Word order in Mandarin Chinese Intransitive Clauses

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Abstract

This study, couched in Mel’čuk’s (2001) theory of communicative organization, deals with word order in simple intransitive Mandarin Chinese sentences from a communicative point of view. The Semantic-Communicative Structure of Subject-Verb, Verb-Subject, and Prolepsis-Subject-Verb sentences is described. We also demonstrate that the Rheme~Theme opposition does not affect the Subject-Verb and Verb-Subject word orders. It is shown that (i) Subject-Verb sentences are communicatively unmarked (i.e., this word order signals no particular Semantic-Communicative Structure), (ii) Verb-Subject sentences can only encode New Neutral Non-Focalized Subjects, and (iii) Prolepsis-Subject-Verb sentences encode Given Focalized Subjects.

Keywords


1 Introduction

The goal of the present paper is to describe the Semantic-Communicative Structure of monoclusal Subject-Verb (SV), Verb-Subject (VS), and Prolepsis-Subject-Verb (PiSV) sentences in Mandarin Chinese (MC). The Prolepsis (P) is a sentential element that always occurs to the left of the sentence, which is syntactically very loosely connected to the rest of it and allows a pause separating it from the rest of the sentence (Mel’čuk, 2001, 130). Note that the MC examples presented here do not have coverbs or adverbial phrases, and have a neutral prosody.¹ Also note that they are all used in context and therefore each sentence has only one Sem-CommS. It has been argued by a number of linguists, among others, Hu (1995), LaPolla (1993, 1995), Li and Thompson (1975, 1976), and Li Wendan (2005), that word order in Mandarin Chinese is determined to a great extent by informational/communicative considerations (we will use the term ‘communicative’ throughout this paper). In other words, a certain communicative structure will give rise to a certain order of constituents within the

¹ Coverbs are defined in Po-Ching & Rimmington (2004) as verbs that are similar to English prepositions and that generally occur in conjunction with other verbs (e.g., dui ‘towards, facing’, xiang ‘heading, towards’, and zi ‘from’). Some coverbs, however, may also function as independent verbs.
sentence. Notice that the same word order can, in principle, correspond to several communicative structures. Among the above authors, some argue that the Topic-Comment opposition is the determining factor affecting word order. They maintain that Topics always occur in sentence-initial position (Li & Thompson, 1976, 466; Li Wendan, 2005, 30). In this paper, we follow Lambrecht (1994) and Mel’čuk, (2001), among others, in maintaining that communicative considerations are far more complex than the Topic-Comment dichotomy might suggest. It is argued that word order in MC is determined by a number of Semantic-Communicative-oppositions. In the following section, relevant aspects of the Meaning-Text Theory are reviewed, and in section 3 the SV, VS, and P,S,V word orders are discussed.

2 The Semantic-Communicative Structure

In this section we give a brief overview of the Semantic-Communicative Structure in MTT. Every utterance has a Semantic Structure (SemS) on which the Semantic-Communicative Structure (Sem-CommS) is superimposed. While the SemS represents a sentence’s ‘propositional’ content, the Sem-CommS specifies the manner in which the speaker wants to organize it. The Sem-CommS divides the SemS into communicative areas along eight Semantic-Communicative-oppositions: (i) Thematicity (i.e., also known as the Topic-Comment dichotomy); (ii) Givenness; (iii) Focalization; (iv) Perspective; (v) Emphasis; (vi) Presupposedness; (vii) Unitariness; and (viii) Locutionality. Of these eight oppositions, two are relevant to the present discussion namely, Thematicity and Givenness. The Sem-CommS determines (to a great extent) the Deep-Syntactic Structure of a sentence, which in turn determines its surface form. In the following sections, the Sem-Comm-oppositions of Thematicity, Givenness, Focalization, and Perspective are characterized.

