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THE TEACHABILITY HYPOTHESIS AND CONCEPT-BASED INSTRUCTION

TOPICALIZATION IN CHINESE AS A SECOND LANGUAGE

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by

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ABSTRACT

Teachability Hypothesis (TH, Pienemann, 1984, 1987, 1989) claims that formal instruction cannot affect the route of acquisition of processing procedures predicted by Processability Theory (PT, Pienemann, 1998). Aligned with Piagetian theory, Pienemann argues that L2 instruction is subordinated to L2 development and therefore cannot override PT’s universal developmental sequences. Vygotsky (1978) argued that psychological development is neither predetermined nor universal. It depends on the quality of cognitive tools and social relationships, most especially in educational settings. This thesis tests the central claim of the Teachability Hypothesis by investigating whether instructions that follow Gal’perin’s (1970) Systemic Theoretical Instruction (concept-based instruction) would change the L2 Chinese developmental sequence predicted by the Topic Hypothesis, an extension of PT (Pienemann, Biase, & Kawaguchi, 2005).

According to the Topic Hypothesis, L2 Chinese learners must progress through three sequential stages: SVO, ADJ+SVO, OSV. Eight beginning L2 Chinese learners and two heritage speakers took part in this study. In the first experiment, six participants at the SVO stage were taught the OSV structure. It was found that these learners were capable of producing OSV structure before they could produce ADJ+SVO structure. In the second experiment, two participants at the SVO stage were taught the OSV and the ADJ+SVO structure in the same instruction session. Results indicate that both the OSV and the ADJ+SVO structure were processable to the two learners. In the third experiment, it was found that the two heritage speaker could produce a higher stage grammar structure (the ba-construction, Gao, 2009; Wang, 2012) without the capability of
processing a lower stage grammar structure (the OSV structure). All these results highlight Vygotsky’s argument that instruction can be an important factor that leads cognitive development.
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Chapter 1

Introduction

The cognitive approach to second language acquisition (SLA), driven by cognitive-interactionist framework (Ortega, 2009), is mainly interested in how human internal mechanisms may interact with external factors to influence second language development (e.g. Gass, 1997). The cognitive process underlying acquisition is usually the focus of research within the cognitive SLA framework. One goal of cognitive SLA is to find the universal patterns of acquisition among second language learners in order to explain SLA as a general phenomenon (Ortega, 2009).

In the 1970s, a number of studies were carried out to discover the acquisitional order of grammatical morphemes (e.g. Bailey, Madden, & Krashen, 1974; Dulay & Burt, 1973; Larsen-Freeman, 1976). In the 1980s, focuses turned to acquisition of morphology and syntax. A number of studies found evidence to suggest that acquisition of morphological features such as tense and aspect follow fixed sequences (e.g. Bardovi-Harlig, 1999; Dietrich, Klein, & Noyau, 1995; Klein, 1995). Besides morphology, development of grammatical features such as syntax also received a good deal of attention from researchers. The ZISA (Zweitsprachenerwerb Italienisher und Spanischer Arbeiter) project investigated the acquisitional sequence of L2 German syntax among guest workers whose L1 included Turkish or Italian and found that development of German word order followed a fixed sequence (Clahsen, 1984; Clahsen, Meisel, and Pienemann, 1983; Meisel, Clahsen, and Pienemann, 1981). Following the ZISA project, a
number of subsequent studies tried to observe syntax development in other languages such as English (Johnston and Pienemann, 1986), Swedish (Pienemann and Håkansson, 1999), Japanese (Doi & Yoshioka, 1990). To explain why L2 development follows some specific developmental patterns, Meisel et al. (1981) employed a psycholinguistic approach to argue that L2 developmental sequences are a consequence of a set of cognitive processing mechanisms that underlie L2 production. The cognitive model was incorporated into the Lexical Functional Grammar (a linguistic theory, Kaplan & Bresnan, 1982) to construct Processability Theory (Pienemann, 1998).

The cognitive account of SLA has been dominating the field since 1970s. However, in late 1990s, some researchers were not satisfied with the state of affairs (e.g. Appel & Lantolf, 1994; Hall, 1993; Lantolf, 1996). Firth and Wagner (1997) called for a reconceptualization of SLA research so that more attention would be given to the social and contextual side of SLA. Different from the cognitive approach that focuses on general developmental phenomena, the social account of SLA prioritizes situated and contextualized learning. Accordingly, one important difference between the cognitive account and the social account is associated with their goals concerning whether L2 learning is a general phenomenon or a contextualized phenomenon.

It has been claimed that it is beneficial for language teaching if a general pattern of development can be found. This is because L2 instruction can be attuned to a learner’s stage of development so that the appropriate type of instruction can be provided (Pienemann, 1998). This claim is based on the assumption that learning can take place only when a learner is ready to develop. The belief that instruction should be subordinated to learners’ internal development is the foundation of Pienemann’s
Teachability Hypothesis, which argues that non-cognitive factor such as instruction cannot change or reverse the developmental sequence predicted by Processability Theory (Pienemann, 1998). Instruction can only speed up or slow down development; it can not alter the predicted developmental path that all learners are assumed to follow. For Pienemann, the only effective type of instruction with regard to developmental sequences is that which is attuned to a learner’s current processing ability.

However, Vygotskian sociocultural theory views the relationship between teaching and development differently. For Vygotsky (1987), the only good type of instruction is that which creates a pathway for development. Vygotsky believes that the sociocultural environment is the very source of cognitive development. Therefore, cognitive development is not predetermined. Instead, it depends on external mediation made available to a learner (Ratner, 2002).

The contrast between the cognitive account and the social account of L2 development is the impetus for the current study. This study intends to test the claim of the Teachability Hypothesis and therefore undertakes to investigate whether instruction can have an effect on changing the developmental sequence predicted by Processability Theory.

Detail description of Pienemann’s Processability Theory and the sociocultural theory will be given in the subsequent chapters. The next chapter (Chapter 2) first provides an overview of Pienemann’s Processability Theory, including a brief description of its theoretical foundation, its predictions and some key constructs of the theory. Studies that support the claims of Processability Theory will be reviewed in Chapter 3.
including, in particular, studies that focus on L2 Chinese topicalization, the primary focus of this dissertation.

In Chapter 4, a brief introduction to Vygotskian Sociocultural Theory (SCT) is presented. This chapter also compares a cognitive account and an SCT account of development. It also considers the relationship between instruction and development proposed by the respective approaches.

Chapter 5 will first introduce Vygotsky’s distinction between everyday and scientific concepts, a key aspect of the pedagogical approach implemented in the present study. In concrete terms, it discusses a specific approach to instruction that situates scientific concepts as the fundamental unit of instruction—Systemic Theoretical Instruction (STI) proposed by Gal’perin (1970), an influential psychologist who formulated an instructional model grounded in Vygotsky’s theory. A review of empirical studies that employed STI to teach L2 grammar will also be discussed in this chapter.

Chapter 6 provides an overview of the topic of instruction addressed in the study—word order in Chinese topicalized constructions. The chapter also outlines the pedagogical materials used to deliver instruction to six beginning-level learners of L2 Chinese as well as two heritage speakers of the language.

Three studies were carried out to test the claim of the Teachability Hypothesis. In the first study (Chapter 7), six L2 Chinese learners who could process and produce only Stage X structure were recruited. Stage X+2 grammar structure was taught to these learners following Gal’perin’s (1970) Systemic Theoretical Instruction. The study investigated whether instruction would allow learners to skip Stage X+1. In the second study (Chapter 8), Stage X+1 and Stage X+2 grammar structures were taught to two L2
Chinese learners at Stage X in the same instruction session. This study examined whether instruction would allow Stage X+1 and Stage X+2 structures to emerge simultaneously. Study 3 (Chapter 9) showed a case of two heritage speakers, who could process and produce Stage X+1 syntactic structure without any knowledge of Stage X structure.

