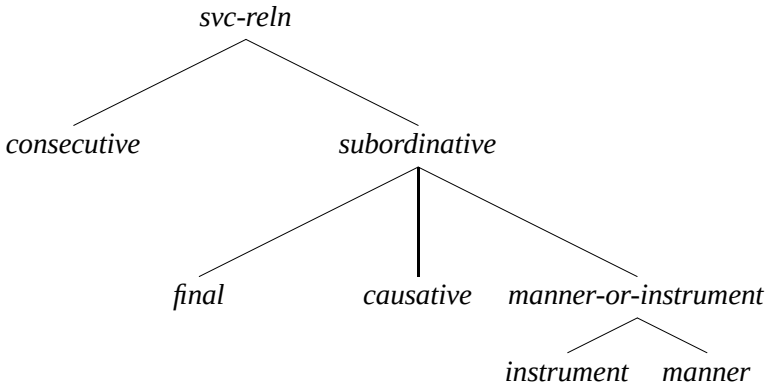

Figure 1: Possible relations between events expressed by SVCs

3.3 Shared object SVCs

In this section, we describe in more detail the specific syntactic and semantic properties of the SVC with shared direct object. SVCs of this type are formed out of two transitive verbs. However, only the first verb takes an overtly realized direct object. The unrealized object of the second verb is understood to be coreferenced with the object of the first verb. The shared-object SVC involves no semantic ambiguity: it only allows for a final reading and thus also has the semantic constraints imposed on canonical final SVCs. However, shared-object SVCs are limited in productivity, as they impose further lexical constraints on the possible combinations of verbs. These restrictions are discussed in Section 4.2.

Liu (2009) argues that the described constellations with shared objects are not instances of SVCs. He motivates this by the different properties of the constructions with respect to perfective aspect marking: in an SVC with two complete VPs, both verbs can be marked by the perfective aspect marker *le*, whereas only the first VP can be marked in the shared-object SVC. This argument results from a different understanding of SVCs; in fact, both VPs in canonical SVCs can take *le* without challenging the syntactic acceptability of the construction. However, the notion of SVC adopted in our paper relies on the semantic relations between subevents. This relation in turn interacts with aspectual properties: the distribution of aspect markers is restricted for subtypes on semantic grounds. For the final SVC – whether canonical or shared-object – we assume that the second VP cannot be marked by *le*, as it is an irrealis clause.

4 Extra-lexical meaning components in SVCs

The challenges posited by SVCs are to a great part semantic in nature. On the one hand, we have to deal with the non-compositionality and underspecification of meaning and the resulting ambiguities. On the other hand, we will see that SVCs show different degrees of specificity of meaning and, therefore, of productivity: possible SVCs go from fully productive structures with free lexical instantiations to collocational expressions reflecting grammaticalization and lexicalization tendencies. In a typological perspective, SVCs show systematic restrictions on possible meaning combinations, which have to be integrated into the analysis in addition to syntactic constraints on the form and argument structure of the VPs. Finally, SVCs show interesting effects of interaction between the argument structures of the constituent verbs, which also contribute a part of their non-compositional meaning.

4.1 Surface ambiguity and disambiguation of the SVC

We have seen that SVCs come with a set of possible semantic relations between the subevents. They are not marked on the surface and thus are determined at phrase level. The semantic ambiguity of an unmarked SVC results from an underspecification, as the correct relation between the parts of the SVC is to be deduced from

world and context knowledge and from lexical and iconic properties of the verbal combinations.

We hypothesize that three types of knowledge – with different degrees of specificity with respect to the speech situation – are involved in the interpretation of an utterance: 1) Linguistic knowledge (default: semantic compositionality), 2) World knowledge (presupposes concrete receiver), and 3) Context (presupposes concrete speech situation). The presumed availability of these knowledge components impacts on the choice of a construction with which the speaker intends to express a semantic relation. In line with the argument of Goldberg (1995, p. 68), who claims that two constructions cannot be both semantically and pragmatically equivalent, the following constructions are available to express the set of relations postulated for SVCs in different pragmatic settings:

- Lexical / syntactic meaning → complex clause with subordinate conjunction
- World knowledge → SVC with aspectual marking
- Context → unmarked SVC

We see a decrease in "heaviness" of the constructions: the more information available, the less complex and elaborate the syntactic structure. It is assumed that the speaker chooses the most economic form of expression allowing for a correct interpretation.

