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Abstract: The semantically fine-grained ditransitive constructions in Mandarin Chinese show complex interaction between lexical semantics, constructional semantics, and syntactic frames. This study examines the acquisition process of the syntax as well as the semantics of these constructions by launching two experiments with French learners of Chinese. The experiment results reveal a ‘syntax-before-semantics’ learning process and the important role of input in implicit learning.

Keywords: interface, ditransitive constructions, Mandarin Chinese, syntax, adult learners

Introduction

For several decades, many studies have contributed to the understanding of argument realization in different languages and from diverse points of view, such as in the fields of syntax, corpus study, first language acquisition, and second language acquisition, etc. This subject attracts our interest in the foreign language acquisition field because of a difficulty hypothesis claimed by Krifka (2004):

One of the difficult areas for persons learning a foreign language is to grasp the range of usages of syntactic patterns that exist in the foreign language. It is not sufficient to learn how passive formation works, [...]. One also has to learn which verbs can passivize at all, [...]. (p. 1)

I am especially interested in the acquisition of ditransitive constructions in Chinese by French learners, exactly because of the multiple argument realization possibilities and the existence of certain lexical and constructional semantic constraints in the target language, which should cause learning difficulties for learners whose mother tongue exhibits neither such possibilities nor such constraints.

In consequence, our general research question is: facing the ditransitive constructions in Mandarin Chinese, how do French learners of Chinese acquire the complex three-way interface between lexical semantics, constructional semantics and syntactic frame?

Ditransitive Constructions in French, English, and Mandarin Chinese

Even though our study adopts the construction grammar frame (Goldberg, 1995; Jackendoff, 1997, among others) for theoretical analysis and for the experimental study interpretation, the term ‘ditransitive’ used here refers “to all three-argument constructions across languages whether a double object construction, as in English, or other syntactically comparable constructions: usually, subject, object, and a dative NP, but also a clitic doubled dative, as in Spanish, or a genitive NP, as in Greek” (Levin, 2004, p. 4).

Some Theoretical Background. The ditransitive constructions in English have been studied for several decades. Most endeavors have been devoted to the so-called ‘dative alternation’ phenomenon which refers to the alternation between a prepositional construction and a double object construction as illustrated in the following examples:

- | | |
|-------------------------------|----------------------------|
| (1) John sent a book to Mary. | prepositional construction |
| (2) John sent Mary a book. | double-object construction |

It has been observed that the alternation between these two constructions is not always free for the same verb (Gruber, 1965; Oehrle, 1976, among others).

- | |
|---------------------------------|
| (3) John sent a book to London. |
| (4) *John sent London a book. |

Pinker (1989) proposes the Wide Range Rules to capture the semantic constraint in the double-object construction, according to which the first object

in the double object construction must have the property of a possessor. So this constraint excludes sentence (4) since the city of London could never be a possessor.

It has also been claimed that the dative alternation is not free for all dative verbs. For example, *throw* and *push* are very close in semantics, but they demonstrate different behaviors with regards to the dative alternation:

- (5) John threw Mary the ball.
- (6) *John pushed Mary the ball.

Pinker (1989) then proposes the Narrow Range Rules that restrict certain verb subclasses from entering the double object construction. For example, *throw* belongs to the verb subclass denoting an instantaneous force, which allows the dative alternation, while *push* belongs to the verb subclass denoting a continuous force, which prevents the dative alternation.

These lexical semantic constraints were further developed by Van der Leek (1996) and Krifka (1999; 2004) and were adopted in both the construction grammar (Goldberg, 1995; Croft, 2003) and lexical semantic approaches (Rappaport Hovav & Levin, 2008).

It is proposed in the construction grammar approach that the double object construction indicates a transfer event while the prepositional construction implies a caused motion event (Goldberg, 1995, among others). But the 'verb sensitive approach' (Rappaport Hovav & Levin, 2008; Levin, 2008) argues that the implied event depends not only on the syntactic form (double object or prepositional) but also on the verb lexical semantics. So *give* type verbs denote a caused possession event in both forms while *send* and *throw* type verbs denote a caused possession event in the double object construction and a caused motion event or a caused possession event in the prepositional construction.

I apply this perspective of combining lexical semantic constraint and constructional constraint to our comparative analysis of the ditransitive constructions in French, the mother tongue of our target learners, English, an L2 for most of the learners, and Chinese, the target language.

According to construction grammar, each basic argument structure denotes an event that is related to human experiences. With regard to our study, the caused possession event is the semantic key to delimiting the ditransitive constructions in the three languages. Precisely, based on the specificity of Chinese, I am going to look at the outward caused possession event, outward intended caused possession event and concerned benefaction event. There is a fourth event related to ditransitive constructions in Chinese, the inward caused possession event. But due to space limitations, in this paper I will just talk about the first three events and leave the last one for future discussion.

Constructional Semantics: Outward Caused Possession Event. In Chinese, there are four syntactic forms which express an outward caused possession event (examples are given in Table 1): two post-verbal prepositional constructions (i.e. (7) and (10)) (henceforth NP-PP form and PP-NP form), a preverbal prepositional construction (i.e. (23)) (henceforth preverbal-GEI), and the double object construction (i.e. (15)) (henceforth DO construction). But similar to the dative alternation in English, in Chinese not all dative verbs can enter into these four constructions: there are also some lexical semantic constraints. In this study, we take two verb subclasses into consideration: caused possession type verbs and caused motion type verbs.

Caused possession verbs ('true-dative' verbs in the term of Jackendoff 1992, 'give-type verbs' in the term of Rappaport Hovav & Levin, 2008), such as *give*, *submit*, *offer*, and *return*, denote an event such that an agent causes a recipient to possess a theme and take inherently three arguments: agent, theme, and recipient. Caused motion verbs ('send-type' and 'throw-type' verbs in the term of Rappaport Hovav & Levin, 2008), such as *send*, *pass*, *throw*, and *move*, denote an event such that an agent causes a theme to move and take inherently two arguments: agent and theme. According to construction grammar, in English when caused motion verbs enter the double object construction, it is the construction that contributes the third argument: recipient (Goldberg, 1995).

In Chinese both types of verb can enter the two post-verbal constructions (i.e. (7) and (10) vs. (17) and (20)), but only the caused motion verbs are allowed in the preverbal GEI form (i.e. (23) vs. (13)) while only the caused possession verbs are legitimate in the double object form (i.e. (15) vs. (25)).

The two post-verbal constructions also exist in French (i.e. (9), (12) vs. (19), (22)) and English (i.e. (8), (11) vs. (18), (21)), and exhibit no particular lexical semantic constraint either. But it is observed that the PP-NP form is preferred when the PP denoting the recipient is 'heavier' than the NP denoting the theme ('Heavy NP shift').

There is not any preverbal-GEI equivalent in French or in English. But there is a preverbal-recipient form in French: the clitic construction. This construction legitimates both caused possession verbs and caused motion verbs (i.e. (14), (24)).

As we have seen previously, the double object construction exists in English and legitimates caused possession verbs (i.e. (16)) and some types of caused motion verbs (i.e. send-type and throw-type, but not push-type, (26) vs. (27)). This construction does not exist in French.

The summary of comparison of the three languages is presented in Table 1.