Based on the results of the three studies, Chapter 10 and Chapter 11 summarize the findings. Chapter 10 also discusses the neurolinguistic theories (Paradis, 2004; Ullman, 2001) and their implications on PT. Chapter 11 focuses on working memory. More specifically, this chapter first introduces Baddeley’s (2000) working memory model and then demonstrates how material mediation has allowed a learner with small working memory to learn Stage X+2 structure. Chapter 12, the final chapter, discusses limitations of this study.
Chapter 2

Processability Theory

2.1 An Introduction to Processability Theory

Processability Theory (PT) (Pienemann, 1998) is an L2 theory that describes the developmental stages of the L2 linguistic system. The construction of the PT dates back to Meisel, Clahsen and Pienemann’s ZISA project in the late 1970s and 1980s. The ZISA group intended to find out the processing sequence of German word order rules (Pienemann, 1998). The project generated a number of models to explain L2 development, including the Multidimensional Model (Meisel, Clahsen & Pienemann, 1981) and the Strategies Approach (Clahsen, 1984). The Multidimensional Model is a framework focusing on describing the developmental sequences in SLA. Based on a series of longitudinal and cross-sectional data, Meisel et al. found some unified developmental patterns (e.g. L2 German word order rules). In advancing the descriptive framework, Clahsen (1984) used speech processing strategies to explain developmental patterns of L2 German word order. However, the Multidimensional Model has been criticized on the grounds that it cannot be falsified (Larsen-Freeman & Long, 1991). The Strategies Approach has a major limitation in that it cannot explain the relationship between L2 development and grammatical representation (Pienemann, 1998).

To overcome these limitations, the PT was developed (Pienemann, 1998). As was mentioned above, PT is aimed at describing and explaining language development over
time. Pienemann (1998) made explicit claims that PT is designed to be applied universally to the acquisition of all human languages. The basic logic of the theory is that at any stage of development, L2 learners can “produce and comprehend only those second language (L2) linguistic forms that the current state of language processor can handle” (Pienemann, 2007, p.137). In other words, for Pienemann, processability of grammatical and pragmatic knowledge goes through a series of hierarchical stages. At each stage, L2 learners are restricted by cognitive constraints that limit their capacity to process grammatical or lexical knowledge beyond their current ability. The processing hierarchy is the core construct of the theory.

Language learning theories usually deal with two important problems: the logical problem and the developmental problem (Felix, 1984). The logical problem is mainly concerned with why humans can learn natural language: that is what makes acquisition possible. The developmental problem deals with the question of why language is acquired the way it is.

To deal with the two problems of language acquisition, Processability Theory adopts a modular approach. Pienemann adopted a psychological theory and a linguistic theory as the modules of the PT. The psychological module (the processing module) deals with the developmental problem, and the linguistic module (the grammar module) deals with the logical problem (Pienemann, 2007). The processing module is constructed on the basis of Levelt’s (1989) skill-based approach to language production (the speech processing model). The grammar module, parallel to the processing module, draws on Lexical Functional Grammar (LFG) (Kaplan and Bresnan, 1982; Bresnan, 2001).
2.2 Levelt’s Speech Processing Model

Because PT focuses on L2 production, it borrows heavily from Levelt’s speech processing model (1989). The basic premises of Levelt’s model of language processors are given by Pienemann (2005, p. 3-7):

1. Language processing is autonomous, automatic and incremental. As processing grammatical information is highly automatic, accessing such information is usually autonomous and unattended.

2. The sentence output of the processor is linear, though the underlying meaning being constructed in the output process may not be linear.

3. The output processing has access to the grammatical memory store. The grammatical information such as subject-verb agreement is held temporarily in the grammatical memory store. And such information can be accessed by the grammatical processors for language production (Pienemann, 2005). The grammatical memory that stores grammatical information is usually known as “procedural memory,” which is different from “declarative memory” that usually involves consciousness and attention (Paradis, 2004; Paradis, 2009; Ullman, 2001).

Levelt’s approach to speech production divides the sentence production process into three sequential stages: (1) formation of the message using the “Conceptualiser,” (2) construction of the message based on the “Formulator,” (3) actual production of the message through the “Articulator” (Levelt, 1989, p. 55). PT utilizes the grammatical
encoding process of the Formulator, which encodes a grammatical and phonological message with selected conceptual information and sends the encoded message to the Articulator. Pienemann (1998) gave a detailed description of the processes that generated the message. Consider Pienemann’s example of “a man gives a cat to his mother,” to illustrate the sentence production process described by the model (Figure 2.1). First, the Conceptualizer locates the concepts that underlie the sentence. The lemma “man,” together with the categorical information N (noun), is first activated. The categorical information N calls the categorical procedure NP (noun phrase), which inspects the concept “man” for complements and specifiers in order to generate the diacritic features (such as singular form) and to attach the branch Det (determiner) to the NP. Because the NP is annotated with a Det and the diacritic features include the “noun singular” feature, the lemma “A” is activated. The value of the diacritic feature is stored in the categorical procedure until it is checked against the modifier “A”. As the NP has been architected in the above process, the relationship of the NP to the remaining message of the sentence is then established. To establish such a relationship, the NP will be assigned a grammatical function, in this case “subject of a sentence,” by the syntactic procedure known as the Appointment Rules. Such a grammatical function will then be sent to the S-procedure (sentence procedure), which stores the didactic features of the NP. While constructing the structure of the NP, the other conceptual fragments (e.g., NP, a cat, as an object) are also constructed at the same time in a parallel fashion. The final procedure is carried out by the so-called Word Order Rules, which are responsible for assembling subordinate clauses (if there is a subordinate clause). The message being constructed by the Formulator will then be sent to the Articulator to produce the actual output. The whole
procedure highlights Levelt’s (1989) notion of the incremental architecture of language production. The process performed by the Formulator can be summarized by the following sequence which illustrates the hierarchy of the PT (Pienemann, 2005, p.9).

i. The lemma,
ii. The category procedure (lexical category of the lemma),
iii. The phrasal procedure
iv. The S-procedure and the target language word order rules,
v. The subordinate clause procedure.

Figure 2.1. An illustration of sentence production process.
Note: Adapted from Pienemann (1998, p.68).
Levél’s incremental language production process is assumed to be applicable to mature language users whose “linguistic processors” have all taken shape. However, for novice language learners, this process is not fully applicable (Pienemann, 2005). As PT is intended to describe second language learning, Pienemann assumes that L2 learners must utilize procedures different than those described above, under the condition that the L2 is not closely related to the L1. Such an assumption also suggests that an “L2 learner is initially unable to deposit information into the syntactic procedures” mainly because the syntactic procedures “have not specialized to hold L2 syntactic information” (Pienemann, 2005, p.11). For this reason, it is predicted that learners will not be able to produce L2 structures that rely on the information exchange mechanism in the syntactic procedures. Information exchange is a mechanism in Lexical Functional Grammar (LFG) (Bresnan, 1982; Kaplan & Bresnan, 1982; Bresnan, 2001) that allows PT to link a psychological theory to a linguistic theory to explain language development. As PT describes how L2 learners acquire the syntactic procedures that handle the necessary information exchange, LFG was regarded as a complementary linguistic model to Levél’s psychological model to construct Pienemann’s theory.

2.3 Lexical Functional Grammar (LFG)

In order to apply his theory universally to all types of L2, Pienemann (2005) argues that it is necessary to connect Levél’s speech production process to the grammatical structure of individual languages. To do that, LFG (Bresnan, 1982; Kaplan & Bresnan, 1982; Bresnan, 2001) is chosen by PT to describe how syntactic and
morphological structures of languages with different typologies can be explained based on the processing procedures (Pienemann, 1998). One of the most important components of LFG is feature unification, which “captures a psycholinguistically plausible process that involves (1) the identification of grammatical information in the lexical entry, (2) the temporary storage of that information and (3) its utilization at another point in the constituent structure” (Pienemann, 1998, p. 73).

LFG and its prominent component feature unification allow different parts of a sentence to be fit together (Pienemann, 2005). The original version of LFG (Bresnan, 1982; Kaplan & Bresnan, 1982) has three components: a lexicon, a constituent structure and a functional structure. Each entry of the lexicon is attached with various types of information, including syntactic information, for sentence generation. Lexical entries of the sentence “Jane makes cookies” are annotated with information given in Figure 2.2.

For example, tense of the lexical entry “make” is assigned the value “present.”

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Figure 2.2. Lexical entries of “Jane makes cookies”.

The constituent structure consists of universal units of the sentence parts, such as “verb” and “noun phrase.” The order of these universal units is language-specific. For example, some languages have an adjective before a noun while some have a noun
followed by an adjective (Pienemann, 2007). An example of constituent structure is given in Figure 2.3.