In the case of the complex clause, the meaning can be deduced compositionally: it is contributed by the meanings of the lexical items and their syntactic combination. The subordinate relation is unambiguously specified by an overt conjunction. For the use of SVCs, we assume that speakers of the language have knowledge about the set of possible causal SVC-relations as part of their language capacity. If world knowledge is assumed on the side of the hearer which allows the perception of the described events as a conceptual whole, the SVC with aspect marking is used: as we will see in the next section, causal relations that hold in SVCs also contain a temporal component, which can be specified by aspect markers. The mapping of the aspect values onto the set of possible relations allows the deduction of the correct causal relation. Finally, if an SVC-relation is to be expressed which fits in a specific context known to the hearer, an unmarked, completely underspecified SVC will be used.

In the following paragraphs, we illustrate the semantic correspondences between unmarked SVCs, marked SVCs and complex clauses. It will be shown that these constructions differ on the level of pragmatics: their use is conditioned by presuppositions of the speaker about the presence or absence of world and context knowledge on the side of the receiver.

4.1.1 Aspect marking in SVCs

The relation between the two events can be disambiguated by use of the particles *le* (perfective) and *zhe* (durative). These particles are commonly claimed to be

aspect markers. However, they can also act as markers of temporal reference: although Chinese does not have a grammaticalized tense component, aspect markers in complex clauses are interpreted as markers of temporal relations between the events.

In SVCs, aspect markers perform a pragmatic function similar to subordinative conjunctions. Their temporal reference function can be related to the semantic relations in SVCs in the following way: subordinative relations are complex relations in the sense that they also contain a temporal component. They expose the following correspondences:

- Final → succession
- Causative → underspecified relation (succession or simultaneity)
- Manner, instrument → simultaneity

Thus, by mapping the temporal function of aspect markers onto the set of possible subordinative relations, we get the following interpretations for SVCs:

- VP1[perf] VP2 → VP1 *in order to* VP2

  (7) Ta1 qu3 le qian2 qu4 guang1jie1.
  he withdraw PERF.ASP money go shopping
  'He withdrew money to go shopping.'

- VP1 VP2[perf] → VP2 *because of* VP1

  (8) Ta1 zhu4 Zhong1guo2 xue2 le Han4yu3.
  he live China learn PERF.ASP Chinese
  'He acquired Chinese because he lived in China. '

- VP1[dur] VP2 → VP2 *by means of* VP1

  (9) Ta1 na2 zhe kuai4zi chi1 fan4.
  he take DUR.ASP chopsticks eat meal
  'He eats with chopsticks.'

4.1.2 Interrelations of SVCs with complex clauses

The causal relations in SVCs can also be expressed by complex clauses with subordinate conjunctions (e. g. *yin1wei4* ('because of'), *wei4le* ('in order to'), *yi3hou4* ('after')). The following examples demonstrate such semantic equivalences:

(10) a. Ta1 xie3 zi4 ai4 ma3.
he write characters suffer critics
'He wrote characters and suffered critics.' or
'He suffered critics for writing characters.'

b. Ta1 yin1wei4 xie3 zi4 ai4 ma3.
he because write characters suffer critics
'He suffered critics for writing characters.'

(11) a. Ta1 qu3 qian2 qu4 guang1 jie1.
he withdraw money go shopping
'He withdraws money to go shopping.'

b. Ta1 wei4le qu4 guang1 jie1 qu3 qian2.
he in order to go shopping withdraw money
'He withdraws money to go shopping.'

4.1.3 Ordering of the VPs

The ordering of the VPs in an SVC also makes a contribution to its extra-lexical meaning: the subevents are sequenced according to the order of occurrence in the real world (Temporal Sequence Principle, Tai, 1988) as well as to their direction of causation (Durie, 1997, p. 330). Both criteria apply for SVCs with a consecutive ordering of the events: in final SVCs, the purpose VP follows the action VP. In causative SVCs, the cause VP precedes the effect VP. Instrument SVCs, which bear a temporal relation of simultaneity, are interpreted according to causal priority between the events: the use of an instrument is prior to the effect which is achieved with it; thus, the instrument VP precedes the main event VP.