Table 1
Caused possession events—comparison of Chinese, English, and French

	Chinese	English	French
Lexical semantics			
caused possession verbs: i.e. give, submit, offer, return...	<p>NP-agent V VP-theme PP-recipient (7) Zhangsan song-le yi-ben-shu Gei Mali. 'Zhangsan gave a book to Mary.'</p> <p>NP-agent V PP-recipient NP-theme (Heavy NP shift) (10) Zhangsan song GEI Mali yi-ben-shu. 'Zhangsan gave to Mary a book.'</p> <p>?* NP-agent PP-recipient V NP-theme (13) ?* Zhangsan GEI Mali song-le yi-ben-shu. ('Zhangsan gave a book to Mary.')</p> <p>NP-agent V NP-recipient NP-theme (15) Zhangsan song-le Lisi yi-ben-shu. 'Zhangsan gave Lisi a book.'</p>	<p>NP-agent V NP-theme PP-recipient (8) John gave a book to Mary.</p> <p>NP-agent V PP-recipient NP-theme (Heavy NP shift) (11) John gave to Mary a book that he bought yesterday.</p> <p>NP-agent CLITIC-recipient V NP-theme (14) Jean lui a donné un livre. 'Jean gave him/her a book.'</p>	<p>NP-agent V NP-theme PP-recipient (9) Jean a donné un livre à Marie. 'Jean gave a book to Marie.'</p> <p>NP-agent V PP-recipient NP-theme (Heavy NP shift) (12) Jean a donné à Marie un livre qu'il a acheté hier. 'Jean gave to Marie a book that he bought yesterday.'</p> <p>NP-agent CLITIC-recipient V NP-theme (14) Jean lui a donné un livre. 'Jean gave him/her a book.'</p>
caused motion verbs: i.e. send, pass, throw, move...	<p>NP-agent V VP-theme PP-recipient (17) Zhangsan ji-le yi-ben-shu Gei Mali. 'Zhangsan sent a book to Mary.'</p> <p>NP-agent V PP-recipient NP-theme (20) Zhangsan ji GEI Mali yi-ben-shu. 'Zhangsan sent to Mary a book.'</p> <p>NP-agent PP-recipient V NP-theme (23) Zhangsan GEI Mali ji-le yi-ben-shu. 'Zhangsan sent a book to Mary.'</p> <p>?* NP-agent V NP-recipient NP-theme (25) ?* Zhangsan ji-le Lisi yi-ben-shu. 'Zhangsan sent Lisi a book.'</p>	<p>NP-agent V NP-theme PP-recipient (16) John gave Mary a book.</p> <p>NP-agent V NP-theme PP-recipient (18) John sent a book to Mary.</p> <p>NP-agent V PP-recipient NP-theme (Heavy NP shift) (21) John sent to Mary a book that he bought yesterday.</p> <p>NP-agent V NP-recipient NP-theme (26) John sent Mary a book. (27) *John pushed Mary a book.</p>	<p>NP-agent V NP-theme PP-recipient (19) Jean a envoyé un livre à Marie. 'Jean sent a book to Marie.'</p> <p>NP-agent V PP-recipient NP-theme (Heavy NP shift) (22) Jean a envoyé à Marie un livre qu'il a acheté hier. 'Jean sent to Marie a book that he bought yesterday.'</p> <p>NP-agent CLITIC-recipient V NP-theme (24) Jean lui a envoyé un livre. 'Jean sent him/her a book.'</p>

Constructional Semantics: Outward Intended Caused Possession vs. Concerned Benefaction (No Transfer). In English, the dative alternation involves not only the alternation between the double object construction and the *to*-prepositional construction, but also the alternation with the *for*-prepositional construction:

- (28) John baked a cake for Mary. (in order to give the cake to Mary/in Mary's place)
 (29) John baked Mary a cake.

But just like the '*to*-alternation', the '*for*-alternation' is also subject to some semantic constraints:

- (30) John opened the door for Mary. (in Mary's place/*in order to give the door to Mary)
 (31) *John opened Mary the door.

As predicted by the Wide Range Rules of Pinker (1989), the '*for*-alternation' should also obey the restriction that the first object in the double object construction implies a recipient. 'For' in (28) can introduce a recipient who receives the object-theme, or a concerned beneficiary (term proposed by Coleman, 2010) in whose interest the action is carried out by the subject-agent with no intention to transfer the object-theme to the beneficiary. When the sentence is interpreted such that John baked the cake in order to give it to Mary, (28) may be 'alternated' to (29). 'For' in (30) can only introduce a concerned beneficiary but never a recipient, which is why (31) is ruled out.

So here a *for*-prepositional construction in English can denote (at least) two types of event: a caused possession event and a concerned benefaction event, while the double object construction expresses just a caused possession event type.

A closer examination of the double object construction issuing from the *for*-dative reveals that this kind of caused possession event is more like an intended event rather than a successful event (Goldberg, 1995; Croft, 2003, among others).

- (32) John baked Mary a cake, but threw it away.
 (33) *John gave Mary a cake, but threw it away.

A caused possession event expressed by caused possession verbs, such as *give*, implies the successful possession of the object-theme by the object recipient; but such implication is not shared by a caused possession event expressed by verbs such as *bake* since it can be denied (cf. (33)). The verb *bake* stands

Table 2
Intended caused possession event vs. concerned benefaction event—comparison between Chinese, English, and French

Lexical semantics	Chinese	English	French
creation verbs (intended caused possession): i.e. make, draw, write...	NP-agent V VP-theme PP-recipient (34) Zhangsan zuo-le yi-ge-dangao Gei Mali. 'Zhangsan made a cake for Mary.' (?) NP-agent V PP-recipient NP-theme (37) (?)Zhangsan zuo GEI Mali yi-ge-dangao. 'Zhangsan made a cake for Mary.'	NP-agent V NP-theme PP-recipient (35) John baked a cake for Mary.	NP-agent V NP-theme PP-recipient (36) Jean a fait un gâteau pour Marie. 'Jean made a cake for Marie.'
	NP-agent PP-recipient V NP-theme (38) Zhangsan GEI Mali zuo-le yi-ge-dangao. 'Zhangsan made a cake for Mary.'		NP-agent CLITIC-recipient V NP-theme (39) Jean lui a fait un gâteau. 'Jean baked a cake for him/her.'
	*NP-agent V NP-recipient NP-theme (40) *Zhangsan kao-le Mali yi-ge-dangao. 'Zhangsan baked Mary a cake.'	NP-agent V NP-recipient NP-theme (41) John baked Mary a cake.	
activity verbs (concerned benefaction without transfer): i.e. open (a door), water (a plant), clean (window),...	*NP-agent V NP-theme PP(gei)-beneficiary (42) *Zhangsan dakai men gei Mali. 'John opened the door for Mary.' *NP-agent V PP(gei)-beneficiary NP-theme (45) *Zhangsan dakai gei Mali men. 'Zhangsan opened the door for Mary.'	NP-agent V NP-theme PP(for)-beneficiary (43) John opened the door for Mary.	NP-agent V NP-theme PP(pour)-beneficiary (44) Jean a ouvert la porte pour Marie. 'Jean opened the door for Marie.'
	NP-agent PP(gei)-beneficiary V NP-theme (46) Zhangsan GEI Mali dakai men. 'Zhangsan opened the door for Mary.'		NP-agent CLITIC-beneficiary V NP-theme (47) Jean lui a ouvert la porte. 'Jean opened the door for him/her.'
	*NP-agent V NP-beneficiary NP-theme (48) *Zhangsan dakai le Mali men. 'Zhangsan opened the door for Mary.'	*NP-agent V NP-beneficiary NP-theme (49) *John opened Mary the door.	

for verbs pertaining to a verb subclass, creation verbs (Pinker, 1989; Levin, 1993). These verbs can enter the double object construction in order to express an intended caused possession event. Of course, creation verbs are not the only verbs that can have *for*-dative alternation in English. Other verbs, such as *buy*, are also legitimate in both constructions, as long as they indicate a pre-condition of transfer event (Goldberg, 2010; Liu, 2006).