The functional structure includes the universal units, such as subject and object that are related to the constituent structure in a language-specific way (Pienemann, 2007). It is generated by the interaction between the constituent structure and the lexicon, which contains grammatical information to interpret the semantic meaning of the sentence (Pienemann, 2005). Figure 2.4 gives an example of the functional structure.
In addition to the constituent structure and the functional structure, the extended version of LFG (Bresnan, 2001) includes an *argument structure*. The *argument structure* describes who does what to whom, which constitutes universal argument roles such as agent, experiencer, locative, or patient. Feature unification is illustrated in Figure 2.5, which uses the sentence “Jane makes cookies”.

Figure 2.4. The functional structure.

Figure 2.5. The parallel structure in LFG (adopted from Pienemann et al., 2005, p. 200).
In the simple sentence “Jane makes cookies,” adding the affix “-s” to the verb “make” is determined by the grammatical features and their values, PERSON (=3) and NUM (=SG), annotated in the NPsubj, which is unified at the sentence level in a non-linear fashion (Pienemann, 2005). All these grammatical features need to be stored in the S-procedure during sentence production. Feature matching provides a plausible explanation for the “linearization” problem in language generation; this problem is related to the mismatch between the actual order of events and the surface order. As feature unification can be used to describe each hierarchical level of the processing procedures, it works as the interface between the syntactic representation and the language production procedures. Further description of how feature unification functions in this manner will be given below.

2.4 Key Constructs of Processability Theory

Levet’s model and LFG are the underlying modules chosen by Pienemann to construct his theory to predict and explain L2 development of all languages regardless of typological differences. After a brief discussion of the foundation of PT, it is necessary to focus the discussion on the constructs of PT that are most relevant to the current study. These key constructs are the Processability Hierarchy, Lexical Mapping, the Topic Hypothesis and the Teachability Hypothesis.
2.4.1 Processability Hierarchy

L2 learners must learn to make grammatical information exchanges within and between the phrases of a sentence (Pienemann, 1998), a process described in LFG as “feature unification.” Feature unification is a key mechanism in LFG that allows different components of a sentence to fit with one another. To illustrate, consider the simple sentence “the boy eats two apples a day”. Pienemann argued that L2 learners need to develop a procedure for building the noun phrases “the boy” and “two apples.” Another procedure is also needed to link the two phrases together for sentence construction. In the example above, the phrase building procedure matches “two” to the plural form “apples” (within the phrase feature unification process). A higher-level procedure that is responsible for sentence construction matches “the boy” with the verb “eats” (the third person singular form), grammar matching known as subject-verb agreement (between phrase feature unification process). In Levelt’s model of language production, the grammatical information of subject-verb agreement (third person singular) needs to be stored in the procedures that build phrases.

L2 learners need to develop all of the procedures that store and compare grammatical information (Pienemann, 2007) before they can produce sentences. For Levelt (1989), all of these procedures take place in a discrete and serial fashion. In other words, there is a time sequence involved in the matching of grammatical information, which forms a processability hierarchy. Noun phrases are formed before verb phrases, and both are formed before a sentence is assembled. Based on Levelt’s model, Pienemann (1998) proposed the following hierarchy stages:
1) the lemma\no procedure
2) the category procedure;
3) the phrasal procedure;
4) the S-procedure;
5) the subordinate clause procedure (if applicable)

Pienemann (2007) argued that there are two reasons that learners must follow the above hierarchy in order to develop their grammatical inventory: (1) every procedure is a necessary prerequisite for the next procedure, and (2) the hierarchy reflects the time-course in language production. For Pienemann, learners have no choice but to develop their procedural knowledge (the grammatical inventory) in accordance with this hierarchy:

The hierarchical nature of set of procedures arises from the fact that the procedure at each level is a prerequisite for the functioning of the procedure at the next higher level: a word needs to be added to the L2 lexicon before its grammatical category can be assigned. The grammatical category of a lemma is needed before a category procedure can be called on. Only if the grammatical category of the Head of a phrase is assigned can the phrasal procedure be accessed. Only if a phrasal procedure has been completed and its value is returned can Appointment Rules determine the function of the phrase. Moreover, only if the function of the phrase has been determined can it be attached to the S-node and sentential information be stored in the S-holder. Based on this logic, Pienemann (1998) made the following predictions about L2 acquisition:

(1) During the first stage, no language-specific procedures can take place. The learner has
no syntactic information about the L2 lexical item, and is only able to map conceptual structures onto individual words and fixed phrases.

(2) Once lexical items have been assigned a grammatical category lexical morphological markers can be produced (but no grammatical information can be exchanged yet). At this stage as well, because learners cannot exchange grammatical information, they will rely, for the mapping of semantic roles onto surface form, on procedures that do not require this mapping. For example, they might rely on strictly serial word order (e.g. action + agent + patient).

(3) Phrasal procedures are developed which enable the sharing of information at phrase level, that is, between a Head and its modifiers. No information can be exchanged across phrases at this stage.

(4) Once phrasal procedures are present, Appointment Rules and the S-procedure can be developed. This means that the functional destination of phrases can be determined and phrases can be assembled into sentences, with each phrase playing a clear function within the sentence as a whole.

(5) Once the syntactic information at the level of the sentence is available for processing by learners, subordinate clauses can develop. (p.83-86)

Pienemann (1998) applied his hierarchical models to a number of developmental phenomena including the development of morphemes and syntax in a variety of languages such as German, Italian and English. He found that there is a clear developmental route in the processing of German word-order. This is summarized below:
Stage 1: SVO: Canonical Order

\[(S \ V \ O: \ S \rightarrow NP_{subj}V(NP_{obj1})(NP_{obj2}))\]

Stage 2: ADV: Focus position

\[(XP \ S \ V \ O: \ S'\rightarrow (XP)[_{S}NP_{subj}V(NP_{obj1})(NP_{obj2})])\]

Stage 3: SEP: Verb separation

\[(XP \ S \ V_{aux=+} \ O \ V_{aux=-}: \ S'\rightarrow (XP)[_{S}NP_{subj}[_{VP}V_{aux=+}[_{V-COMP}(NP_{obj1})(NP_{obj2})V_{aux=-}]]])\]

Stage 4: INV: Verb-second

\[(XP \ V_{INF=-} \ O \ V_{INF=-}: \ S'' \rightarrow XP[_{S'}V_{INF=-}[_{S}NP_{subj}[_{V-COMP}(NP_{obj1})(NP_{obj2})V_{INF=-}]]])\]

Stage 5: V-END: Verb-final in subordinate clauses

\[(COMP \ S \ O \ V_{inf=+} \ V_{inf=-}: \ S'' \rightarrow COMP_{ROOT=+}[_{S'}[_{NP_{subj}[_{V-COMP}(NP_{obj1})(NP_{obj2})V_{INF=-}]}]V_{INF=+}])\]


2.4.2 Lexical Mapping

One key component of the LFG is lexical mapping. As shown in Figure 2.6 and discussed above, there are three independent and parallel levels of representation in LFG: argument structure, functional structure and constituent structure. Argument structure describes who does what to whom, which constitutes universal argument roles such as agent, experiencer, locative, or patients. Constituent structure consists of universal units of a sentence, such as verb phrase and noun phrase. The order within and between these universal units is language-specific. For example, in some languages preference is for adjectives to appear in pre-nominal position, while in others preference is for post-
position (Pienemann, 2007). Functional structure includes the universal units, such as subject and object that are related to the constituent structure in a language specific way (Pienemann, 2007). Functional structure connects argument structure and constituent structure.

The architecture of lexical mapping in LFG specifies the relationship between argument structure and functional structure, which allows universal argument roles (argument structure) to be expressed by different grammatical forms (functional structure). For example, in Figure 2.6, each of the arguments is mapped onto a grammatical function: ‘John’ as agent is mapped onto subject; ‘Ball’ as theme is mapped onto object; ‘Into Water’ as locative is mapped onto oblique.

Figure 2.6. Three levels of structure in LFG.

Note: Adapted from Pienemann (2007, p.144).