2.1 Thematicity

Thematicity has three values: Theme, Rheme, and Specifier (we will not be concerned with this last value). The Theme-Rheme opposition is the most universal and relevant in that a proposition necessarily says something (the Rheme) about something (the Theme). As such, it is not surprising that it was the first opposition to be identified in linguistics. The Semantic Theme of a sentence can be defined as the part of its SemS which corresponds to what the message is about, and the Semantic Rheme as what is stated about the Theme by means of the sentence. By way of example, if someone answers *John killed a rabbit* to the question *What did John kill?*, *John killed* expresses the Theme and *a rabbit* the Rheme. In other words, the event of John killing something is talked about and it is said about it that what was killed is a rabbit. Note that a Semantic Representation necessarily contains a Rheme, but it need not contain a Theme.

2.2 Givenness

The Sem-Comm-opposition of Givenness is composed of three values: Given, New, and Not-Applicable. The value Given can be defined as the part of the SemS of a sentence which the Speaker presents as being in the Addressee’s current consciousness or at least easily accessible for the Addressee. To say that something is in the Addressee’s consciousness is to...

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2 Also see Lambrecht (1994, Chapter 4), and especially section 4.7, pages 199-205, for a discussion of the ‘Topic-first principle’. It is similar to LaPolla (1995, 310) who proposes that topical elements occur in pre-verbal position while focal elements appear in post-verbal position.

3 See Mel’čuk (1988, 43-91) for an in-depth characterization of the framework.
say that the addressee can foresee it coming up next in the discourse and can uniquely identify its referent. This state of affairs can arise from (i) linguistic context (i.e., from preceding utterances) or (ii) extralinguistic context (i.e., encyclopaedic knowledge shared by both the Speaker and the Addressee and/or from the situation in which the discourse takes place). The value New, on the other hand, characterizes items that are not in the Addressee’s consciousness. Finally, Not-Applicable means that the Given-New division does not apply for a certain configuration. The Given-New opposition is an Addressee-oriented Sem-Comm-opposition in that the Speaker chooses which part of the SemS is Given and which part is New according to what information he believes the Addressee can or cannot access. For instance, in Some brothers had the quarrel over the book, Some brothers is encoded as New, while had the quarrel over the book is encoded as Given. Note that the concept of Givenness is not equivalent to that of Determinedness, which encompasses the values Determined and Non-Determined. Determinedness is not part of the Sem-CommS, but rather of the SemS. Determined NPs in MC are, for instance, preceded by a demonstrative pronoun and/or a numeral in addition to a classifier (e.g., zhe*(yi$_2^*$)ge ping$^3$guo$^3$ ‘this (one) apple’), while Non-Determined NPs are bare (e.g., ping$^3$guo$^3$ ‘the apple(s)/apple(s)). Determined and Non-Determined NPs can be Given or New.

2.3 Focalization

Focalization has two values: Focalized and Non-Focalized. The former is defined as the part of a proposition which the Speaker presents as being logically prominent for him, that is, which is in the speaker’s focus of attention. When a configuration is logically prominent it excludes any other possibilities (note that it may or may not be contrastive). A Non-Focalized portion of a SemS is simply not logically prominent (it is the unmarked value of the division). For example, if A says I think Mike met the doctor at the airport and B replies No, it was John who met the doctor at the airport, John is logically prominent for B, who is telling A that the person who met the doctor at the airport was precisely John.

2.4 Perspective

Perspective has the values Foregrounded, Backgrounded, and Neutral. Foregrounded and Backgrounded can be characterized as the part of a SemS which the speaker presents as psychologically prominent/secondary for him — that is, as having, from his point of view, special/reduced psychological importance with respect to what he wants to communicate (Mel’čuk 2001, 199). What is known as ‘possession raising’ is a good example of Foregrounded. In brief, possession raising ‘promotes’ the possessor of a noun to a higher ‘syntactic rank’ at the Deep-Syntactic Structure (Mel’čuk 2001, 204-5). Compare the French sentence J’ai lavé sa tête ‘I have washed his head’ to Je [lui]$_{Foregrounded}$ ai lavé la tête ‘I to-him have washed the head’ (adapted from Mel’čuk 2001, 206). The first sentence is the non-raised construction: The possessor of tête ‘head’ is expressed via the possessive adjective sa ‘his’, which is dependent on the Direct Object tête ‘head’. The second sentence illustrates raising: The possessor is expressed by the dative clitic pronoun lui ‘him’, which directly depends on the main verb, not on the thing washed. In other words, because the possessor of the head was Foregrounded, it was syntactically ‘promoted’ or ‘raised’. Regarding the second value, the appositive clause who is a very good carpenter in the sentence [John]$_{Neutral}$ [who is a very

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4 Mel’čuk (2001: 183) writes that “a member of a contrastive pair is necessarily Focalized, even if a Focalized element is not necessarily a member of an explicit contrast.”
good carpenter] Backgrounded, [built this cabinet] Neutral is Backgrounded. Finally, the value Neutral amounts to being Neither- Foregrounded-nor-Backgrounded.