If we take a look at Chinese, we can observe that the double object construction is ruled out for both intended caused possession event (cf. (40)) and concerned benefaction event (cf. (48)) (examples are given in Table 2).

The intended caused possession can be expressed in both post-verbal prepositional constructions with some acceptability differences ((34) vs. (37)). It is also legitimated in the preverbal GEI construction (cf. (38)).

Contrary to English, which uses the same post-verbal NP-PP construction to express both events ((35) & (43)), in Chinese the concerned benefaction is ruled out in the post-verbal constructions ((42) & (45)) and is only expressed by the preverbal GEI construction (cf. (46)).

In French, both the post-verbal prepositional *pour*-construction (equivalent to *for*-construction in English) (cf. (36)) and the preverbal clitic construction (cf. (39)) can host creation verbs and other transfer pre-condition verbs to express an intended caused possession event. They can also host other activity verbs to express a concerned benefaction event ((44) & (47)).

The summary of comparison of the three languages as regards intended caused possession event and concerned benefaction event is presented in Table 2.

Some Previous Studies on Acquisition of Ditransitive Constructions

Different linguistic theories have led to different research perspectives on the (L1 as well as L2) acquisition of ditransitive constructions.

Under the generative grammar approach, in the early years, interest was devoted to the markedness of the double object construction and L1 transfer effect in L2 acquisition (cf. Mazurkewich, 1984; White, 1987). Later linguists focused more on the acquisition of the interaction between the lexical semantics and the syntactic form, specifically, the learnability of Broad Range Rules and Narrow Range Rules (Gropen et al., 1989; Pinker, 1989; Inagaki, 1997; Gorden & Chung, 1998, among others). It has been argued that L2 learners can acquire the Narrow Range Rules as long as they have achieved a certain proficiency (Inagaki, 1997). More recently, the acquisition of *to*-dative alternation and *for*-dative alternation has been studied in terms of high applicative and

low applicative (Oh, 2010; Shimanskaya, 2012) according to the proposal of Marantz (1993) and Pylkkänen (2008).

Under the construction grammar approach, linguists work more on the possibility of the generalization of the form-meaning pairs (constructions) and the role of different input types (skewed vs. balanced input) during the generalization of constructions (Goldberg et al., 1995; 2002; 2006; 2008; Gries & Wulff, 2005; Taylor, 2008; McDonough, & Nekrasova-Beckern, 2014; Yook, 2013, among others).

According to Goldberg and Casenhiser (2008), form-meaning pairs (constructions) are learned based on input. In experimental studies, with a minimum of training, subjects are capable of recognizing the form and the meaning of a new construction (fast mapping). Furthermore, biased input supplied with the preponderance of a certain type of examples could lead to generalizations that are more accurate when compared to a more representative input. But the biased frequency is only a sufficient but not a necessary condition to facilitate learning. In the L2 acquisition perspective, it would be advisable to supply a target input which includes abundant prototypical cases during training.

An examination of textbooks of Chinese as a foreign language shows that the teaching of ditransitive verbs generally begins with typical ditransitive verbs such as *gei* (give), *jiao* (teach), *wen* (ask). The verb *gei* (give) is a significant example since it carries the nuclear meaning of ditransitivity—successful caused possession, which is identical to the central meaning of ditransitive constructions (Goldberg, 1995).

Based on the comparative analysis of Chinese, English, and French and previous studies on the acquisition of ditransitive constructions, I would like to examine whether French adult learners of Chinese can acquire the three-way interface between lexical semantics, constructional semantics and syntactical frame. Furthermore, due to some similarities between the three languages, are the constructions with post-verbal PP favored by the learners? In order to answer these general questions, two experiments were carried out with the participation of French adult learners of Chinese as learner groups, and Chinese native speakers as a control group.

Method

Participants. Fourty French college students majoring in Chinese took part in our experimental study. Most of them come from the University of Paris Diderot, and a few of them are from the National Institute of Oriental Languages and Civilizations (INaLCO), University of Rennes II, and University

of Lyon II. Every participant gets an ID to take all the tests and to validate their participation. Since there is no official or national Chinese proficiency test in France, in order for us to get to know the participants' language background, they were asked to complete an online language history questionnaire (Li et al., 2013). Meanwhile I contacted three teachers of the Chinese Department of Paris Diderot and asked them to individually evaluate every participant from this university. Putting the participants' auto-evaluation and teachers' global evaluation together, I managed to divide the learner participants into three groups: low intermediate, high intermediate, and advanced.

I also found 14 Chinese native speakers, who were generally college students, to form a control group.

The participants' general information is summarized in Table 3.

Table 3

Summary of experiment subjects

Group	Number	Sex	Mean age	Mean learning time	Experience in China/Taiwan	Mean duration in China/Taiwan
Low intermediate	15	3M 12F	22.07	3.7 years	3 persons	6.67 months
High intermediate	16	4M 12F	21.69	3.1 years	2 persons	11.5 months
Advanced	9	5M 4F	28.22	6.7 years	6 persons	20.6 months
Control group	14	4M 10F	29.3	-----	-----	-----

Materials of Experiment I: Interaction Between Lexical Semantics and Syntactical Frame to Express a Caused Possession Event. Research questions and hypotheses. In the first experiment, I tried to tackle two specific questions:

Research question 1: Do French learners acquire the double object construction in Chinese to express the caused possession events despite its absence in French?

Hypothesis: Given that learners are supposed to have pre-acquired the double object construction in English, and that the initial input of ditransitive verbs in Chinese consists of *gei* (give), *wen* (ask), *gaosu* (tell), prototypical ditransitive verbs according to Goldberg and Casenhiser (2008), learners should acquire the usage of double object to express the caused possession.

Research question 2: Can French learners acquire different sub-classifications of dative verbs, especially the distinction between the caused possession verbs and the caused motion verbs?

Hypothesis: Since the caused possession verbs and the caused motion verbs behave alike in French and the distinction in English is very subtle, French learners are expected to overgeneralize the usage of these two types of verbs in the double object construction and the preverbal GEI

construction due to interference from pre-acquired languages. Precisely, they would be expected to approve the occurrence of caused motion verbs in the double object construction and caused possession verbs in the preverbal GEI construction.

Acceptability judgment task (AJT). Recall that in this experiment I examine the caused possession events expressed by four syntactic frames combined with two types of verbs in Chinese. These combinations constitute the 8 conditions of the AJT (see Table 4).