2.4.3 The Topic Hypothesis
Different from Lexical Mapping that describes how argument structures are mapped onto functional structures, the Topic Hypothesis proposed by Pienemann et al. (2005) is aimed at making developmental predictions that are derived from the relationship between functional structures and constituent structures. The Topic Hypothesis predicts that beginning learners of an L2 will not be able to differentiate between Subject and other grammatical functions (such as the Topic) in sentence-initial position (Pienemann et al., 2005; Pienemann, 2007). In LFG, TOPIC is a grammatical function. The Topic (initial) position of a canonical structure (Subject+Verb+Object) is usually the grammatical Subject (the agent in the argument structure). This canonical structure takes up the most prominent position in the grammatical function hierarchy (Bresnan, 2001). However, as speakers may have different intentions and wish to profile different aspects of an event or scene, the Topic position, usually occupied by the grammatical Subject, may be replaced by another element such as Object. The process of placing the Object in the topic position is called topicalization. When the Topic position is occupied with a constituent other than Subject, it triggers the differentiation of the grammatical functions Topic and Subject (Pienemann, 2007). The differentiation between Topic and Subject leads to linguistic non-linearity and is regarded as more costly in terms of processing effort, when compared to the canonical structure in which Topic and Subject are not differentiated. Thus, the production of a specific structure is constrained by learners’ processability capacity (Pienemann et al., 2005). Therefore, Pienemann made the following prediction (Pienemann et al., 2005):
In second language acquisition learners will initially not differentiate between SUB and TOP. The addition of an XP to a canonical string will trigger a differentiation of TOP and SUBJ which first extends to non-arguments and successively to arguments thus causing further structural consequences. (p. 239)

Based on such a prediction, the Topic Hypothesis predicts three stages in the mapping of functional structures onto constituent structures. L2 learners must go through these three stages in the processing of L2 syntax, beginning from a canonical structure (SVO) and moving towards a non-linear sentence structure:

**Stage 2: TOP = SUBJ: TOP$_{subj}$ V(O)**

<table>
<thead>
<tr>
<th>e.g.</th>
<th>Mary</th>
<th>ate</th>
<th>an apple.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP=SUBJ</td>
<td>V</td>
<td>OBJ</td>
<td></td>
</tr>
</tbody>
</table>

**Stage 3: TOP = ADJ(unct): TOP$_{adj}$ SV(O)**

<table>
<thead>
<tr>
<th>e.g.</th>
<th>Yesterday</th>
<th>Mary</th>
<th>ate</th>
<th>an apple.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP=ADJ</td>
<td>SUBJ</td>
<td>V</td>
<td>OBJ</td>
<td></td>
</tr>
</tbody>
</table>

**Stage 4: TOP = OBJ: TOP$_{obj}$ SV**

<table>
<thead>
<tr>
<th>e.g.</th>
<th>Bob,</th>
<th>I think,</th>
<th>she</th>
<th>will not forget.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP=OBJ</td>
<td>SUBJ</td>
<td>V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2.4.4 The Teachability Hypothesis

The stage prediction in the Processability hierarchy forms one of Pienemann’s (1989) key arguments related to language Teachability. Two explicit claims of the Teachability Hypothesis were made by Pienemann (1998, p.250): 1) Stages of processing
cannot be skipped as a result of formal instruction. 2) Instruction will be beneficial only if it focuses on structures from the next processing stage.

L2 learners usually follow a relatively rigid route in their acquisition of certain grammatical structures, which suggests that certain grammatical structures are not learnable or processable until the previous stages along the processing path have been attained. At any given point in time, because the language processing mechanism is constrained by the processing resources, learners can only process and produce the linguistic feature that they can handle at the current stage. Therefore, for Pienemann (1998), stages of L2 processing cannot be skipped even under formal instruction. This is not to say that instruction cannot affect developmental variability at each stage of development (PT allows each stage to have some degree of leeway and variability for the shape of the L2 grammar. This leeway, known as hypothesis space, is not subject to hierarchical constrains, Pienemann, 1998). Because Teachability Hypothesis insists that instruction cannot lead a learner at Stage X to advance to Stage X+2 because the learner is not ready for Stage X+2 (Pienemann, 1989; Pienemann, 1998), instruction is beneficial only if it is focused on the next processing stage.

2.5 Summary

Processability Theory is a cognitive theory that describes language development. The four key constructs of the PT are the key features that have allowed the theory to be tested. Lexical mapping and the Topic Hypothesis explain why L2 learners have to follow the sequential step-by-step Processability Hierarchies. Such hierarchies are
universal in that they cannot be reversed, skipped or over-ridden by other types of hierarchies. Because of this universality, no teaching can alter the development trajectory, the theory becomes testable. There is empirical evidence to support the theory. In the next chapter, some of the empirical studies that tested the claims of PT will be reviewed.
Chapter 3

A Review of PT Studies

3.1 Studies Supporting PT

Since Pienemann laid out his work in the late 1990s, a number of studies have been carried out to test the “universal hierarchy” proposed by the Processability Theory. Pienemann (1998) analyzed data from 18 existing studies in order to evaluate his theory. Pienemann found that regardless of L1 background and age, learners’ acquisition of syntax and morphology in L2 English, L2 Swedish or L2 Japanese followed the stages predicted by the PT.

Some of the subsequent studies supported PT predicted stages of syntax and morphology development. Pienemann and Håkansson (1999) found supporting evidence from L2 acquisition data of Swedish syntax and morphology in a corpus made up of 14 previous studies on the acquisition of Swedish morphosyntax. Glahn, Håkansson, Hammarberg, Holmen, Hvenekilde, & Lund (2001) investigated the effects of PT hierarchy on the processing of L2 Danish, Norwegian, and Swedish attributive and predicative adjectives and subordinate clause syntax in classroom settings. The order of emergence in all 3 languages showed that phrasal (attributive) adjectives were first acquired, followed by interphrasal (predicative) adjectives and subordinate clauses.

A number of subsequent studies tested whether development of lexical, phrasal or interphrasal morphemes follows PT’s hierarchical stages. In Australia, Kawaguchi (2005)
observed L2 Japanese learners’ L2 development and found that these learners’ developmental trajectory adhered to the processability hierarchy. Kawaguchi (1996) confirmed her early finding that L2 Japanese learners can process the SOV structure at the initial stage regardless of their L1 background. Kawaguchi then claimed that Japanese offers fruitful ground for testing PT because Japanese has an SOV structure as its canonical structure is typologically distant from that of European languages.

Zhang (2001, 2005) tested the theory on the emergence of Chinese morphology in an L2 Chinese classroom in Australia and showed that the development of L2 Chinese lexical, phrasal and interphrasal morphemes supported PT’s prediction. The order of development for her participants followed a step-by-step progression from lexical-procedure (e.g. aspect markers such as “guo” (EXP) and “zhengzai” (PROG)) to phrasal procedure (e.g. classifiers “yi ben”) and finally to inter-phrasal procedure (clause marker “de”). In an L2 Arabic classroom in Australia, Mansouri (2005) tested the developmental stages for Arabic agreement morphology (hierarchy of agreement marking in Arabic) and found evidence supporting PT’s prediction of morpheme development. In a more recent study, Baten (2011) tested the PT by observing German case marking. Baten used time-constrained fill-in-the-blanks tasks to measure use of case marking by Dutch native speakers between the ages of 15 and 18. Comparisons of proportions of case assignments showed that learners first learned lexical case marking, followed by phrasal and inter-phrasal case marking.

With regard to syntax/word order development, Jansen (2008) collected cross-sectional data of classroom learners of German with L1 English backgrounds and applied the data to test the stages of German word order development. A higher percentage of
sentences at a later stage were produced by more proficient speakers as compared to less proficient speakers. Jansen then argued that the results confirmed the cumulative nature of the stages laid out by the PT. Dyson (2008) investigated acquisition of L2 English by two Mandarin speaking adolescents over one academic year. In this study, Dyson tried to examine whether processing of morphology is always a prerequisite for processing of syntax across stage 1 to stage 5. The order of stages predicted by PT was upheld as syntax and morphology emerged in the predicted sequences. However, morphological development did not turn out to be the precursor to syntax across all stages. One of Dyson’s participants attained the predicted syntax for stages 3 and 4 without the required morphology. The only stage at which the morphology and syntax emerged together was Stage 2. Otherwise, syntax was shown to emerge before morphology or together with morphology. Dyson used the Universal Grammar account to explain that the counter evidence to PT may be due to the fact that “proceduralization of properties of UG prompts staged syntactic development, processing which interacts with the morphological procedures hypothesized in PT” (p. 375).