3 Simple Intransitive MC Sentences

Word order in Mandarin Chinese, though flexible, is constrained by Semantic-Communicative factors. In this section, we describe the Semantic-Communicative Structure of simple SV, VS, and P_iS_iV sentences. These different word orders are described in terms of marked and unmarked sentences. Let us first briefly define the term ‘markedness’ as used in this paper. An unmarked word order is one which neutralizes different Sem-CommSs — that is, it can be used in sentences that express a number of different SemComSs. A word order is marked with respect to another word order if it encodes fewer Sem-CommSs (potentially only one) than the word order it is compared to. By way of example, let there be word orders A and B, and a set of different Sem-CommS α, β, and γ. Let us suppose that word order A can encode Sem-CommSs β and γ whereas word order B can only be used to encode Sem-CommS α. Then word order B is said to be marked relative to word order A.

Having said this, let us turn to the Mandarin Chinese intransitive word orders under scrutiny. There are three possible word orders for ordinary intransitive Mandarin Chinese sentences — namely SV, VS, and P_iS_iV. We will start the discussion by demonstrating that the Sem-Comm-opposition of Thematicity does not affect word order in SV and VS sentences (cf. 3.1) and then show in sections 3.2 and 3.3 that SV sentences can encode any Sem-CommS with two exceptions: (i) The Subject must not be New, Neutral (= Non-Foregrounded), and Non-Focalized; in this case, the VS order has to be chosen; and (ii) The Subject (= Semantic actant) must not be Given Focalized; in this case, a P_iS_iV sentence must be used (cf. section 3.4).

3.1 Thematicity and Word Order in Intransitive Clauses

In (1), Zhangsan expresses the Rheme and zou³–le ‘left’ the Theme. A asks B who left, and B answers the following (the interlinear gloss COMPL stands for COMPLETIVE aspect):

(1) a. [zhang¹·san¹]Rheme [zou³–le] Theme (S_Rheme V_Theme)
   zhang.san    walk–COMPL
   ‘Zhangsan left’

b. *[zou³–le] Theme [zhang¹·san¹] Rheme (V_Theme S_Rheme)
   walk–COMPL   zhangsan
   ‘Left Zhangsan’

Only the sentence where Zhangsan (which expresses the Rheme) occurs in pre-verbal position is acceptable. In (1), Zhangsan expresses the Theme and zou³–le ‘left’ the Rheme. In this case, A asks what did Zhangsan do, and B answers:

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5 See (Beck, 2002: 20-41) for a discussion of markedness.
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(2) a. [zhang\(^1\).san\(^1\)]\(\text{Theme}\) [zou\(^3\)–le]\(\text{Rheme}\) (\(S\text{Theme}V\text{Rheme}\))
   
   zhang-san     walk–COMPL
   
   ‘Zhangsan left’

   b. *[zou\(^3\)–le]\(\text{Rheme}\) [zhang\(^1\).san\(^1\)]\(\text{Theme}\) (\(V\text{Rheme}S\text{Theme}\))
   
   walk–COMPL   zhang-san
   
   ‘Left Zhangsan’

In the above dataset, the only acceptable sentence is the one uttered in (2a), that is, the one where the Theme occurs before the Rheme. Finally, in (3), both Zhangsan and zou\(^3\)–le ‘left’ express the Rheme (i.e., the answers are All-Rhematic utterances). A asks what happened and B answers:

(3) a. [zhang\(^1\).san\(^1\)]\(\text{Rheme}\) [zou\(^3\)–le]\(\text{Rheme}\) (\(S\text{Rheme}V\text{Rheme}\))
   
   zhang-san     walk–COMPL
   
   ‘Zhangsan left’

   b. *[zou\(^3\)–le]\(\text{Rheme}\) [zhang\(^1\).san\(^1\)]\(\text{Rheme}\) (\(V\text{Rheme}S\text{Rheme}\))
   
   walk–COMPL   zhang-san
   
   ‘Left Zhangsan’

Of the All-Rhematic sentences in (3), only the (a) sentence is acceptable, that is, the one where the Subject precedes the Verb.