4.2 Specificity of meaning and productivity in SVCs

In this section, we will show that SVCs show different degrees of specificity of meaning, which are interrelated with restrictions in productivity of the possible lexical constellations: a range of SVCs can only be formed with verbs from restricted classes. These restrictions, in turn, interact with the choice of a "preferred" construction by the speaker described in the previous section: the hierarchy of constructions applies fully only in the case of freely productive SVCs (causative / final SVCs with unshared objects). We find two basic kinds of SVC productivity in Chinese: first, SVCs can manifest combinations of verbs of semantic classes which seem to be representative for the causal relations included in the event structure of SVCs. Such combinations are found in final SVCs with shared objects as well as in causative SVCs. On the other hand, SVCs may include one verb that is frequently used in series. This kind of serialisation is also found in a number of other serialising languages (e. g. Sranan, Sebba, 1987). It is used to describe event-types

with “identifiable recurrent subcomponents” (Durie, 1997). We find this type of serialisation in Chinese manner, instrument and deictic-final SVCs.

In shared-object SVCs, both verb positions are restricted: the V1 is obligatorily volitional and denotes the creation or acquisition of its object; thus, two semantic classes are available for V1: Verbs of creation (ex. *chuang4zuo4* (‘create’), *chao3* (‘cook’), *zhong3* (‘plant’)) and Verbs of acquisition (ex. *mai3* (‘buy’), *zhao3* (‘find’)). These verbs can also occur in the ditransitive *gei3*-construction with a benefactory argument. Assuming that a benefactory role is inherently contained in their lexical semantics, the agent of the shared-object SVC can be understood as an implicit beneficient.

The V2 expresses how the object is to be disposed of after the action of V1. The disposal meaning is also relevant for other syntactic constructions in Chinese; thus, the *ba*-construction, which licenses preposed objects, is only grammatical with verbs containing a disposal component.

The overall meaning of the shared-object SVC can be illustrated as follows:

(12) SUBJ V1 OBJ V2
agent creates/gains possession over theme/patient$_i$ in order to dispose of *i*

The following set of examples shows possible instantiations of this semantic constraint:

(13) a. Ta1 chao3 yi4 pan1 cai4 chi1.
he cook one CL dish eat
‘He cooked a dish to eat it.’

b. Ta1 zhong3 cai4 mai4.
he plant vegetable sell
‘He plants vegetables to sell them.’

c. Ta1 chuang4zao4 yue4qu3 yan2chu1.
he create music.work perform
‘He writes musical works to perform them.’

In causative SVCs, the first verb is obligatorily volitional, whereas the second verb is mostly unaccusative; the second VP can also take a passive form with the particle *bei4* (14b):

(14) a. Ta1 zuo4 zai4 di4shang4 gan3mao4 le.
he sit on floor get.cold PERF.ASP
‘He caught a cold because he was sitting on the floor.’

b. Ta1 tou1 che1 bei4 jing3cha2 zhua1 le.
he steal car BEI police arrest PERF.ASP
‘He was arrested by the police for stealing a car.’

In manner SVCs, the verb in the first VP is restricted to verbs which are canonically used to express means or manner; these are: Verbs of position as in (15), verbs of motion as in (16), and *zuo* ('sit'), which takes as object a transport medium and expresses the means by which one gets to a location (17). In the latter case, V2 is also restricted to the two verbs *qu* ('go') and *lai* ('come'), which attributes a collocational character to the SVC.

(15) Ta1men zhan4 zai4 men2kou3 liao2tian1.
they stand at door chat
'They chat standing by the door.'

(16) Ta1 qi2 zhe zi4xing2che1 da3 dian4hua4.
he ride PERF.ASP bike call phone
'He phones cycling on his bike.'

(17) Ta1 zuo4 huo3che1 qu4 Bei3jing1.
he sit train go Pekin
'He goes to Beijing by train.'

Another kind of SVC with collocational meaning is the final SVC in which the first VP describes the movement towards a location at which the action of the second VP is to be performed. The position of the first verb is restricted to a small class of verbs which can also act as directional complements:

(18) a. Ta1 lai2 Mo2si1ke1 xue2 E2yu3.
he come Moscow learn Russian
'He comes to Moscow in order to learn Russian.'

b. Ta1 shang4 lou2 shui4jiao4.
he go.up house sleep
'He goes upstairs to sleep.'