3.2 Studies on Topicalization in Chinese

Regarding the development of Chinese topicalization structure, only a limited number of studies have been conducted to test the TOPIC Hypothesis. The few exceptions were Zhang’s doctoral project (2001), which was later published in a book chapter based on a reanalysis of her data (Zhang, 2007); Gao (2009) and Wang (2011).
In her study, Zhang (2007) tested the Topic Hypothesis on L2 Chinese processing in the classroom setting. Specifically, she carried out a longitudinal study on three native English speakers in a beginning level Chinese course at an Australian university. Zhang interviewed these learners on a regular basis for 15-50 minutes throughout the first year of the course as they engaged in several communicative tasks that included problem-solving, role-playing, picture-based oral compositions and story-telling. One of the main findings, as Zhang claimed, is that participants’ progression from linear alignment of TOPIC and SUBJECT towards non-linear alignment supports the Topic Hypothesis. That is, at the early stage, the three participants could produce only the SVO structure. At a later stage the Adj.+SVO structure emerged, followed by the emergence of the OSV structure. Table 3.1 summarizes the stage-by-stage development of morpheme and syntax in Zhang (2001, 2005) and Zhang (2007).

Table 3.1. L2 Chinese acquisitional stages, Zhang (2007).

<table>
<thead>
<tr>
<th>Stages</th>
<th>Processing Procedure</th>
<th>Information Exchange</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>S-procedure</td>
<td>Inter-phrasal information</td>
<td>Topicalization: OSV, SOV</td>
</tr>
<tr>
<td>3</td>
<td>Phrasal procedure</td>
<td>Phrasal information</td>
<td>XP SV(O): adv-fronting Adverbial Subordinate clause Wh-adverbial Canonical SV(O): Declarative interrogative</td>
</tr>
<tr>
<td>2</td>
<td>Category procedure</td>
<td>Lexical morphology</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Word /Lemma</td>
<td>Words</td>
<td>Formulaic expressions</td>
</tr>
</tbody>
</table>
Although Zhang provided some information about the elicitation task, no detailed description of the activities was provided. This may raise a reliability issue. Detailed information of each task should be given. Leaving aside the details of the tasks, a bigger concern for Zhang’s study is related to instruction. Little information was given about the type of instruction students received. The textbooks used in Zhang’s study also raised concern. The textbook was *New Practical Chinese Reader 1 (Book 1)*. Table 3.2 summarizes the content of the book with each specific grammatical structure taught through the teaching plan.

Table 3.2. The content of *New Practical Chinese Reader 1 (Book 1)*.

<table>
<thead>
<tr>
<th></th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L6</th>
<th>L7</th>
<th>L8</th>
<th>L9</th>
<th>L10</th>
<th>L11</th>
<th>L12</th>
<th>L13</th>
<th>L14</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. OSV</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Adv-fronting</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
<td>+</td>
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<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>1. SVO</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

Notice that the sequence of structure presented in the *New Practical Chinese Reader 1* matches the PT-predicted developmental order (the OSV structure was not taught in *Practical Chinese Reader 1*, but was covered in later sessions of instruction). Therefore, even though the investigation results showed that Zhang’s (2007) informants followed the identical processing route in alignment with the Topic Hypothesis, it is not clear whether the development patterns of the three L2 Chinese learners were actually due to the “universal processability constraint” or due to the instruction itself. Nevertheless, Zhang’s study lends support to the Teachability Hypothesis as instruction aims at the next stage of development would aid learners to advance to the next stage.
Since all subjects in Zhang’s (2001) study had a similar L1 English language background, Gao’s (2009) dissertation tried to evaluate whether the Topic Hypothesis would also apply to L2 Chinese learners from different L1 backgrounds. Three groups of L2 Chinese participants with different L1 backgrounds were recruited: L1 Japanese speakers, L1 German speakers and L1 English speakers. One major finding was that all three groups of learners similar to Zhang (2007), followed the predicted processing sequence: SVO (stage 2) $\rightarrow$ Adj+SVO (stage 3) $\rightarrow$ OSV (stage 4). Therefore, Gao concluded that the Topic Hypothesis holds for language learners from different backgrounds, which seems to align with PT’s claim that the theory can be applied universally for all L2 learners regardless of their L1 background.

Gao also considered a stage beyond the OSV stage (stage 4). The *ba-construction* (e.g. 我把门关上了, wo ba men guan shang le, I ba door closed) was observed among her participants, occurring after the OSV stage. The *ba-construction* is a unique structure in Chinese that allows canonical SVO order to be changed into the SOV structure, which Bender (2000) argued was another form of topicalization (some other linguists do not consider *ba-construction* as a special type of topicalization). The movement of object to the preverbal position usually accompanying the inclusion of *ba* changes the structure of the sentence to S(*ba*)OV. Further discussion of the *ba-construction* will be given in a later chapter. At this point, we will focus on the processing sequence involving topicalization, including *ba*-construction. As information exchange between the object and the predicate at the sentence level recruits the S-procedure (Gao, 2009; Wang, 2011), the *ba-construction* is hypothesized to be acquired after the OSV stage. This hypothesis was supported by Gao’s observation. Gao found that all her three groups of participants
had the *ba-construction* emerge after the emergence of the OSV structure. Gao then extended the processing sequence to five stages: SVO (stage 2) → Adj+SVO (stage 3) → OSV (stage 4) → ba-construction (stage 5).

Following the line of study by Zhang and Gao, Wang (2011) used PT as the theoretical framework for her dissertation research, which evaluated the Topic Hypothesis. Wang recruited eight L2 Chinese learners from a British university. Different from Gao’s study, Wang provided more information related to the participants, whose ages ranged from 19 to 22. They also had different L2 Chinese experience. Six of them had been to China prior to the study. Two had learned Chinese for 1.5 months, and the others had 11 months of learning experience. Seven of the participants’ L1 was English, and the other one was German. Wang’s general finding was similar to Zhang and Gao. All her learners followed the predicted processing stages for Chinese topicalization. In addition, Wang predicted that the “bei” structure (e.g. 门被我关上了, *men bei wo guan shang le*, the door was closed by me), an additional type of topicalization structure similar to English passive voice, would also emerge at stage 5. In both Chinese and English, the object can be placed in the topic position and become the focus of the sentence. A further discussion of the *bei* structure in Chinese can be found in Li and Thompson (1981). In sum, all the three word order studies seemed to support the Topic Hypothesis.
Table 3.3. An extension of L2 Chinese acquisitional stages.

<table>
<thead>
<tr>
<th>Stages</th>
<th>Processing Procedure</th>
<th>Information Exchange</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>S-bar procedure</td>
<td>Main and sub-clause</td>
<td>(ba)-construct; (bei) structure</td>
</tr>
<tr>
<td>4</td>
<td>S-procedure</td>
<td>Inter-phrasal information</td>
<td>Topicalization: OSV, SOV</td>
</tr>
<tr>
<td>3</td>
<td>Phrasal procedure</td>
<td>Phrasal information</td>
<td>(XP) (SV(O):) adv-fronting (Adverbial) (Subordinate) (clause) (Wh)-(adverbial)</td>
</tr>
<tr>
<td>2</td>
<td>Category procedure</td>
<td>Lexical morphology</td>
<td>Canonical (SV(O):) (Declarative) (interrogative)</td>
</tr>
<tr>
<td>1</td>
<td>Word /Lemma</td>
<td>Words</td>
<td>Formulaic expressions</td>
</tr>
</tbody>
</table>

Note: Adapted from Gao (2009) and Wang (2011).

### 3.3 Critics of PT

Compared with its predecessors (the Strategies Approach and the Multidimensional Model), PT has its strengths. First, it provides not only prediction but also explanation of interlanguage development (Jordan, 2004). Second, it is falsifiable (Pienemann, 1998; Pienemann, 2005). However, the theory is not without criticism. One major criticism of PT is related to the scope of the theory (Jordan, 2004; Ellis, 2008). First, PT concerns mainly production data, which limits its scope to processing for the purpose of speaking an L2. This is a concern because one’s actual linguistic knowledge may not be fully revealed in the production data. For example, one may not produce a specific grammar structure, but that specific structure may have already been in one’s grammar. In response, Pienemann (2005) quoted Chomsky (1978) to argue that there is
no priori knowledge suggesting which type of linguistic data is attributable to grammatical competence. Although production data is regarded as the most appropriate data type for testing PT, comprehension is also relevant because reaction time of receptive knowledge is acceptable for testing the theory (Pienemann, 2007). However, the connection between comprehension and production does not seem to be straightforward. In a recent study, Spinner (2013) tested PT’s prediction of morphology development using both receptive task (an audio grammaticality judgment task, GJT) and productive task. It was found that the two groups of L2 English learners in the study did not demonstrate the same order of emergence in the two different modality tasks. The GJT data does not follow PT’s predicted emergence order while the production data confirms the predicted order. This result suggests that there may be a gap between L2 receptive morphological knowledge and L2 productive morphological knowledge. It seems that it is necessary for PT to address the comprehension-production asymmetries issue found in Spinner’s study, which is relevant to which type of data is valid to test the theory.