Table 4

Conditions of the Acceptability Judgment Task of Experiment I

Conditions	Chinese	English	French
NP-PP-POSS*	+	+	+
NP-PP-MOT	+	+	+
PP-NP-POSS	+	+	+
PP-NP-MOT	+	+	+
DO-POSS	+	+	∅
DO-MOT	–	+	∅
GEI-POSS	–	∅	∅
GEI-MOT	+	∅	∅

* In this table, NP-PP denotes the form NP-V-NP-PP, PP-NP denotes the form NP-V-PP-NP, DO denotes the double object construction, GEI stands for the preverbal GEI construction, POSS stands for the lexical semantics of caused possession, while MOT stands for caused motion. Hence, NP-PP-POSS denotes the combination of the form NP-V-NP-PP and the lexical semantics of caused possession. The addition symbol '+' means that such combination is acceptable in this language; the subtraction symbol '-' means that such combination is not or is less acceptable in this language; the empty set symbol ∅ means that such form does not exist in this language.

The verbs used in the 1–7 Likert Scale AJT are:

- 5 caused possession verbs: *zengsong* (offer), *huan* (return), *jiao* (submit), *jie* (lend), *zu* (rent);
- 5 caused motion verbs: *ji* (send), *dai* (bring), *na* (take), *ban* (move with hands), *chuan* (pass).

Each caused possession type verb combines with a caused motion type verb to form a pair; such a verb pair mixes with the four constructions to constitute the previously illustrated 8 conditions. The combinations of caused possession verbs and caused motion verbs are randomized. In total, there are 24 verb pairs constituting 24 experimental items. Each experimental item contains the sentence to be judged, following a context that is necessary to exclude inappropriate interpretation of the sentence to be judged. Besides, there are 24 distracters formed with diverse types of prepositions.

Table 5 presents an experimental item with the verb pair *zengsong* (offer) and *ji* (send).

Table 5
Example of AJT of Experiment I

Conditions	Context: Mark loves Chinese tea. Mr. Wang is his Chinese friend.	Items	L1 prediction	L2 prediction
NP-PP-POSS	Wang xiansheng zengsong-le yixie zhongguo cha gei Mark. Mr. Wang offer-asp some Chinese tea GEI Mark 'Mr. Wang offered some Chinese tea to Mark.'		+	+
NP-PP-MOT	Wang xiansheng ji-le yixie zhongguo cha gei Mark. Mr. Wang send-asp some Chinese tea to Mark 'Mr. Wang sent some Chinese tea to Mark.'		+	+
PP-NP-POSS	Wang xiansheng zengsong gei Mark yixie zhongguo cha. Mr. Wang offer GEI Mark some Chinese tea 'Mr. Wang offered Mark some Chinese tea.'		+	+
PP-NP-MOT	Wang xiansheng ji gei Mark yixie zhongguo cha. Mr. Wang send GEI Mark some Chinese tea 'Mr. Wang sent Mark some Chinese tea.'		+	+
DO-POSS	Wang xiansheng zengsong-le Mark yixie zhongguo cha. Mr. Wang offer-asp Mark some Chinese tea 'Mr. Wang offered Mark some Chinese tea.'		+	+
DO-MOT	Wang xiansheng ji-le Mark yixie zhongguo cha. Mr. Wang send-asp Mark some Chinese tea 'Mr. Wang sent Mark some Chinese tea.'		-	+
GEI-POSS	Wang xiansheng gei Mark zengsong-le yixie zhongguo cha. Mr. Wang GEI Mark offer-asp some Chinese tea 'Mr. Wang offered some Chinese tea to Mark.'		-	+
GEI-MOT	Wang xiansheng gei Mark ji-le yixie zhongguo cha. Mr. Wang GEI Mark send-asp some Chinese tea 'Mr. Wang sent some Chinese tea to Mark.'		+	+

Elicitation task—Translation. Besides the AJT, which is conceived to examine learners' implicit knowledge (Nunan, 1996; Sorace, 1996; Chaudron, 2003), a semi-guided translation task is conceived to examine learners' target language performance (Chaudron, 2003).

In order to avoid the priming effect, the clitic form in French is chosen to conceive resource language experimental items, since it is the only syntactic frame not shared by the target language.

Among the verbs used in the AJT, 6 verbs are chosen in the translation task:
 – 3 caused possession verbs: *zengsong* (offer), *jie* (lend), *huan* (return);
 – 3 caused motion verbs: *ji* (send), *dai* (bring), *ban* (move with hands).

Each verb is used in 3 sentences, which results in 18 experimental items. There are also 18 distracters soliciting uses of different prepositions.

Just like the AJT, in the translation task, each item consists of a context and a sentence to be translated. Taking the experiment duration into account, in order to make the task easier, I provide all the elements in Chinese necessary for the translation. Note that these elements are presented in a random order. Apart from the NPs and the verb that must be used, prepositions other than

GEI are also provided. The subjects of the experiments are asked to choose the necessary elements (NPs, verb, preposition(s)) and put them in the correct order according to the original sentence in French.

Here is an example of the experimental items with the caused possession verb *huan* (return):

Context in French: *Zhangdong a rencontré Fanfan à la bibliothèque.*
(Zhangdong met Fanfan in the library.)

Sentence to translate into Chinese:

- (50) Zhangdong lui a rendu un album d'images.
Zhangdong CLITIC has returned a photo album.
'Zhangdong returned a photo album to her.'

The sentence in French is followed by an empty space where subjects can paste the necessary elements to translate the sentence. Below the empty space are the provided elements in Chinese:

(To use if necessary) *gen* (with) / *ti* (in the place of) / *gei* (to) / *ba* (disposal preposition) / *bei* (passive marker) / *wei* (for)

Zhangdong

huan (return)

ta (she/her)

(To use if necessary) *le* (aspectual marker)

yi-ben-huace (a photo album)

With a sentence like (50), learner subjects could produce a translation such as:

- (51) NP-PP-POSS

Zhangdong huan-le yi-ben-huace gei ta.

Zhangdong return-asp one-cl-photo album GEI her

- (52) PP-NP-POSS

Zhangdong huan gei ta yi-ben-huace.

Zhangdong return GEI her one-cl-photo album

- (53) DO-POSS

Zhangdong huan-le ta yi-ben-huace

Zhangdong return-asp her one-cl-photo album

And in case learner subjects did not acquire the relevant lexical semantic constraint, they would produce an unacceptable sentence such as:

- (54) GEI-POSS

Zhangdong gei ta huan-le yi-ben-huace.

- (54) Zhangdong GEI her return one-cl-photo album
 ‘Zhangdong return a photo album for her/in her place.’ (a concerned benefaction reading)

Materials of Experiment II: Interaction Between Lexical Semantics and Syntactical Frame to Express an Intended Caused Possession Event and a Concerned Benefaction Event. Research question and hypothesis. In this experiment I want to answer one specific question:

Research question 3: Can French learners acquire the construction semantics constraint of the intended caused possession event and the concerned benefaction (without transfer) event?