In this case, the meaning of the construction is:

(19) SUBJ V1 OBJ VP2
agent goes to/comes to goal$_i$ in order to perform some action at *i*

The object of V1 is assigned two thematic roles: it is the goal of V1 and the location of the event described by the second VP.

Finally, the instrument SVC can be formed only with the two verbs *na* ('take') and *yong* ('use'). In these cases, the object of the first verb is understood to be the instrument argument of the second verb.

In this section, we have seen various 'prototypical' constellations of SVCs which impact on the constructional meaning and show that the meaning of SVCs in Chinese cannot be deduced lexically. Further evidence for the SVC as an autonomous construction is provided by languages in which SVCs bear semantically

unanalyzable, strongly lexicalized meanings. We have also shown that the additional content of SVCs is often conditioned by overlapping argument structures, in that a sole argument gets assigned semantic roles from different verbs. The argument structure properties of SVCs are discussed in the following section.

4.3 Issues of argument structure in SVCs

The SVC shows two distinctive argument structure properties: on the one hand, it disallows the attribution of the same semantic role to different arguments. On the other hand, the same argument can receive multiple semantic roles from different verbs.

Durie (1997) points out that SVCs cannot contain duplicate semantic roles: a role cannot be attributed to two different arguments. He illustrates this with examples from White Hmong and Kalam, where two transitive verbs can only take distinct objects if one of these objects is an oblique argument. This property also applies for other verbal constructions, starting with simple clauses with single verbs. It justifies the overall event reading of the SVC as we assume that the same event does not allow for two distinct participants to be attributed the same semantic role. Thus, coinciding semantic role assignments of verbs must be realized on the same argument. In the following pair of examples, (20a) is an instance of coordination where the two verbs each have an independent theme argument; (20b) is an SVC, as both verbs attribute their theme role to the argument *cai*:

(20) a. Ta1 zhong3 cai4 mai4 shui3guo3.
he plant vegetable sell fruit
'He plants vegetables and sells fruits.'

b. Ta1 zhong3 cai4 mai4.
he plant vegetable sell
'He plants vegetables to sell them.'

To account for the assignment of multiple semantic roles to the same arguments, Durie (1997) proposes an approach with two levels of argument structure: alongside the independent argument structures of the single verbs, a "fused" argument structure is imposed for the whole construction. Durie points out that this additional level is necessary for the realization of the prohibition against the duplication of semantic roles, as it is illustrated by the following example:

(21) Ta1 na2 bi3 xie3 zi4.
he take pen write character
'He writes characters with a pen.'

On the level of lexical semantics, the verbs *na2* and *xie3* both assign a theme role to their direct object. However, the "fused" argument structure can be represented as [Agent, Instrument, Theme], whereby the noun *bi3* is assigned the instrument role instead of the theme role. Thus, the constraint against duplicate role

assignment is satisfied at the level of the constructional argument structure. This level is also involved in the correct interpretation of argument roles, which can often only be deduced in the context of the whole SVC: we have seen that *na2* in the above example does not take an instrument argument when used independently. However, in the SVC context, it is used to mark an instrument.

5 HPSG analysis of Chinese SVCs

In this section, we describe an HPSG-analysis of Chinese SVCs. We first posit a general syntactic constraint that holds for all SVCs. In a second step, we deal with constraints on binary SVCs (unshared-object SVCs and shared-object SVCs) in more detail. The consecutive SVCs will not be dealt with in this paper. We propose complex implicational constraints relating the aspect marking constellations of SVCs to the semantic relations that were introduced in Section 3.2. Finally, we show how valence requirements in shared-object SVCs can be satisfied non-locally by projection to the constructional level.