The limited scope of PT is also reflected in its limited generalizability given that PT uses the criteria of emergence of structures in the output to measure whether the grammar is processable or not. PT makes no claims regarding the development of a structure from the point of emergence to the point of mastery. In other words, development (e.g. automaticity) of the grammar structure at a specific stage after the emergence of the structure is left unspecified.

Moreover, PT has defined a limited number of stages (e.g. five stages in Chinese). No other stage has been described after the grammar structures of the final stage emerge.
This is a weakness from the standpoint of developmental psychology and assessment. If a learner can produce the grammar structures of the pre-specified stages, a wide range of grammatical phenomena the learner acquires at a later time will remain unexplained. In other words, PT only observes a limited number of stages for grammar development. From the developmental psychologist’s point of view, it is not comprehensive because development is a life-long process. For assessment, PT’s stages are so limited that they cannot be used to compare proficiency levels between advanced learners and beginning learners when both can produce all stages of grammar.

Pienemann (2005) admitted that the scope of PT is limited. On the other hand, Pienemann argued that it is a theory under construction. Since PT adopts the modular approach, the theory allows inclusion of compatible modules that can expand the scope of the theory. However, incorporating other modules into the theory is akin to “hot-fix patches” (When there is a problem, find a module to fix the problem and simply add it to the theory). The question one may ask is how comprehensive this theory is because there may always be a problem. If PT is constructed in an “add-on” fashion, it is also necessary for the theory constructor to always provide justification and empirical evidence to explain why a module is compatible with the theory. Making sure that an add-on module fits all other modules may turn out to be more and more difficult if there are more modules being included in the theory.

It must also be pointed out that PT assumes a universal hierarchy for all types of learners regardless of their L1, age and cultural background. However, adult L2 learners, who are biologically matured, are different from young children or adolescents, who are biologically immature. It is necessary for PT to provide justification for why its
biological endowment such as the “language processor” works in the same way for adults and children. Do adults and children have the same type and the same level of processing constraints? Do processing constrains of adults and children work in the same way? In fact, Ullman’s DP model (2004) suggests that adults and children do not learn language in the same way (adult learners are less efficient in using procedural memory to support learning). All these issues remain to be answered. One more issue that needs to be addressed by the theory is the counter-evidence.

3.4 Counterevidence to PT

Spada and Lightbown (1999) conducted a study to examine whether instruction could have an impact on the acquisition order of English questions laid out by Pienemann and Johnson (1987). One-hundred and fifty Canadian francophone ESL students in grade 6 (age 11-12) took part in the study. Most of the students were at stage 2 of the 5-stage sequence posited for processing English questions (the five stages are given in Table 3.4). Learners first took a pre-test and then entered an intensive 2-week program of ESL instruction in which a lot of input was provided. Learners were exposed to hundreds of English questions at stages 4 and 5 in communicative activities guided by their ESL teachers. Following instruction, a post-test and a delayed post-test were administered. It was found that learners initially at stage 2 could advance to stage 3 whereas learners initially at stage 3 advanced to stage 4. What’s more, stage 2 learners demonstrated some knowledge of English questions at stage 4 and stage 5 at the post-test and delayed post-test. One major finding is that teaching grammar at next+1 stage would allow learners to
progress to the next stage. Although Pienemann rejected the study as counter-evidence to PT for the reason that the tasks used in three tests did not elicit spontaneous speech production, Spada and Lightbown’s study challenges the Teachability Hypothesis’s claim that the best instruction is the instruction that follows PT’s developmental hierarchy. If the claim is true, then we should not see children at Stage 2 demonstrate the same type of knowledge as children at Stage 3.

Table 3.4. English question formation.

| Stage 1: Single words or fragments (A spot on the dog?) |
| Stage 2: SVO (A boy throw the ball?) |
| Stage 3: Fronting |
| Do-fronting (Do the boy is beside the bus?) |
| Wh-fronting (What the boy is throwing?) |
| Other fronting (Is the boy is beside the bus?) |
| Stage 4: Y/N inversion/ Copula Inversion |
| Wh- with copula BE (Where is the ball?) |
| Y/N questions with aux inversion (Is the boy in the garden?) |
| Stage 5: Wh- with auxiliary second (What is the boy throwing?) |

Note: Adapted from Spada and Lightbown (1999)

Another big challenge to PT’s syntactic word order appeared in Liu (1991). Liu conducted a longitudinal study on a five-year old Chinese boy (Bob) who was learning English. Over a 2 year period, Liu audio-recorded Bob's speech on multiple occasions when Bob interacted with peers and teachers at school and when he interacted with the investigator. One major finding was that Bob acquired English questions in a different order from the one proposed by Pienemann and Johnson (1987). Bob learned to use English questions at stage 4 and 5 before he could use English questions at Stage 3. Tarone (2007) regarded this phenomenon as startling counter evidence to Pienemann's
theory and argued that the social setting was a major factor affecting Bob’s order of acquisition.

Another challenge of the Teachability Hypothesis comes from Bonilla’s (2012) recent dissertation. Bonilla tested the PT hierarchy of Spanish in three separate studies. In the first study using a corpus of conversation data by twenty-one L1 English speakers, Bonilla found evidence to support five stages of development predicted by PT. In her second study, beginning Spanish learners at either Stage 2 or Stage 3 were randomly assigned to three groups: a Stage 4 grammar instruction group, a Stage 5 grammar instruction group and a control group. The Stage 4 grammar instruction group received Stage 4 grammar instruction and Stage 5 grammar instruction group received Stage 5 grammar instruction. The third study has a similar design to the second study but instruction was targeted at Stage 3 and Stage 4 grammars. Results of the two studies showed that some learners were capable of producing the target morphological and syntactic structures after instruction on next, next+1 or next+2 instruction. Based on these results, Bonilla argued that instruction on next+1 or next+2 can allow learners to advance, challenging the claim of Teachability Hypothesis.

3.5 Summary

The Processability theory is an L2 developmental theory built to explain the route of L2 acquisition for all human language. It argues that all L2 development is sequential and progressive. Such a stage-by-stage development’s roots can be traced back to Piaget’s developmental theory. Pienemann himself admitted that he was under the
influence of Piaget (Pienemann, 1987). Such progressive development seems to be forward moving. When an L2 learner reaches a stage, there is no going back and the change is qualitatively different. The Piagetian developmental theory sharply contradicts another developmental theory proposed by Vygotsky, which argues that there is no stage-by-stage development and that development is neither sequential nor progressive. Further discussion of this opposing theory will be given in the next chapter.
Chapter 4

Sociocultural Theory

4.1 Introduction

At Vygotsky’s time, two approaches, each belonging to a different school of psychology, dominated the field. The downward reductionist approach (e.g. Wundt) studies mental activity solely as a function of our biological endowment. The upward reductionist approach, associated with the behaviorists, understands mental activity as a physical response to environmental stimuli (Valsiner & van der Veer, 2000). These two approaches, originated from Cartesian dualism, draw a clear distinction between biological and environmental developmental factors. Vygotsky was critical of such dualistic thinking and regarded these approaches as generating the crisis in psychology (Vygotsky, 1997). Vygotsky rejected Cartesian dualism’s dichotomy between biology and environment and adopted a dialectic approach (the dialectic approach views phenomena as unifications and syntheses of contradictions rather than as being made up of parts and pieces) to study the human mind.

Abandoning the dualistic assumption that no connection exists between people and the physical world, Vygotsky argued that a person and her environment are intricately connected. He transcended the mind/body dualistic perspective by conceptualizing human cognitive development as a process whereby social and external factors transform into internal mental processes. Vygotsky valued the important role of
both biological endowment and external environment. However, he understood human processes as oppositional to animalistic ones. Vygotsky noted that while animal’s mental activities are usually reflexes to direct environmental stimuli, human’s unique functions—memory, logical thinking, and categorization—are developed through socially constructed activities and engagement with cultural artifacts (Lantolf, 2006). The biological endowment provides necessary capacities to support mental activities. But through internalization of culturally constructed external factors, the biological capacities are reorganized into consciousness that allows human to voluntarily control their biological endowment. In other words, only through social and cultural factors are humans able to intentionally control their biological endowments (Vygotsky, 1978). For SCT, the neurobiological bases of the human brain are only a necessary condition while formation of higher functions relies completely on “social relations and relations among people” (Vygotsky, 1978, p.57). Vygotsky best described biological and cultural factors as dialectally connected: biology providing basic functions (e.g. the brain, the ears and the mouth that allow human to capture and produce language) and cultural factors empowering humans to intentionally regulate these functions (Vygotsky, 1997).