Hypothesis: In French, both target events are expressed by the same syntactic forms and are very close semantically. In Chinese, despite their semantic similarity, the concerned benefaction (without transfer) event is exclusively expressed in the preverbal GEI construction, while the intended caused possession event can be expressed in both preverbal and post-verbal constructions. French learners are supposed to be less sensitive to this constraint due to the interference from pre-acquired languages.

Acceptability judgment task (ATJ). As we have seen previously, in Chinese, creation verbs and other pre-condition of transfer verbs can be used in three ditransitive constructions (with different acceptability) to express an intended caused possession event. On the contrary, the concerned benefaction event can only be expressed with general activity verbs in preverbal GEI construction (or some other structures, such as NP TI (in place of) NP V NP, NP WEI (for) NP V NP, that I do not tackle in this study) but not post-verbal constructions. So the 3 structures combined with 2 types of verb create the 6 conditions of the ATJ (see Table 6).

Table 6

Conditions of the Acceptability Judgment Task of Experiment II

Conditions	Chinese	English	French
NP-PP-CRE*	+	+	+
NP-PP-BEN	–	+	+
PP-NP-CRE	+/?	–	–
PP-NP-BEN	–	–	–
GEI-CRE	+	∅	∅
GEI-BEN	+	∅	∅

* The labels of structures used in this table are identical to those in Experiment I. CRE stands for creation verbs, while BEN stands for general activity verbs that can be used to express a concerned benefaction event.

The verbs used in the 1–7 Likert Scale AJT are:

- 5 verbs of creation/precondition of transfer: *zuo* (make), *mai* (buy), *zhao* (find), *hua* (draw), *xuanze* (choose);

- 5 verbs of activity without possibility of transfer: *chuan-shang* (put-on), *dai-shang* (put-on), *tie* (paste), *gua* (hang), *baoguan* (keep).

Each creation verb combines with a general activity verb to form a pair; such a verb pair mixes with the three constructions to constitute the previously illustrated 6 conditions. The combinations of creation verbs and activity verbs are fixed due to pragmatic reasons (for instance, given that the two verbs in each verb pair share the same context, if the context provides an engagement event, it would be appropriate that someone ‘put on’ or ‘keep’ a ring for someone else, but rather unnatural that someone ‘draw’ a ring. Hence, some verb-pair combinations are pragmatically inappropriate). In total, there are 18 verb pairs constituting 18 experimental items. Each experimental item contains the sentence to judge following a context that is necessary to exclude inappropriate interpretation of the sentence to be judged. Besides, there are 30 distracters. See Table 7 for an example of experimental item containing the verb pair *zuo* (make) and *chuan-shang* (put-on):

Table 7

Example of AJT of Experiment II

Conditions	Item Context: Xiao Hong will go to school.	L1 prediction	L2 prediction
NP-PP-CRE	Mama zuo-le baisede chenshan gei Xiao Hong. mum make-asp white shirt GEI Xiao Hong 'Mum made a white shirt for Xiao Hong.'	+	+
NP-PP-BEN	Mama chuanshang-le baisede chenshan gei Xiao Hong. mum put on-asp white shirt GEI Xiao Hong 'Mum put on a white shirt for Xiao Hong.'	–	+
PP-NP-CRE	Mama zuo-gei Xiao Hong baisede chenshan. mum make-asp Xiao Hong white shirt 'Mum made a white shirt for Xiao Hong.'	+/?	–
PP-NP-BEN	Mama chuanshang gei Xiao Hong baisede chenshan. mum put on GEI Xiao Hong white shirt 'Mum put on a white shirt for Xiao Hong.'	–	–
GEI-CRE	Mama gei Xiao Hong zuo-le baisede chenshan. mum GEI Xiao Hong make-asp white shirt 'Mum made a white shirt for Xiao Hong.'	+	+
GEI-BEN	Mama gei Xiao Hong chuanshang-le baisede chenshan. mum GEI Xiao Hong put on-asp white shirt 'Mum put on a white shirt for Xiao Hong.'	+	+

Elicitation task—Translation. An elicitation task similar to the one in Experiment I was conceived for Experiment II.

6 verbs chosen from the AJT were used in the translation task:

- 3 creation/precondition of transfer verbs: *zuo* (make), *mai* (buy), *hua* (draw);
- 3 activity (without possibility of transfer) verbs: *chuan-shang* (put on), *dai-shang* (put on), *baoguan* (keep).

Each verb was used in 3 sentences, which results in 18 experimental items. There are also 18 fillers.

Here is an example of experimental items with the creation verb *hua* (draw):
Context in French: *Prof Guan vient de déménager dans un nouvel appartement.* (Prof. Guan has just moved into a new apartment.)

Sentence to translate into Chinese:

- (55) Lin Tian lui a peint une peinture.
Lin Tian CLITIC has drawn a painting
'Lin Tian drew him/her a painting.'

Similarly, the sentence in French is followed by an empty space where subjects can paste the necessary elements to translate the sentence. Below the empty space are the provided elements in Chinese:

(To use if necessary) *gen* (with) / *gei* (GEI) / *bei* (passive marker) / *bi* (compared to) / *de* (resultative marker)

Lin Tian
hua (draw)
ta (she/her)
(To use if necessary) *le* (aspectual marker)
yi-fu-youhua (a painting)

The sentence (55) is supposed to be translated in one of the 3 tackled di-transitive structures:

- (56) NP-PP-CRE
Lin Tian hua-le yi-fu-youhua gei ta.
Lin Tian draw-asp one-cl.-painting GEI him/her
- (57) PP-NP-CRE
(?) Lin Tian hua gei ta yi-fu-youhua.
Lin Tian draw GEI him/her one-cl.-painting
- (58) GEI-CRE
Lin Tian gei ta hua-le yi-fu-youhua.
Lin Tian GEI him/her draw-asp one-cl.-painting

Procedure. The two experiments were carried out on Ibex Farm between April 2nd and 15th of 2014. Mails including experiment instructions and a vocabulary list were sent to participants to get them prepared before the launch of the experiments. Learner participants were allowed to take the tests at home or in the Language Resources Centre of Paris Diderot. When they had finished all the tests of the two experiments, they got a small present as a reward.

Results

Results of AJT of Experiment I. Three way ANOVA with Construction and Semantic as within-subject factors and Group as between-subject factor was conducted. The main effect of Construction ($F(3, 138) = 24.78, p < 0.001$), Semantic ($F(1, 46) = 4.36, p < 0.05$) and Group ($F(3, 46) = 4.45, p < 0.01$) was significant. There was a significant interaction effect of Construction \times Group ($F(9, 138) = 10.10, p < 0.001$), and Construction \times Group \times Semantic ($F(9, 138) = 15.74, p < 0.001$) were observed.

Further simple effect analysis showed that Chinese native speakers are sensitive to the lexical semantic constraint in both double object construction and preverbal GEI construction. In the double object construction the caused possession verbs are accepted more easily than the caused motion verbs ($F(1, 13) = 100.99, p < 0.001$). In the preverbal GEI construction, caused motion verbs are found more acceptable than caused possession verbs ($F(1, 13) = 445.38, p < 0.001$). In the post-verbal NP-PP and PP-NP constructions, both types of verbs are found almost equally acceptable. These behaviors conform to what the linguistic analysis predicted.