5.1 General constraint for SVCs

We assume that all SVCs are instances of one of three types: *consecutive-svc*, *unshared-obj-svc*, and *shared-obj-svc*. These types are subtypes of the type *svc*. Structures of type *svc* have to obey the following constraint:

(22) *svc* →

$$\left[\begin{array}{l}
\textsc{synsem}\mid\textsc{loc}\mid\textsc{cat}\left[\begin{array}{ll}\textsc{head} & \textit{verb}\\ \textsc{spr} & \langle \boxed{1}\,\textsc{np}\rangle\end{array}\right]\\
\textsc{c-cont}\left[\begin{array}{ll}\textsc{ind} & \boxed{2}\\ \textsc{rels} & \left\langle\left[\begin{array}{ll}\textit{svc-reln}\\ \textsc{arg}0 & \boxed{2}\\ \textsc{arg}1 & \boxed{3}\\ \textsc{arg}2 & \boxed{4}\end{array}\right]\right\rangle\end{array}\right]\\
\textsc{nh-dtrs}\left\langle\left[\begin{array}{ll}\textsc{ss}\mid\textsc{loc}\mid\textsc{cat}\left[\begin{array}{ll}\textsc{head} & \textit{verb}\\ \textsc{spr} & \langle\boxed{1}\rangle\\ \textsc{subcat} & \textit{los}\end{array}\right]\\ \textsc{cont}\mid\textsc{ind} & \boxed{3}\end{array}\right],\left[\begin{array}{ll}\textsc{ss}\mid\textsc{loc}\mid\textsc{cat}\left[\begin{array}{ll}\textsc{head} & \textit{verb}\\ \textsc{spr} & \langle\boxed{1}\rangle\end{array}\right]\\ \textsc{cont}\mid\textsc{ind} & \boxed{4}\end{array}\right]\right\rangle
\end{array}\right]$$

We represent the SVC as a non-headed structure with two verbal daughters, whereby the first verbal daughter is always a complete VP. We assume a non-cancellation approach to valence. This approach was introduced by Meurers (1999) and Przepiórkowski (1999) for the analysis of case and fronting in German. It has subsequently been used by Müller (2008) for depictives in German and English, as well as by Bender (2008) for the explanation of constituent order in Wambaya. The gist of this proposal is that valents are still members of the SUBCAT list even if the respective argument has been combined with the head already. Whether this combination has taken place or not is registered by a binary feature REALIZED whose

value is '+' if an argument is combined with its head and '–' if no such combination has taken place. A fully saturated head has a SUBCAT list that has only elements with the REALIZED value '+'. Meurers called such elements *spirits*. So, the value of the SUBCAT list in the first non-head daughter in (22) is *list-of-spirits* (*los*). This list contains the values of the arguments already realized in the VP. The two verbal daughters subcategorize for the same subject. Therefore, their SPR values are identified and projected to the mother node. The semantic relation between the VPs is contributed at the level of the mother node: we use the feature C-CONT (constructional content) proposed in Copestake, Flickinger, Pollard and Sag, 2005 to accommodate semantic relations contributed at construction level. The constraint above only says that there will be a relation between the two events expressed by the VPs. The relation is a subtype of *svc-reln* (see Section 3.2).

5.2 Analysis of SVCs with unshared objects

SVCs with unshared objects require that the arguments of the verb in the second VP are all realized, that is: the elements in the SUBCAT list of the second VP have to be spirits. This is what is formalized as the following constraint:

(23) $\textit{unshared-object-svc} \rightarrow \left[\text{NH-DTRS } \left\langle [\,], [\text{SS|LOC|CAT|SUBCAT } \textit{los}]\right\rangle\right]$

The semantic interpretation of the construction depends on the aspect marking of the VPs. If the second VP is perfective, the relation between the two events is causative. We assume that the perfective aspect is analyzed as a lexical rule that combines a verb with the aspect marker *le* and contributes a *perfective*' relation to the beginning of the RELS list. Hence, the unshared object SVC can refer to this relation: if it is present in the RELS list of the second VP the relation that is contributed by the construction has to be *causative*':

(24) $\left[\begin{array}{l}\textit{unshared-object-svc}\\ \text{NH-DTRS } \left\langle [\ldots], [\text{RELS } \left\langle \textit{perfective}\right\rangle \oplus \textit{list}]\right\rangle\end{array}\right] \rightarrow \left[\text{C-CONT|RELS } \left\langle \textit{causative}\right\rangle\right]$

If the first VP is perfective, the relation between the two events is final:

(25) $\left[\begin{array}{l}\textit{unshared-object-svc}\\ \text{NH-DTRS}\left\langle [\text{RELS } \left\langle \textit{perfective}\right\rangle \oplus \textit{list}]\right\rangle \oplus \textit{list}\end{array}\right] \rightarrow \left[\text{C-CONT |RELS } \left\langle \textit{final}\right\rangle\right]$

Note that this analysis predicts that not both VPs can be marked for (perfective) aspect simultaneously, since if they were, conflicting constraints would be imposed on the constructional contribution of the SVC (*final* and *causative* are incompatible with each other, see Figure 1).

