The Invertible Construction in Chinese

Yan Cong
Dept. of Chinese and Bilingual Studies
Hong Kong Polytechnic University
stella.cong@polyu.edu.hk

Chu-Ren Huang
Dept. of Chinese and Bilingual Studies
Hong Kong Polytechnic University
churen.huang@polyu.edu.hk

Lian-Hee Wee
Dept. of English Language and Literature
Hong Kong Baptist University
lianhee@hkbu.edu.hk

ABSTRACT

This paper argues that the Invertible Construction (IC) in Chinese is a kind of distributive construction. What appears to be an inversion of word order is best understood as the division of the theme NP to be acted upon by a number of agents for an embedded event. This analysis best captures a number of otherwise intractable properties of the IC including the necessarily quantitative interpretation of the NPs and the incompatibility with adverbs of volition.

1 Introduction

The paper revisits the so-called Invertible Construction in Chinese (henceforth IC); see also (Li & Thompson, 1981:377-395; Li, 1996, 1998; Wee, 2008). Among them, one highly relevant work was a semantic constraint oriented Constructional Grammar account for the IC in Chinese (Huang et al., 1999). Adopting an LFG framework, this paper offers an arguably more comprehensive account of IC through mapping an event structure containing three participants to a dyadic argument structure, thereby producing IC's signature inversion effect as well as other characteristics that otherwise appear to be unrelated.

Traditionally, the IC, or the Flip-flop construction has been described as having the canonical NP_1 V NP_2 being inverted to produce NP_2 V NP_1, (1).

(1) Invertible Construction in Chinese (IC)
NP_1 V $NP_2 \leftrightarrow NP_2$ V NP_1
a. 八个人吃三碗饭
ba-ge-ren chi san-wan-fan
8-CL-person eat 3-CL-rice
Eight people to eat three bowls of rice
b. 三碗饭吃八个人
san-wan-fan chi ba-ge-ren
3-CL-rice eat 8-CL-person
Three bowls of rice to eat eight people

In (1a, b), the English glosses are provided in the infinitive since the Chinese expression is neutral with regard to the specification of tense and aspect. We shall continue to do so throughout the rest of this paper to maintain a faithful translation to the original language's grammar rather than the literary content. The sentence in (1a) has the canonical order of the noun phrases in terms of agenthood and patienthood. In contrast, (1b) is "inverted" or "flip-flopped". The "inverted" form (1b) is more marked than (1a) in that speakers are sometimes stunned by the apparently weird interpretation of the rice being human-eaters before they draw upon the intended reading[1]. It should however be noted that the markedness of (1b) is not due to ungrammaticality, as will be evident when compared with the anomalous reading of (2b) below.

(2) Non-invertability
a. 八个人砸三只碗
ba-ge-ren za san-zhi-wan
8-CL-person break 3-CL-bowls
Eight people to break three bowls
b. * 三只碗砸八个人
san-zhi-wan za ba-ge-ren
3-CL-bowls break 8-CL-person

[1] Note that any possible metaphorical inferences derived from (1b) are excluded from this paper. The present study is confined to the grammatical content of data.

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Reading A: three bowls to break 8 people
Reading B: *three bowls to be broken by 8 people

As presented in (1), the IC appears to be a curious case of a freer word order in a language like Chinese that has no overt case marking, thus the label "IC" refers to both orders i.e., NP_1 V NP_2 (canonical order) and NP_2 V NP_1 (flip-flopped order) that share the same semantic interpretation, which is as shall be explained in Sections 3 and 4, a distributive reading.

It is important to recognize the incompatibility of the IC with expressions of volition (3).

(3) Incompatibility of the IC with volition
a. 八个人故意吃三碗饭 (cf. (1a))
ba-ge-ren guyi chi san-wan-fan
8-CL-person intentionally eat 3-CL-rice
8 people intentionally to eat three bowls of rice
b.* 三碗饭故意吃八个人 (cf. (1b))
san-wan-fan guyi chi ba-ge-ren
3-CL-rice intentionally eat 8-CL-person
3 bowls of rice intentionally to eat 8 people

If the IC is a case of simple inversion, one would expect (3b) to be acceptable given the acceptability of (3a). Incompatibility with expressions of volition demonstrates that the IC does not involve agenthood.

Another property of the IC is the constraint on the quantity readings of the participant NPs, (4) and (5).