With regard to the low intermediate group, learners are not sensitive to lexical semantic constraint in any construction form. More precisely, they almost equally accept the two types of verbs in the four different structures. It is worth mentioning, however, that learners of this group demonstrate a marginally different acceptability between the NP-PP and the PP-NP form: they tend to accept more easily the PP-NP form ($F(1, 14) = 4.44, p = 0.054$).

For the high intermediate group, learners are not sensitive to the lexical semantic constraint either. But among the four structures, preverbal GEI and post-verbal PP-NP are much more favored than the other two structures. Furthermore, learners of this group significantly prefer the PP-NP structure as compared to the NP-PP structure ($F(1, 11) = 13.15, p < 0.01$).

As far as the advanced group is concerned, learners show some sensitivity to the lexical semantic constraint. In the double object construction, they correctly accept more caused possession verbs than caused motion verbs ($F(1, 8) = 15.21, p < 0.01$). But in the preverbal GEI construction, no distinction between the two types of verb has appeared yet. It is curious to see that they significantly prefer caused motion verbs to caused possession verbs in the NP-PP form ($F(1, 8) = 8.29, p < 0.05$), even though Chinese native speakers do not show such preference.

Figure 1 presents the mean scores rated by control group and learner groups in the acceptability judgment task of Experiment I.

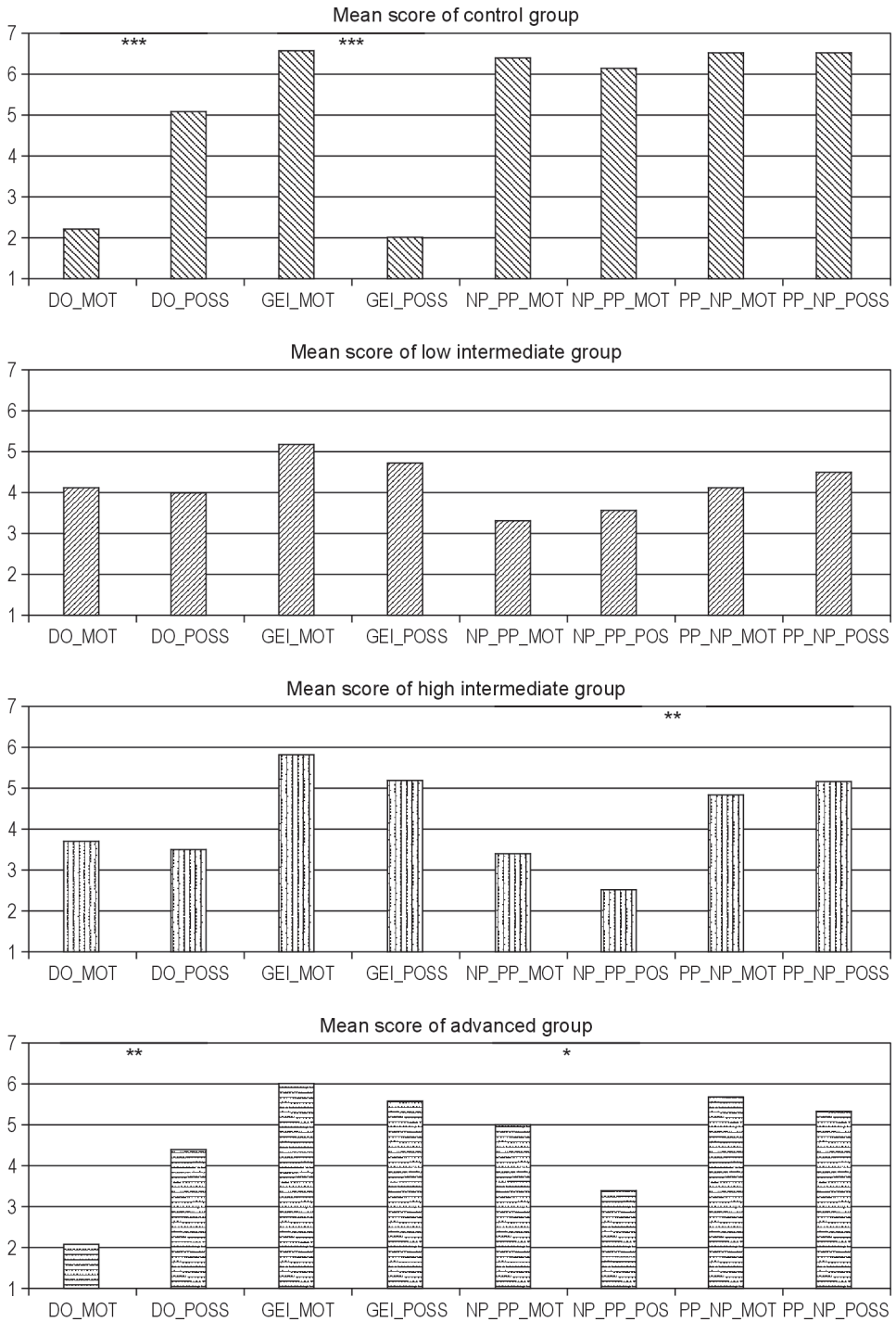


Figure 1. Means scores of control group and learner groups in AJT of Experiment I.

Results of Translation Task of Experiment I. The translation task is conceived to elicit the production of ditransitive constructions to express a caused possession event. Recall that all four structures studied here are legitimate to express such an event, albeit being subject to different lexical semantic constraints.

After the elimination of some incomplete sentences (4.1% of total sentences), it is interesting to see that in the data collected from the 40 learner participants there are not only the four ditransitive constructions but also some unexpected structures.

For example:

Original sentence in French: *'Xiao Wang lui a prêté un livre.'* ('Xiao Wang lent him/her a book.')

Translation in Chinese: BA construction

(59) NP BA NP V GEI NP

Xiao Wang ba yi-ben-shu jie gei ta.

Xiao Wang BA one-cl-book lend GEI he/she

(60) BA without GEI

Xiao Wang ba yi-ben-shu jie ta.

Xiao Wang BA one-cl-book lend GEI he/she

The BA construction is often called a 'disposal' construction (Li & Thompson, 1981; Xu, 1996). Syntactically it proposes the direct object in a preverbal position and marks it with BA (BA originally is a verb, indicating 'hold', then is grammaticalized to a 'coverb', a term proposed by Li and Thompson (1981), or a 'light verb', the term used in generative grammar, or a 'preposition', the term used in teaching of Chinese as a foreign language). Semantically the BA construction implies that the action expressed by the verb affects the object. The BA construction is compatible with ditransitive constructions (Tang, 1979, among others) by realizing the direct object in the preverbal position. But both corpus studies (Liu, 2007; Yao & Liu, 2010) and experimental studies (Yu, 2013) show that the BA construction is more likely to be used when the direct object conveys given information.

In the present work, direct objects in experimental items represent new information rather than old information. So the use of BA construction is not ungrammatical but it is not appropriate.

Besides the inappropriate production of the BA construction, subjects also use other prepositions or structures. Since they are not abundant, we will not talk about them in detail.

The percentage of major structures found in the collected data is presented in Table 8.