Now consider the following instances, where the Subject is yi\(^2\) ge gong\(^1\) ren\(^2\) ‘a worker’ (the interlinear gloss CLS stands for CLASSIFIER). A asks B who died:

(4) a. [yi\(^2\)–ge  gong\(^1\).ren\(^2\)]\(\text{Rheme}\) [si\(^3\)–le]\(\text{Theme}\) (\(S\text{Rheme}V\text{Theme}\))
   
   one–CLS worker    die–COMPL
   
   ‘A worker died’

   b. *[si\(^3\)–le]\(\text{Theme}\) [yi\(^2\)–ge  gong\(^1\).ren\(^2\)]\(\text{Rheme}\) (\(V\text{Theme}S\text{Rheme}\))
   
   die–COMPL   one–CLS worker
   
   ‘Died a worker’

In (4), the Subject expresses the Rheme. Contrary to Zhangsan in (1), which also expresses the Rheme, yi\(^2\) ge gong\(^1\) ren\(^2\) ‘a worker’ can occur either in preverbal position, as in the answer given in (4a), or in post-verbal position, as in (4b). The same is true in the following All-Rhematic utterances, where A asks B what happened.

(5) a. [yi\(^2\)–ge  gong\(^1\).ren\(^2\)]\(\text{Rheme}\) [si\(^3\)–le]\(\text{Theme}\) (\(S\text{Rheme}V\text{Theme}\))
   
   one–CLS worker    die–COMPL
   
   ‘A worker died’

   b. *[si\(^3\)–le]\(\text{Theme}\) [yi\(^2\)–ge  gong\(^1\).ren\(^2\)]\(\text{Rheme}\) (\(V\text{Theme}S\text{Rheme}\))
   
   die–COMPL   one–CLS worker
   
   ‘Died a worker’
The examples given here clearly demonstrate that Thematicity does not affect word order in SV and VS sentences. Why, then, are both the SV and VS sentences in (5) acceptable whereas only the SV sentences in (1)-(4) are? We will argue in sections 3.2 and 3.3 that Given Subjects (cf. (1)-(4)) and New Foregrounded Subjects (cf. (5a)) are encoded by SV sentences whereas New Neutral Subjects (cf. (5b)) are encoded by VS sentences.

3.2 SV Sentences

It is argued here that the SV word order is the unmarked intransitive word order. Indeed, SV sentences can be used whether the Subject and the Verb are Given or New, Focalized or Non-Focalized, Foregrounded or Neutral, Thematic or Rhematic. Let us first consider the dataset in (6).

(6) [Talking about Zhangsan, a member of a group says the following:]

\[\text{[sv]} \begin{array}{l}
\text{he} \quad \text{die–COMPL} \\
\text{‘He died’}
\end{array} \]

(6a) Given

\[\text{New} \]

(6b) *

\[\text{[vs]} \begin{array}{l}
\text{die–COMPL} \quad \text{he} \\
\text{‘Died he’}
\end{array} \]

In these examples, the Subject is Given. The SV sentence in (6a) is grammatical whereas the other one is not. The VS sentence in (6b) is not acceptable because a Given Subject cannot appear in post-verbal position. If a Subject is central to the situation, it is Foregrounded. In Mandarin Chinese, this is expressed by an unmarked SV sentence. Consider the following example, where the Subject ‘a worker’ is central to the situation (i.e., it is Foregrounded).