(4) Quantity reading of NP_1
a. 张三吃三碗饭
Zhangsan chi san-wan-fan
Zhangsan eat 3-CL-rice
Zhangsan to eat three bowls of rice
b.* 三碗饭吃张三
san-wan-fan chi Zhangsan
3-CL-rice eat Zhangsan
Three bowls of rice to eat Zhangsan

(5) Quantity reading of NP_2
a. 八个人吃饭
ba-ge-ren chi fan
8-CL-people eat rice
Eight people to eat rice
b.* 饭吃八个人
fan chi ba-ge-ren
Rice eat 8-CL-people
Rice to eat eight people

The acceptability of (4a, 5a) in contrast with (4b, 5b) points to the constraint that the participant NPs in the IC must be quantities and non-referential, a point also noted in Li (1996) and Wee (2008).

A third important observation about the IC is the stability of valence. As may be seen with how the IC interacts with monadic or triadic verbs. As shown in (6), *gei* "give" is triadic; *san-ge-xiaofendui* "three teams" is the SOURCE/ AGENT, *wu-ge-shequ* "five communities" is the GOAL/ BENEFICIARY, and *shi-tai-dianshiji* "ten TVs" the THEME.

(6) IC with triadic verbs
a. 三个小分队给五个社区十台电视机
san-ge-xiaofendui geiwu-ge-shequ shi-tai-dianshiji
3-CL-team give 5-CL-community 10-CL-TV
Three teams to give ten TVs to five communities
b.? 五个社区给三个小分队十台电视机
wu-ge-shequ gei san-ge-xiaofendui shi-tai-dianshiji
5-CL-community give 3-CL-team 10-CL-TV
Ten TVs to be given to three teams by five communities
c.? 十台电视机给五个社区三个小分队
shi-tai-dianshiji gei wu-ge-shequ san-ge-xiaofendui
10-CL-TV give 5-CL-community 3-CL-team
Ten TVs to be given to five communities and three teams
d.? 五个社区三个小分队给十台电视机
wu-ge-shequ san-ge-xiaofendui gei shi-tai-dianshiji
5-CL-community 3-CL-team give 10-CL-TV
Five communities and three teams to be given ten TVs
e.* 十台电视机五个社区给三个小分队
shi-tai-dianshiji wu-ge-shequ gei san-ge-xiaofendui
10-CL-TV 5-CL-community give 3-CL-team
Ten TVs and five communities to be given to three teams
f. 十台电视机给五个社区

shi-tai-dianshiji gei wu-ge-shequ
10-CL-TV give 5-CL-community
Ten TVs to give five communities

g. 五个社区给三个小分队
wu-ge-shequ gei san-ge-xiaofendui
5-CL-community give 3-CL-team
Five communities to give three teams

As shown in the acceptability of (6f, g) but the marginality of (6b-d) and the unacceptability of (6e), the IC appears to prefer the expression of two NPs. In (7), we see how an otherwise monadic verb triggers the overt expression of another NP.

(7) IC with monadic verbs

a. 八个人哭了
ba-ge-ren ku le
8-CL-people cry ASP-LE
Eight people cried

b.* 八个人哭
ba-ge-ren ku
8-CL-people cry
Eight people to cry

c.* 三口棺材哭
san-kou-guancai ku
3-CL-coffin cry
Three coffins to cry

d. 八个人哭三口棺材
ba-ge-ren ku san-kou-guancai
8-CL-people cry 3-CL-coffin
Eight people to cry beside three coffins

e. 三口棺材哭八个人
san-kou-guancai ku ba-ge-ren
3-CL-coffin cry 8-CL-people
Three coffins to cry eight people

Whether the verb in the IC is triadic or monadic verbs, the data above suggest the dyadic valence of the IC.

In view of above observations, any account of the IC must take into consideration the characteristics listed (8).

(8) Central characteristics of the IC

a. The license in ordering the theme/patient NPs before the Agent NPs (i.e. the impression of inversion)
b. The unavailability of the IC with certain verbs
c. The incompatibility of the IC with volition
d. The quantity readings of the participant NPs
e. The dyadic valence of the IC

This paper argues that capturing all the above aspects of the IC is best done by understanding the IC as a kind of distributive construction that expresses the divisibility of the theme NP. This captures under a single analytical umbrella the apparently unrelated set of puzzles involving the inverted word order, the incompatibility with volition, as well as the dyadicity of the construction without resorting to very complex structures that might be necessary in a purely syntactic account. The analysis is fleshed out using the conceptual framework of Mohanan's (1994) multi-dimensional syntax, where interface between semantics and syntax can be explicitly expressed and elaborated in the ensuing sections.