Table 8

Summary of percentage of attested structures occurrences in elicitation task of Experiment I

Low intermediate group	BA(38%)	>	PP NP(25%)	>	DO(19%)	>	PREVERBAL GEI(15%)
	POSS(44%) < MOT(56%)		POSS(75%) > MOT(25%)		POSS(40%) < MOT(60%)		POSS(51%) ≈ MOT(49%)
High intermediate group	PP NP(48%)	>	PREVERBAL GEI(25%)	>	DO(12%)	>	BA(9%)
	POSS(63%) > MOT(37%)		POSS(37%) < MOT(63%)		POSS(44%) < MOT(56%)		POSS(50%) = MOT(50%)
Advanced group	PP NP(38%)	>	PREVERBAL GEI(31%)	>	DO(12%)	>	BA(12%)
	POSS(64%) > MOT(36%)		POSS(14%) < MOT(86%)		POSS(95%) > MOT(5%)		POSS(58%) > MOT(42%)

From Table 8 we can see that learners of the low intermediate group overuse the BA construction from the point of view of information structure. It seems that they have acquired the forms of PP-NP construction, double object construction and preverbal GEI construction. But in the use of the two latter constructions, they are not sensitive to the lexical semantic constraints: they use more caused motion verbs in the double object construction and both caused possession verbs and caused motions verbs in the preverbal GEI construction.

The most obvious difference between the low intermediate group and the high intermediate group is that learners of the latter group use much fewer BA constructions, which may be interpreted as progress in the acquisition of information structure (this interpretation needs to be further checked). The PP-NP form is still the favorite ditransitive construction, followed by the preverbal GEI construction, followed by the double object construction. In the use of the preverbal GEI construction learners begin to be sensitive to the lexical semantic constraint and use more caused motion verbs than caused possession verbs. But such a constraint has not been acquired in the use of the double object construction.

It is in the production of the advanced group that the acquisition of lexical semantic constraints can be evidenced. Learners of this group make correct and significant distinction between the two types of verb in both preverbal GEI construction and double object construction. The overuse of BA construction is an individual behavior rather than a group performance.

Results of AJT of Experiment II. Three way ANOVA with Construction and Semantic as within-subject factors and Group as between-subject factor was conducted. The main effect of Construction ($F(2, 94) = 129.17, p < 0.001$), Semantic ($F(1, 47) = 23.33, p < 0.001$) and Group ($F(3, 47) = 3.65, p < 0.05$) was significant. There was a significant interaction effect of Construction \times Group ($F(6, 94) = 11.05, p < 0.001$), Semantic \times Group ($F(3, 47) = 21.46, p < 0.001$) and Construction \times Semantic \times Group ($F(6, 94) = 5.01, p < 0.001$) were observed.

Further simple effect analysis showed that the preverbal GEI construction can be used to express both an intended caused possession event and a concerned benefaction event. Both creation verbs and general activity verbs are highly acceptable in this structure by Chinese native speakers, but with a constant significant difference between them ($F(1, 16) = 12.2, p < 0.01$). The NP-PP form cannot be used to express a concerned benefaction event, but it can legitimate intended caused possession events; the difference is significant ($F(1, 16) = 173.97, p < 0.001$). The concerned benefaction event is totally rejected in the PP-NP form, while the intended caused possession event is slightly but significantly more acceptable in this structure ($F(1, 16) = 10.23, p < 0.01$).

Learners from the low intermediate group and the high intermediate group accept the preverbal GEI structure to express intended caused possession event and concerned benefaction event. But they make no significant distinction when rating the two post-verbal prepositional structures.

For the advanced group, learners significantly highly accept the preverbal GEI construction and they reject more the post-verbal prepositional constructions. Meanwhile, they begin to make a significant distinction between the two events when the NP-PP form is concerned ($F(1, 8) = 17.67, p < 0.01$).

Figure 2 presents the mean scores rated by the control group and the 3 learner groups in the 1–7 Likert scale acceptability judgment task of Experiment II.

Results of Translation Task of Experiment II. As I examine the acquisition of 3 ditransitive constructions in this experiment, the preverbal GEI construction, the NP-PP construction and the PP-NP construction, we find many unexpected structures in the collected data. Besides the overuse of BA construction that we have discussed in section 5.4, in the translation task of Experiment II, there is also a curious and noticeable usage of the BEI construction.

The BEI construction is a prototypical passive construction in mandarin Chinese (Li & Thompson, 1981; Xu, 1996, among others). The subject of the BEI construction generally implies a patient semantic role. It is semantically not compatible with the concerned benefaction event; in an intended caused possession event, it is impossible for the recipient role or the incremental theme to occupy the subject position. So, generally this construction is incompatible