(7) [Many murders have occurred recently. All of the victims are workers. A, the policeman on the case, overheard two workers talking about a person who died but could not make out who. A asks one of them who died. His addressee tells him the following (the fact that the victim is a worker affects B).]

\[\begin{array}{l}
\text{[sv]} \begin{array}{l}
\text{yi} \quad \text{ge gong} \quad \text{ren} \\
\text{New, Foregrounded} \quad \text{Given} \\
\text{one–CLS} \quad \text{worker} \quad \text{die–COMPL}
\end{array} \\
\text{‘A worker died’}
\end{array} \]

In (7), the Determined New Foregrounded Subject is encoded by an SV sentence. Note that a Non-Determined New Foregrounded Subject cannot occur in pre-verbal position, as illustrated in (8).

(8) *

\[\begin{array}{l}
\text{[sv]} \begin{array}{l}
\text{gong} \quad \text{ren} \\
\text{New, Foregrounded} \quad \text{Given} \\
\text{worker} \quad \text{die–COMPL}
\end{array} \\
\text{‘Worker died’}
\end{array} \]
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In this case, a you$^3$ ‘there is’ construction must be used, as exemplified in (9).\footnote{MC you$^4$ ‘there is’ does not appear before the Deep-Syntactic Structure. That is, (at least in intransitive clauses) you$^4$ ‘there is’ is considered to be the realization of the values Non-Determined, New, and Foregrounded (and/or Focalized) over the Semantic actant, which are found at the SemR.}

(9) you$^3$ [gong$^1$.ren$^2$]$_{\text{New, Foregrounded}}$ [si$^3$–le]$_{\text{Given}}$ (you$^3$ SV)

‘There is a worker who died’ or ‘Some worker died

Note that if the Non-Determined Subject gong$^1$.ren$^2$ ‘worker’ were Given, that is, if its referent were known to both Speaker and Addressee, B’s utterance in (8) would be acceptable. What was just said about SV sentences when the Subject is Foregrounded could also be said of SV sentences when the Subject is Focalized (i.e., in the Speaker’s focus of attention) instead of being Foregrounded.

A Verb may be in a Speaker’s focus of attention, that is, it can be Focalized. As shown in (10), Focalized Verbs are encoded by unmarked SV sentence.

(10) [A asks B if Zhangsan runs. B says that he doesn’t. A then asks him if Zhangsan walks. B answers that he doesn’t and then says the following.]

a. ta$^1$ [you$^2$.yong$^3$]$_{\text{Focalized}}$

he swim

‘He swims’

b. *[you$^2$.yong$^3$]$_{\text{Focalized}}$ ta$^1$

swim he

‘Swims he’

The sentence in (10b) is unacceptable because the Given Subject ta$^1$ ‘he’ is in post-verbal position. If a Verb is central to the situation the speaker is talking about, that is, if the Verb is Foregrounded, an SV sentence is used. This is illustrated in (11), where the passing away of Mao is central to the situation (Maozedong, former chairman of the People’s Republic of China between 1949 to 1976, known to everyone in China).

(11) [Some hears on the radio the following.]

a. mao$^2$ [qu$^4$.shi$^4$–le]$_{\text{Foregrounded}}$

mao pass.away–COMPL

‘Mao passed away’

b. *[qu$^4$.shi$^4$–le]$_{\text{Foregrounded}}$ mao$^2$

pass.away–COMPL mao

‘Passed away Mao’

The sentence in (11b) is unacceptable because the Given Subject Mao is in post-verbal position (not because it would be disrespectful to put Mao second in the sentence). Since SV sentences can be used in sentences with many different Sem-CommSs, they are unmarked.
3.3 VS Sentences

New Neutral Subjects are encoded by VS sentences, whether they are Determined or Non-Determined. This is illustrated in (12) below.

(12) [A overheard two people talking about a person who died but could not make out who. A asks B who died and B answers the following:]

a. \[ \text{si}^{3} \text{−le} \text{Given} \quad \text{yi}^{2} \text{−ge} \quad \text{gong}^{1} \text{ren}^{2} \text{New, Not-Focalized, Neutral} \]
\[ \text{die−COMPL} \quad \text{one−CLS} \quad \text{worker} \]

‘Died a worker’

b. \[ \text{si}^{3} \text{−le} \text{Given} \quad \text{gong}^{1} \text{ren}^{2} \text{New, Not-Focalized, Neutral} \]
\[ \text{die−COMPL} \quad \text{worker} \]

‘Died worker/s’

In (12), both the (a) and (b) are VS sentences. In (12a), the New Neutral Subject is Determined whereas it is Non-Determined in (12b). Given that there is only one Sem-CommS that corresponds to VS sentences, this word order is marked with respect to SV sentences.