2 The Dimensions of Syntax

Regardless of the theoretical framework to which one may subscribe, any syntactic theory must relate (a) the grouping of words, i.e. the constituencies of a given word string; (b) the grammatical function of substrings of words in a sentence, i.e. subjecthood and objecthood against which case and concord are manifest; (c) the valence of predicates, e.g. the transitivity of the main verbs; and (d) the semantic roles played by the participants expressed in the sentence, i.e. thematic roles.

In Government and Binding frameworks, these four "dimensions" of syntax are captured via the movement of syntactic constituents, the binding of traces and the assignment of various properties projected from lexical and/or functional heads (Chomsky, 1981; Haegeman, 1991). Subsequent frameworks such as Minimalism adopt essentially the same strategy (Radford, 1997), also for more alternative frameworks like that of Van Valin and La Polla (1997). Lexical-Functional Grammar (Bresnan, 1982, 2001) relates various dimensions in (a-d) by mapping across different levels.

Consider for example a Chinese sentence such as (9), and a syntactic representation of its constituents as given in Figure 1.

(9) 八个人骑三匹马
Ba-ge-ren qi san-pi ma
8-CL-people ride 3-CL horses

Eight people to ride three horses.

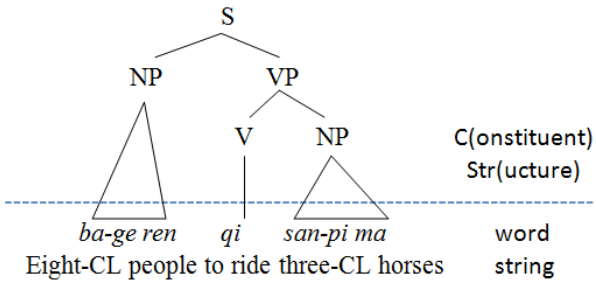

Figure 1. Constituent Structure of (9)

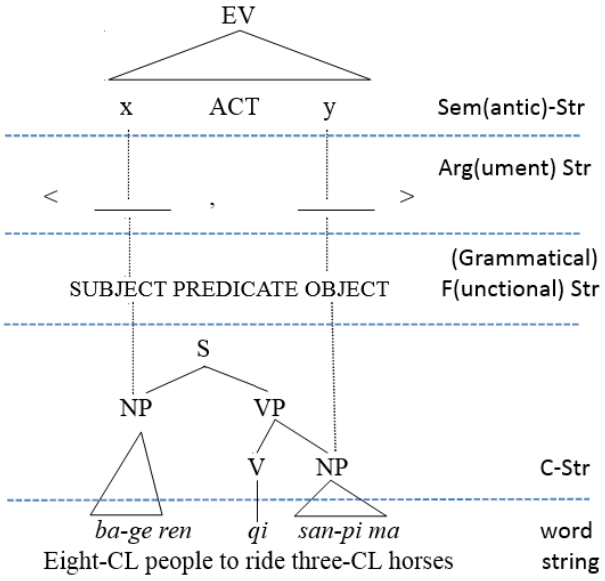

Figure 2. A multi-dimensional model of (9)

Figure 2 is an extension of Figure 1 and captures the various aspects of the (9) sentence in terms of the different parallel dimensions. The C-Str provides the constituencies of the word string. The grammatical roles are expressed in F-Str. These grammatical roles in turn fulfill the valence requirements of the predicate as expressed in the Arg-Str. The Sem-Str informs us that the sentence involves two participants, an actor and a patient, as related by the semantic predicate ACT and its two participants. In Figure 2, the first participant "x" is Agent/actor, which is associated with the first argument slot, the subject grammatical role and the constituent NP. The mapping relations are similarly read for the second semantic participant "y". Encoding thematic information requires a more elaborate Sem-Str than simply saying a NP is assigned a particular thematic role. Mohanan's (1994) conception of the Sem-Str is an adaptation of Dowty's (1970) formalization of Vendler's (1957) verb classification. Vendler recognizes four classes of verbs, (a) state, (b) activity, (c) achievement, and (d) accomplishment, adapted and formalized in Dowty (1979: 159-163). From these, the basic types of thematic roles may be inferred. More elaborate models of Sem-Str can be found in Jackendoff (2002) and various papers in Mohanan (1994) and Wee (1995).

3. The Syntax-Semantics Interface

This section focuses on spelling out why IC licenses two different word orders. This will be most obvious when the semantics of the IC are fully fleshed. The effects will is most transparent when this is presented using Mohanan's (1994) multidimensional model.