We assume that the relations that are contributed by linguistic objects are not represented inside of CONT, but at the outermost level of the sign. Since heads select only *synsem* objects and not complete signs, this makes it impossible for a head to select the semantic relations contributed by its dependents and hence results in a more local theory of selection. See also Sailer, 2004 on the locality of selection with regard to semantic information. However, the semantic contribution

of daughters can be accessed on the constructional level as is demonstrated in the constraint in (25).

The durative marker *zhe* can only be used in the first VP.[1] It marks either a manner or an instrument relation between the two events:

(26) Ta1 chang4 zhe ge1 qu4 xue2xiao4.
he sing DUR.ASP song go school
'He goes to school singing a song.'

(27) $\left[\begin{array}{l}\textit{unshared-object-svc} \\ \text{NH-DTRS} \left\langle \left[\text{RELS} \left\langle \textit{durative} \right\rangle \oplus \textit{list}\right] \right\rangle \oplus \textit{list}\end{array}\right] \rightarrow \left[\text{C-CONT}|\text{RELS} \left\langle \textit{manner-or-instrument} \right\rangle\right]$

We have described SVCs with the two verbs *na2* ('hold') and *yong4* ('use') as structures with a collocational character: the object of the first VP is understood to be the instrument for the action described by the second VP. The *instrument* relation is a subtype of *manner-or-instrument* relation. Thus, an SVC whose VP1 contains the durative marker in combination with a verb that contributes either a *hold*' or *use*' relation is interpreted as an instrumental SVC:

(28) Ta1 na2 zhe bi3 xie3 zi4.
he hold DUR.ASP pen write characters
'He writes characters with a pen.'

(29) $\left[\begin{array}{l}\textit{unshared-object-svc} \\ \text{NH-DTRS} \left\langle \left[\text{RELS} \left\langle \textit{durative, hold-use-rel} \right\rangle \oplus \textit{list}\right] \right\rangle \oplus \textit{list}\end{array}\right] \rightarrow \left[\text{C-CONT}|\text{RELS} \left\langle \textit{instrumental} \right\rangle\right]$

Having explained SVCs with unshared objects, we now turn to SVCs with shared objects.

5.3 Analysis of SVCs with shared objects

In the basic SVC case, each of the two verbs takes its own object. We therefore posited a straightforward subtype *unshared-object-sc* with two VP daughters whose valence requirements are realized locally. For the *shared-object-svc*, we assume a subtype with a complete VP as first daughter and a single verb as second daughter. In this case, the object of the second verb is identical to the object inside the preceding VP.

In order to explain the details of the analysis, we have to elaborate the sketch of the raising spirits analysis that was provided in the previous section: As was mentioned above, we adopt a complex structure for the elements on the SUBCAT-list. The *synsem* objects are represented as the values of the feature ARGUMENT and the status of the argument is represented via the boolean feature REALIZED. The value of REALIZED is '+' for arguments that are realized in a head argument structure and '–' for unrealized arguments.

[1] *Zhe* can mark two adjoined VPs. However, the resultant structure is VP coordination as no specific relation holds between the two events.

(30) $\begin{bmatrix} \text{ARGUMENT} & \textit{synsem} \\ \text{REALIZED} & \textit{boolean} \end{bmatrix}$

This treatment of valence ensures that the elements on the SUBCAT-list are not deleted after their realization. Instead, they are simply marked as realized and projected to the mother node. With this machinery in place, we posit the following constraint for the *shared-object-svc*:

(31) *shared-object-svc* $\rightarrow$

$$\left[\text{NH-DTRS} \left\langle \left[\text{SUBCAT} \left\langle \begin{bmatrix} \text{ARGUMENT} & \boxed{1} \\ \text{REALIZED} & + \end{bmatrix} \right\rangle \oplus \textit{list} \right], \left[\text{SUBCAT} \left\langle \begin{bmatrix} \text{ARGUMENT} & \boxed{1} \\ \text{REALIZED} & - \end{bmatrix} \right\rangle \oplus \textit{list} \right] \right\rangle \right]$$

The object of the first verb is overtly realized, whereas the object of the second verb is not. Its ARGUMENT value is identified with that of the object of the first daughter.