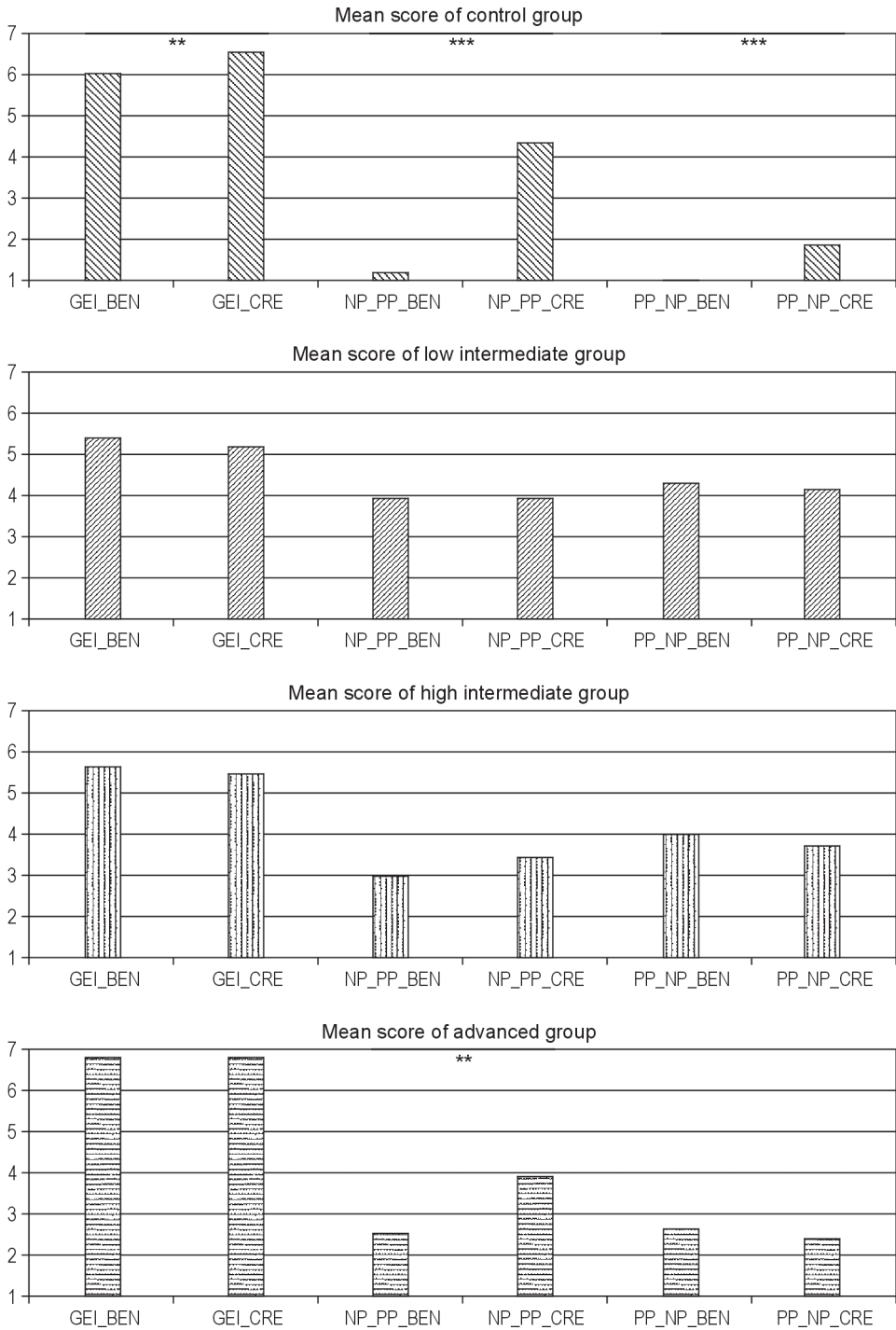


Figure 2. Mean scores of control group and learner groups in AJT of Experiment II.

with a ditransitive construction. This construction is nevertheless found in the learners' productions with either the theme or the recipient/beneficiary in the subject position.

Besides the BA construction and the BEI construction, various other structures were found in the data. I just present the major structures produced by learners with their percentage in Table 9.

Table 9

Summary of percentage of attested structures occurrences in elicitation task of Experiment I

Low intermediate group	Preverbal GEI(37%)	>	DO(21%)	>	PP NP(18%)	+	Diverse errors (BA, BEI, etc.)
	CRE(50.6%) ≥ BEN(49.4%)		CRE(43%) < BEN(57%)		CRE(68%) > BEN(32%)		
High intermediate group	Preverbal GEI(63%)	>	PP NP(21%)	>	DO(9%)	+	Less diverse errors
	CRE(52%) > BEN(48%)		CRE(53%) > BEN(47%)		CRE(32%) < BEN(68%)		
Advanced group	Preverbal GEI(85%)					+	Few errors
	CRE(53%) > BEN(47%)						

The preverbal GEI construction is the favorite structure among the three learner groups with an increased preference correlating with increased proficiency.

In the productions of the low intermediate group, the double object construction appears with a relatively high percentage despite the fact that this structure is legitimated neither for the intended caused possession event nor for the concerned benefaction event. The use of this structure becomes less frequent in the high intermediate group and almost disappears in the advanced group.

The favorite structure in Experiment I, the PP-NP form, appears too in the productions of the low intermediate group and high intermediate group in this experiment. It is used to express both tackled events, while it is actually ungrammatical to express a concerned benefaction event.

As previously mentioned, diverse errors are produced by learners of the low intermediate group and disappear with increased proficiency.

Discussion

The results obtained from the two experiments show that the low intermediate level learners accept and produce the PP-NP structure, the double object construction and the preverbal GEI form. It can be explained by the fact that these three ditransitive constructions are explicitly taught in their textbook: the double object structure and the preverbal GEI are taught early in the first year of their study of Chinese, the PP-NP form is taught at the beginning of the second year, and most participants are in the second or in the third year in college.

But semantic constraints are not taught explicitly. This could explain the constraint violation found in both tasks in the two experiments with intermediate level groups. But fortunately, in Experiment I, the advanced group learners begin to be sensitive to lexical semantic restrictions in the double object construction. In Experiment II, learners overcome little by little the over-acceptance and the overuse of post-verbal constructions to express the concerned benefaction event as they make progress in learning Chinese.

If the advanced group learners can overcome some overgeneralizations, this could not be explained by explicit learning effect, given that to our knowledge no explicit instruction on ditransitive constructions' semantic constraints is provided in classroom teaching. This progress seems to be stimulated by input from the target language. As the auto-evaluation indicates, most of the advanced group learners have frequent contacts with the target language, such as reading, TV watching, and communication with Chinese native speakers in daily lives or in travel. These contacts may implicitly provide them with positive evidence of semantic constraint.

So far, it seems appropriate to conclude that French learners begin the acquisition of ditransitive constructions in Chinese from the learning of structural forms and then move to the learning of subtle lexical and constructional semantic constraints. This acquisition process echoes the findings of some previous studies, such as those of Inagaki (1997) and Oh (2010).

However, there is still a question to be answered: why do not French learners show preference for the post-verbal NP-PP construction despite the existence of an equivalent structure in their mother tongue and other pre-acquired languages such as English? According to the findings of Mazurkewich (1984) and White (1987), there should be a positive transfer to facilitate the acquisition of the NP-PP construction. Why is this phenomenon not seen among our French learners?

Recent quantitative studies carried out by Ambridge et al. (2012; 2013; 2014) and Goldberg (2011) may give us some enlightenment with the entrenchment hypothesis.

The entrenchment hypothesis is the claim that repeated presentation of a verb in one (or more) attested construction (e.g. the PO-dative) [...] causes the learner to gradually form an ever-strengthening probabilistic inference that adult speakers do not use that particular verb in nonattested constructions (e.g. the DO-dative) [...]. (Ambridge et al., 2012, p. 48)

Adopting this hypothesis in my study, I may explain that since the double object construction, the preverbal GEI construction and the PP-NP construction are explicitly taught in class, based on these input the French learners may form the ‘ever-strengthening probabilistic inference’ that the NP-PP form is a nonattested construction and thus not legitimated.

This explanation seems highly probable because from the acquisition process of semantic constraints we have already seen the importance of statistical input in implicit learning.

Conclusion

This study examines the acquisition process of semantically fine-grained ditransitive constructions in Chinese by French adult learners and focuses on the three-way interaction between lexical semantics, constructional semantics, and syntactic frame.

From the point of view of syntactic forms, learners of our study show a great preference for the PP-NP structure and the preverbal GEI structure due to massive input. The very low acceptance and very rare production of the NP-PP form indicates that there is no apparent interference from L1, which could be explained by the entrenchment effect.

From the point of view of semantic constraints, overgeneralizations of form-meaning pairing are found at low intermediate level and high intermediate level. But as the proficiency in Chinese increases, learners can overcome some of the overgeneralization effects.

For future tasks, more detailed statistical analyses are expected to reveal the acquisition process more accurately. Meanwhile as part of our ongoing research, new experimental studies are being carried out to examine the information structure and constituent length factors in the acquisition of ditransitive constructions.

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Das Erwerben von ditransitiven Konstruktionen in der Mandarinsprachvariante von erwachsenen Franzosen

Zusammenfassung

Die Verfasser zeigen ditransitive Konstruktionen in Mandarinvariante der chinesischen Sprache als eine komplexe Interaktion zwischen lexikalischer Semantik und Syntax (eng.: *syntactic frames*). Der Artikel betrifft zwei experimentelle Forschungen, die dem Prozess der Akquisition von ditransitiven Konstruktionen von den Chinesisch lernenden Franzosen gewidmet wurden. Die Ergebnisse bestätigen den Vorrang vom Syntaxerwerb vor der Lexik und die Rolle des Inputs beim indirekten Lernen (eng.: *implicit learning*).