We might recall from Section 1 that the IC requires the NPs to have a quantificational reading and is incompatible with expressions of volition. These two properties together suggest that the IC is in fact a construction that expresses the distribution of the theme NP. This implies that at the semantics level there is a complexity of predication, offering the license of word order inversion. Further, as noted in Section 1, the IC is dyadic, hence it must be stipulated that the construction has a valence of two. To this end, we propose the representation in Figure 3 for IC.

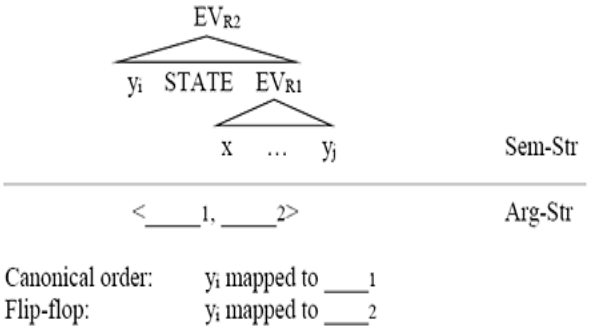

Figure 3. Model of the IC

Figure 3 captures the intended reading that the IC is a stative, and not an activity or an accomplishment as might otherwise been assumed

when one sees verbs like *ride* or *eat*. The stative here is that of "distributivity" with the interpretation that y_i is to be the dividend. This explains why the NPs in ICs are necessarily numeral NPs that do not bear referentiality are non-volitional (Li, 1998; Wee, 2001).

The IC contains a sub-event EV_{R1} that corresponds to the verb, but that is not what the IC is. The IC is the whole structure, with the semantics corresponding to EV_{R2}. There is therefore a third and higher semantic participant corresponding to y_i, which is co-referent with the embedded y_j, the former being the theme of the matrix stative event EV_{R2} and the latter the theme/patient of the embedded event EV_{R1}.

From Figure 3, there are two options of mapping the semantic participants to the arguments in the Arg-Str. Notice that there are only two argument positions. If mapping lines are not allowed to cross (more on this in relation to the Uniformity of Theta Assignment Hypothesis later), there are exactly two possible mappings: either y_i maps to the first argument slot and x to the second, or x could map to the first and y_j the second. This effectively produces two possible word orders for the same semantic representation. The impression of inversion is thus illusory of what is in our account the optionality of mapping between the semantic participants and the argument positions.

The account squares nicely with the Uniformity of Theta Assignment Hypothesis (UTAH, Baker, 1997) where semantic prominence aligns with the linear order of the arguments. UTAH militates against possibilities of cross mappings between the Sem-Str and the Arg-Str, which therefore predicts that there will only be two possible orders for the IC and would also ensure that all semantic participants will surface (recall that y_i and y_j are co-referent).

Returning to the example in (1), we now offer the following explanations. Firstly, given that there are two orders in the IC, one of the orders will be coincidental to the canonical expression that would have an agentive reading. That agentive reading would correspond to EV_{R1} but crucially there is no higher matrix EV_{R2} bearing the stative predicate. Secondly, since the IC has a distributive reading due to the presence of EV_{R2}, there will be three semantic participants which must be mapped into the Arg-Str that has only two slots. With UTAH, this produces exactly two word orders. Thirdly, the stativity of EV_{R2} predicts incompatibility of expressions of volition. Finally, the dyadicity of the IC is accounted for by the Arg-Str that has only two slots, and is therefore oblivious to the valence of the verb. In IC, it is the valence of the construction. In the case of (1) where the verb is *eat*, the solution is largely the same as that given in Figure 3, except that here the EV_{R1} is an accomplishment, shown in Figure 4.

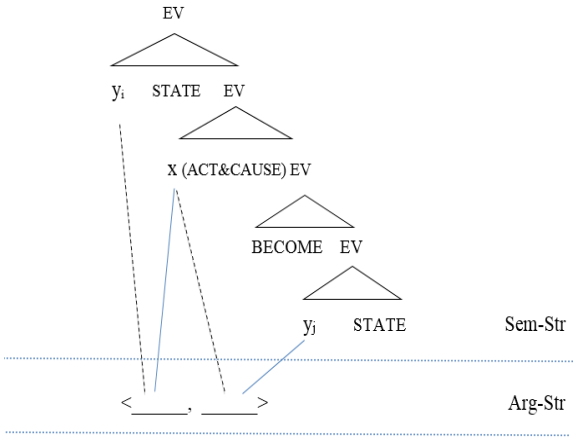

Figure 4. IC with accomplishment verbs

In summary, the hypothesized model in Figure 3 works well in that it explains the puzzles put forward in Section 1, successfully predicting all the main characteristics of the IC:

i. the dyadic valence of the IC;
ii. the quantity reading of the IC;
iii. the incompatibility of the IC with volition; and
iv. the unavailability of the IC with certain verbs