The constraint in (31) refers to the first elements in the respective SUBCAT lists, but nothing is said about the length of this list. This allows for instance ditransitive verbs as the second part of an SVC. (32) shows an example:

(32) Ta1 mai3 yi1 ben3 shu1 song4 gei3 wo3.
he buy one CL book offer for/to me
'He buys a book to offer it to me.'

In contrast to unshared object SVCs the semantic contribution of SVCs with a shared object is fixed. It is always the *final* relation. This is captured by the following constraint on *shared-object-svc*:

(33) *shared-object-svc* $\rightarrow$ $\left[\text{C-CONT|RELS} \left\langle \textit{final} \right\rangle\right]$

We have pointed out in Section 4.2 that the semantics of SVCs is not only constrained with respect to possible relations between the described events; rather, the set of possible meanings for the subevents is also limited. We thus posit a hierarchy of relevant semantic verb classes (*creation-or-acquisition*, *disposal*, *volitional*, *go-or-come*, *hold-or-use* etc.) and constrain the KEY values of the verbs to subtypes of the corresponding relations. These lexical constraints also allow for predictions about the syntactic structure of SVCs: for example, by constraining the first verb of the *shared-object-svc* to verbs of creation and acquisition, we account for the fact that the construction cannot be formed with ditransitive verbs in VP1. On the other hand, it has been shown in Section 4.2 that the restrictions on possible verbs in SVCs correlate in interesting ways with other syntactic constructions such as the *ba3*-construction and the double-object structure with *gei3*.

The analysis of shared object SVCs presented here uses only machinery that was independently motivated. It therefore differs from the analysis of serial verbs in Ga that was suggested by Kropp Dakubu, Hellan and Beermann (2007). Serial verbs in Ga exhibit analogous argument sharing structures. The authors introduce the use of grammatical functions reminiscent of LFG and project information about arguments inside the feature QVAL. As grammatical functions are usually

not assumed in HPSG work, we do not follow this approach but employ the non-cancellation technique that was independently motivated for the analysis of case assignment and partial verb phrase fronting and depictives.

Discussing the RELS feature in the previous section, we pointed out the conceptual advantage of having it at the outermost level of the feature structure rather than under SYNSEM. This feature geometry makes it impossible for a head to select via valence features the internal semantic contribution of a phrase (for instance the relation that is contributed by a verb inside VP). However, the non-cancellation account to valence makes available large parts of the syntactic structure at the mother node of a phrase. We would prefer to have a strictly local theory of selection, that is, a combination of strict locality in semantics as argued for by Sailer (2004) and of syntax as argued for by Sag (2007), but since the sharing of the object comes with a constructional semantic effect, the analysis should be related to a form meaning pair and the identification of the object referents should not be left to pronoun binding or similar devices. If this general approach is correct, we have evidence that information about VP internal objects has to be available at the VP level and hence that a non-cancellation approach to valence or an approach of the kind suggested by Kropp Dakubu et al. (2007) that projects information about the respective dependents is necessary for the analysis of languages like Mandarin Chinese and Ga.

6 Conclusion

In this paper, we provided a description and an analysis of SVCs in Chinese. After a general consideration of the SVC in a typological context and a description of its basic properties, we discussed the issues related to the syntactic underspecification and semantic ambiguity of SVCs. It has been shown that the interpretation of SVCs involves a number of meaning elements which are not contributed by the parts of the construction but rather by the whole configuration. We proposed an analysis of the Chinese SVC in HPSG, using two syntactic constraints for SVCs with unshared and shared objects, as well as complex implicational constraints for the representation of interactions between aspect markers and the subordinative relations in SVCs. The analysis has been implemented in the TRALE system (Meurers, Penn and Richter, 2002; Penn, 2004; Müller, 2007a) as part of a grammar fragment of Mandarin Chinese which uses a core grammar for German, Persian, Danish and Maltese. The respective grammars can be downloaded at http://hpsg.fu-berlin.de/Software/.

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