3.4 P,SV Sentences

A P,SV sentence encodes Given Focalized Semantic Subjects (i.e., in this case, the only argument of the intransitive functor in the Semantic Representation) which are expressed at the Deep-Syntactic Representation both as a Prolepsis (i.e., an element having an Appenditive Deep-Syntactic Relation to the Verb) and as a Syntactic Subject (i.e., an element having a Deep-Syntactic Relation I to the Verb). The Prolepsis here fulfills the function of specifying “the domain with respect to which the following predication should be interpreted” (Mel’čuk 2001, 261). Let us consider the following example.

(13) [Zhangsan and Lisi went to cut down a tree. In the process, Zhangsan cut himself. Lisi runs home to Zhangsan’s wife and tells her the following.]

a. \[ \text{zhang}^{1} \text{san}^{1} \text{Given, Focalized} \quad \text{ta}^{i} \quad \text{shou}^{4} \text{shang}^{1} \text{−le} \quad (P,SV) \]
\[ \text{zhangsan} \quad \text{he} \quad \text{be.injured−COMPL} \]

‘Zhangsan he was injured’

b. \[ \text{zhang}^{1} \text{san}^{1} \text{Given} \quad \text{shou}^{4} \text{shang}^{1} \text{−le} \quad (SV) \]
\[ \text{zhangsan} \quad \text{be.injured−COMPL} \]

‘Zhangsan was injured’

In (13), both the P,SV and the SV sentences are acceptable. The difference between the two lies in that the Semantic Subject in (13a) is Focalized, whereas it is not in (13b).

It is claimed here that in addition to being Focalized, the Semantic Subject in P,SV sentences is necessarily Given. Compare the acceptable sentence in (1), where the Subject is Given, to the unacceptable one presented (15), where the Subject is New.
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(14) [At war, a military camp sustained heavy mortar fire; one person was injured. The nurse who tended to the injured person knows that he is Zhangsan, the husband of Yufen who works as a communications officer on the same camp. She informs Yufen what has happened.]

\[
\text{[zhang}_1^1_{\text{san}}_1\text{] Given, Focalized ta}_1^1 \text{ shou}_4^4 \text{shang}_1^1 \text{–le}}
\]

‘Zhangsan he was injured’

(15) [At war, a military camp sustained heavy mortar fire; one person was injured. The lieutenant reports this to the colonel in charge of the camp.]

\[
*_\text{yi}^2 \text{–ge } shi^4 \text{bin}_1^1 \text{ shou}_4^4 \text{shang}_1^1 \text{–le } \text{he be.injured–COMPL}}
\]

‘A soldier he was injured’

The sentence in (15) is unacceptable because the Focalized Semantic Subject is New. New Focalized Subjects are encoded by an SV sentence, if the Subject is Determined (e.g., \( \text{yi}^2 \text{–ge } shi^4 \text{bin}_1^1 \text{ shou}_4^4 \text{shang}_1^1 \text{–le } \text{‘A soldier was injured’} \)), or by a you\(^3\) ‘there is’ construction if the Subject is Non-Determined (e.g., \( \text{you}^3 \text{ shi}^4 \text{bin}_1^1 \text{ shou}_4^4 \text{shang}_1^1 \text{–le } \text{‘There is a soldier who was injured’ or ‘Some soldier was injured’} \)).

4 Conclusion

We have discussed the Sem-CommS of simple Mandarin Chinese SV, VS, and \( PSVi \) sentences. We have shown that the Rheme–Theme opposition does not affect word order in SV and VS sentences. We have also demonstrated that VS sentences encode New Neutral (= Non-Foregrounded) Non-Focalized Subjects, that \( PSVi \) sentences encode Given Focalized Subjects, and that SV sentences encode the remaining Sem-CommSs. Given that SV sentences can encode more Sem-CommSs than VS or \( PSVi \) sentences, the two latter word orders are said to be communicatively marked with respect to the former word order.

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Bibliography