4.2 Key Constructs of SCT

To understand SCT as a psychological theory, one must understand its key constructs/concepts: mediation, internalization, genetic analysis, and zone of proximal development. I acknowledge that concepts, such as activity among others, are also important; however, I only foreground those that are most relevant for the present study.
4.2.1 Mediation

The human mind does not directly act on the physical world (Vygotsky, 1997). Instead, human contact with the physical world is mediated. Human beings use physical tools to change their material worlds while at the same time relying on symbolic tools such as language and concepts to organize and control consciousness. Such a relationship is clearly demonstrated by the classical triangle given in Figure 4.1. Suppose a group of people are trying to build a new bridge. The bridge builders use various tools such as trucks, ships, and drills to build the bridge, which is an act that changes the material world. But before building the bridge, the architects had to design the bridge. They created a blue print for the workers, which is a symbolic representation of the real bridge. The blue print contains symbols that are made up of signs, numbers and drawings that represent the structure of the bridge. Through this symbolic mediation, the workers are capable of regulating their internal thinking (here specifically referring to consciousness) in order to actually perform the act that changes the material world by building the bridge. If not for the preceding symbolic representation, the workers would not possess the cognitive models that enable them to build a real bridge. In short, the blue print regulates the reorganization of the workers’ thinking.
Mediational means are culturally and historically constructed, and they are made available by both ancestors and contemporaries (Lantolf & Poehner, 2007). These cultural and historical means are passed from one generation to the next, with modifications constantly being made by contemporary users, which in turn pass them on to the next generation (Tomasello, 1999). For example, in the 1960s, a computer would occupy an entire room, making them inaccessible to people in the everyday world. Eventually new modules and component parts enabled producers to reduce the size of computers and at the same time increase the speed of their calculations. This along with a massive reduction in cost made them available to almost anyone. This in turn had an effect on how people conduct their daily lives both in terms of work, education, and leisure activities.

According to Vygotsky (1978), mediation is not only a tool but also the very source of higher mental function. SCT argues that higher order mental functions are essentially “mediated by culturally auxiliary means,” which arise as “a consequence of participation in cultural activities … in which cultural artifacts … and concepts interact in
complex, dynamic ways with each other” (Lantolf & Thorne, 2006, p. 59). The mediational process described by Lantolf and Thorne includes three key components of mediation: cultural artifacts (books, computer, music, art etc.), activities (sports, education, work etc.) and concepts (human-constructed understanding of the world) (Ratner, 2002). In fact, cultural artifacts, activities and concepts play a central role in shaping human mental functioning (Lantolf & Thorne, 2006).

Among all the cultural artifacts, Vygotsky is most interested in semiotic mediation, and understands semiotic mediations as being of many types. For example, music, art and math are all semiotic tools invented and developed by humans over the course of history. Vygotsky (1978) proposed that physical tools, such as hammers, saws, bulldozers and the like are directed toward the external world whereas semiotic tools are bidirectional; that is they can be directed at others, as when we engage in social communication and at ourselves, as when we engage in thinking activity. Language is the most powerful auxiliary means for intentionally controlling and reorganizing our social life and our psychological processing (Lantolf, 2000b).

Regarding L2 as a mediational means for regulating one’s thinking, research on private speech, defined as audible speech being used to address oneself, shows that L2 learners can use private speech in L2 to regulate thinking (Frawley & Lantolf, 1985; Lantolf & Frawley, 1984; Appel & Lantolf, 1994). Although L2 speakers may not always be able to sustain L2 private speech (Lantolf, 2006), these studies support the idea that an L2 can be used as a mediational tool to organize one’s psychological processing under some circumstances.
4.2.2 Internalization

Vygotsky (1978) stated that every psychological function appears first on the interpsychological plane (between people) and then on the intrapsychological plane (within an individual). The transformative process through which interpsychological functioning becomes intra-psychological is referred to by Vygotsky as internalization. Vygotsky regarded the internalization process as the mechanism which eventually enables us to control our biological endowment (Lantolf & Thorne, 2006). Higher mental functioning owes its existence to the process of transforming an external cultural context into internal thinking. That is, higher mental functions such as human language arise as a consequence of internalization (Lantolf & Thorne, 2006). In this sense, human consciousness, or voluntary control over biological functions, is socially originated from the external contexts that surround us.

To illustrate internalization as a developmental process, it is helpful to introduce three stages of thinking: object-regulated thinking, other-regulated thinking and self-regulated thinking. Consider one of the L2 Chinese learners who participated in the current study. At the first stage, to construct a simple Chinese sentence, the learner relied heavily on the Cuisenaire rods in order to remember the position of each sentence element. At this stage, the learner’s thinking is regulated by objects. In other words, she is unable to generate a sentence without the support provided by the rods as external artifacts. It is important to stress that even though the rods are concrete objects for the learner they had psychological status. At a later stage, the learner, with the help of explicit verbal guidance from the instructor, which included spoken directions, was
capable of producing more complex Chinese sentences. At this stage, the learner’s thinking was mediated by another person without the needs of object regulation, a stage known as other-regulation. At the final stage, the learner was capable of producing complex Chinese sentences without any external mediation. She maintained complete control over her own sentence construction. This stage is called self-regulation. The progression from object-regulation to self-regulation is an example of internalization, a process of converting external forms of mediation by objects and other individuals into an internal cognitive resource for thinking (Lantolf & Thorne, 2007).

The foremost mechanism for internalizing social, cultural, and historical contexts is imitation (Vygotsky, 1987). Vygotsky viewed imitation as a complex and transformative activity (Newman and Holzman, 1993) and as “the source of all the specifically human characteristics of consciousness that develop in the child” (Vygotsky, 1987, p. 210). In imitation, people are capable of connecting the goal of an activity with the means for carrying out that activity (Tomasello, 1999). Imitation is not simply and mindlessly replicating an utterance, but instead it is “an intentional and potentially transformative process” (Lantolf & Thorne, 2006, p. 176). In language learning, including L2, imitation plays a crucial role (Tomaseillo, 2003). Saville-Troike (1988) noticed that some children in an ESL classroom avoided speaking English publically while privately they imitated the teachers’ utterances as well as those of their English-speaking classmates. As private speech serves not only as a means to regulate mental functioning but also as a means to facilitate the internalization process (Lantolf, 2006), children’s L2 private speech that imitated the social affordance around them (L2 in
Saville-Troike’s case) played an important role in helping them internalize external linguistic affordances.

4.2.3 Genetic analysis-methodology domains

Vygotsky believed human psychology should not be studied only in its matured form. Instead, he proposed that it is important to study the processes of formation. For this reason, SCT argued that human higher mental systems must be understood historically. That is, the focus should be to study the history or formation of the mental system rather than to take a snapshot of the system once it is formed and operating smoothly. This is not to say that a snapshot is unimportant. But the snapshot cannot fully reveal how the mental system comes into existence and therefore it cannot distinguish clearly the contributions of biological and culture to the formation of the system. In order to study the mind in a “historical” manner, Vygotsky proposed genetic analysis, which includes four domains of analysis: the phylogenetic domain (comparing human to other species), the sociocultural domain (studying human society and culture in general), the ontogenetic domain (studying a single person), and the microgenetic domain (studying a particular task or process). For L2 research, the ontogenetic and microgenetic domains are most relevant because ontogenesis concerns the formation and longitudinal development of individual mental processes through mediational means whereas microgenesis focuses on the “short-term formation of psychological process,” which can be regarded as “a very short-term longitudinal study” (Wertsch, 1985, p.55).
Studies that observe learners’ L2 grammar development over time fall into the ontogenetic domain, and interventional studies that teach L2 grammar may fall into either the ontogenetic or the microgenetic domain. Regardless of which domain one’s study may belong to, the longitudinal nature of genetic analysis highlights Vygotsky’s thinking on the origins and history of human mental processes. Although history is usually associated with the past, it must also be pointed out that studying formation of process does not focus only on the past but on the future as well (Negueruela, 2003). The forward-looking concept of development is one essential element of the “zone of proximal development” (ZPD).