There is only one issue has not been explored in this paper regarding the IC. We have not attempted to sort out which verbs are compatible with IC, as evidently not attested with the example in (2), and also probably not with the verb *ride* in (9). It is certainly an important issue for a comprehensive grasp of the IC and presumably some kind of constraint must be at work. Wee (2008) suspects that the issue may not be syntactic or semantic at all, but rather due to pragmatic factors. We shall have to leave this area unexplored for now.

4. Concluding Remarks

This paper explains the IC as essentially a kind of

distributive construction (calculation formula), with dyadic valences, i.e., the dividend and the divisor. This divisibility nature of the IC determines that the participant roles must be quantity denoting. In explaining the syntax-semantics interface that is so central to how the IC works, this paper adopted an LFG based multi-dimensional framework. However, it must be noted that any other framework that is capable of expressing this interface would be compatible with the analysis advocated here.

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REFERENCES

Baker, Mark. 1997. Thematic roles and syntactic structure, Haegeman, Lilianne. (ed.), *Elements ofGrammar.*, 73-137, Kluwer Academic Publishers.

Bresnan, Joan. 1982. *The mental representation of Grammatical Relations*. Cambridge, Mass: the MIT Press.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford: Blackwell Publishers.

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.

Dowty, David. 1979. *Word Meaning and Montague grammar—the Semantics of Verbs and Times in Generative Semantics and in Montague's PTQ.* Holland: D. Reidel Publishing Company.

Dowty, David. 1991. Thematic Proto-Roles and Argument Selection. *Language*. 67: 547-619.

Haegeman, Lilianne. 1991. *Introduction to Government and Binding Theory*. Oxford: Blackwell Publishers.

Huang, Chu-Ren and Lin, Fu-Wen. 1992. Composite Event Structure and Complex Predicates: A Template-based Approach to Argument Selection. In *Proceedings of the Third Annual Meeting of the Formal Linguistics Society of Mid-America*, Indiana University Linguistics Club, Bloomington, Indiana, pp.90-108.

Huang, Chu-Ren, Li-Ping Chang, Kathleen Ahrens, and Chao-Ran Chen. 1999. 詞彙語意和句式語意的互動關係。（The Interaction of Lexical Semantics and Constructional Meanings）. In Y. Yin et al. Eds. *Chinese Language and Linguistics V: Interactions in Language.* Pp.413-438. Taipei: Institute of Linguistics, Academia Sinica.

Jackendoff, Ray. 2002. *Foundations of Language*. Oxford University Press.

Li, Audrey Yen-Hui. 1996. *A Number Projection. Unpublished manuscript*, University of Southern California at Los Angeles.

Li, Audrey Yen-Hui. 1998. Argument determiner phrases and number phrases. *Linguistic Inquiry* 29: 693-702.

Li, Charles N. and Thompson, Sandra. A. 1981. *Mandarin Chinese: A Functional Reference Grammar*. Berkeley, California: University of California Press.

Mohanan, Tara. 1994. *Arguments in Hindi*. Stanford: CSLI Publications.

Mohanan, Tara and Wee, L. 1999. *Grammatical Semantics: evidence for structure in meanging*. Stanford: CSLI.

Radford, Andrew. 1997. *Syntax: A minimalist introduction*. London: Cambridge University Press.

Van Valin, Robert D. and Randy La Polla. 1997. *Syntax: structure, meaning and function*. Cambridge University Press.

Vendler, Zeno. 1957. Verbs and Times. *The Philosophical Review*. 66:143-160.

Wee, Lian-Hee. 2008. "The rice ate four people" and such Flip-Flops. *The Chinese Language Teachers Association* 43: 33-58.

ABBREVIATIONS & SYMBOLS IN THE CONTENT

Activity: ACT
Argument structure: Arg-Str
ASP: aspect marker
Classifier(s): CL
Determiner: Det
Determiner Phrase: DP
Event: EV
Lexical Functional Grammar: LFG
Grammatical Constituent Structure: C-Str
Grammatical Function Structure: F-Str
Invertible Construction: IC
Le: LE (aspectual marker)
Number: Num
Numeral phrase: NumP
Particle: Prt
Semantic Structure: Sem-Str
Syntactically unacceptable: *
Semantically odd: ?