### 4.2.4 Zone of proximal development (ZPD)

One of the best-known constructs of Vygotskian theory is the ZPD, which has had a substantial impact on a variety of areas such as education and psychology (Lantolf & Thorne, 2007). The ZPD is defined as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with a more capable peer” (Vygotsky, 1978, p.86).

Vygotsky (1978) distinguished three levels of development. The first level is development that has already been achieved. The second level is a potential level of development that can be achieved through the assistance of others or through additional mediational means. The third level is a level beyond the learners’ reach even after
assistance is provided. The ZPD is the gap between the first and second level of development.

The compelling concept of ZPD is its forward-looking nature. After all, what someone can do today with help from others is what that person will be able to do independently in the future (Vygotsky, 1986). This is because help from others or from additional mediation triggers the internalization process by which one’s ability to control the mind is enhanced (Lantolf, 2000a).

Such a future looking concept may open a new area to the field of assessment. Assessment that takes into account the ZPD provides additional “criteria” for assessing learners’ development potential, a factor the contemporary assessment methods have not paid much attention to. Although ZPD may be represented in criteria for assessment purposes, it is not “a physical place situated in time and space, but a metaphor for observing and understanding how mediational means are appropriated and internalized” (Lantolf, 2000b, p.17). Lantolf’s argument emphasizes Vygotsky’s theory of human mental process as a transformation of interpersonal functions (essentially social) into intrapersonal functions through mediational means. Vygotsky recognized the important role of schooling in shaping development as children learn to collaborate with others, especially in instructional settings (Lantolf & Thorne, 2007, p.211). In other words, artificially designed learning instructions can lead to qualitative changes in development. Intentionally designed instruction, which is organized to be sensitive to a learners’ ZPD, is highly effective in simulating qualitative mental development. Systemic Theoretical Instruction, developed by Gal’perin (1970), is one of a group of approaches that are
sensitive to a learners’ ZPD and that allows for full-development of ZPD (Lubovsky, 1989).

4.3 PT and SCT

From the discussion above, it is clear that Pienemann’s PT and Vygotskian social cultural theory are fundamentally different. At this point, it will be useful to summarize their differing perspectives on cognition, language instruction, and L2 development.

4.3.1 Cognition

PT understands language cognition as a psychological process situated in the brain. The architecture of the language processor in PT is constrained by psychological capacities such as lexical access and working memory (Pienemann, 2007). PT argues that due to linguistic and cognitive constraints, the acquisition of word order by language learners will have no choice but to follow the developmental trajectory as proposed by the theory. The core argument of PT is that psychological and cognitive factors are the main force in determining the development of language, a function of cognition. Because the psychological and cognitive factors are absolute constraints that learners cannot overcome, no teaching can change the developmental trajectory. Relying on the cognitive approach to SLA (with connections to formal linguistic theory), PT regards cognitive functions as accomplished by individuals understood as fundamentally biological beings rather than as a dialectical unity of biological and social factors supported by cultural
artifacts. Therefore, for PT, the main purpose of studying the cognitive functions of language acquisition is to identify the interactions among different mental modules controlled by the brain (Pienemann, 1998).

SCT rejects the traditional cognitive account of language acquisition as a pre-wired language device or organ situated exclusively in the head. For SCT, language cognition is not only a psychological faculty but a social faculty as well. Cognition is not a phenomenon that only exists in the head. Vygotsky recognized the biological endowment as a necessary but not sufficient condition for cognition. Development of human cognition is a transformative process. In such a transformative process, human cognition and the world are connected. Therefore, thinking does not take place solely in one’s head. The cognitive function is part of the functional system formed by an individual and the world. Such a system is distributed between the brain, people, artifacts, and features of environments (Salomon, 1993, as cited in Lantolf, 2004). Human cognition extends beyond the head into the world. As Vygotsky (1978, p.57) argued, “Social relations or relations among people genetically underlie all higher functions (including the cognitive functions) and their relationships.” Human cognitive functioning, e.g., cognition, is fundamentally social in its origin. SCT regards human psychology as both an interpsychological and an intrapsychological phenomenon, and the intrapsychological phenomenon cannot be fully understood without the interpsychological phenomenon (Ellis, 2008).
4.3.2 Language instruction

The Teachability Hypothesis in language instruction takes a firm stance when arguing that formal instruction can never enable learners to skip the hierarchical stages:

...one can no longer assume that the fundamental nature of the learner's linguistic system can suddenly change under the influence of non-cognitive variables such as interactional parameters or formal learning environments... It is quite consistent that social parameters may cause a sequence of changes in the learner’s processing of the language...However, these changes of cognitive processes would always occur within the overall architecture of the cognitive system. (Pienemann, 1998, p. 132)

In alignment with Piaget’s argument that instruction is not a major factor in shaping the mind, PT believes that formal instruction’s effect on language development is limited. In order to make teaching effective, instructors must wait for students to first develop cognitively. Instruction should be sensitive to the current stage attained by a student. Instruction should focus on preparing students for the next stage of development (Pienemann, 1998; Pienemann, 2005). Moreover, Pienemann (1998) also argued that instruction can only speed up acquisition in a sequential manner but it cannot override the universal cognitive driving force and change the sequence of acquisition.

Contradictory to Piaget’s view, Vygotsky (1986, p.188) argued that “the only good kind of instruction is that which marches ahead of development and leads it.” For SCT, instruction is an essential condition for development: “properly organized learning results in mental development and sets in motion a variety of developmental processes” (Vygotsky, 1978, p.90). Vygotsky argued that learning is assisted performance whereas “development is the ability to regulate mental and social activities as a consequence of
having internalized the assistance” (Lantolf, 2004, p.336). Gal’perin’s (1992) pedagogical theory echoes Vygotsky’s argument nicely by stating that effective instruction not only changes the developmental rate but also shapes the route of development.

To further appreciate Vygotsky’s thinking on the role of education and instruction, it is necessary to include a brief discussion of cognitive mediation. Vygotsky distinguished two types of cognitive mediation: spontaneous knowledge and scientific knowledge (Lantolf, 2007). Spontaneous knowledge is formed through concrete practical experience when participating in daily human activities (either private or social activities). This type of knowledge is empirical and requires a long time to develop. Moreover, spontaneous knowledge is usually incomplete, imprecise and operates below one’s full consciousness (Lantolf, 2011). For example, knowledge about one’s L1 grammar is usually not available to conscious inspection other than through formal study. Scientific knowledge “represent(s) the generalizations of the experience of humankind that is fixed in science” (Karpov, 2003, p.66). Compared with spontaneous knowledge, scientific knowledge is systematic, complete, and precise. The difference between spontaneous and scientific knowledge is highly relevant to L2 instruction in the classroom setting. For SCT, educational activities should be centered on scientific knowledge in order to promote development (Lantolf, 2011). For L2 grammar, classroom instruction should not be set up to engage learning through everyday activities the way L1 is. This is because L1 grammar is usually empirically and implicitly learned with a massive amount of input, whereas L2 grammar in classrooms is usually explicitly learned. For SCT, educational activities should not replicate everyday life activities. Instead, they should promote
“artificial mastery of natural process of development” (Vygotsky, 1997, p.88). Different from the natural process of development, artificial development, is not pre-determined. It is not already present and simply waiting for a necessary psychological process to develop first. On the contrary, instruction, in Vygotsky’s view, is not just important. It is essential for promoting development.

4.3.3 L2 development

In regards to L2 development, PT claims that certain L2 features (e.g. morphology and syntax) develop in a sequential and incremental manner. One developmental stage is built on a previous developmental stage, and these stages cannot be skipped. Such position aligns with Piaget’s view that learning is a maturational process which progresses through predetermined stages that cannot be altered by external factors. According to Pienemann (1998), the reason that L2 development must progress stage by stage is that language development is constrained by cognitive parameters as explained in Chapter 2.

In Vygotsky’s view, development is internalization of cultural and historical mediation to control mental activities. Development is viewed as a revolutionary process rather than a sequential or evolutionary process (Vygotsky, 1978) since moving from one developmental stage to another is “neither smooth nor discrete” (Lantolf & Thorne, 2006). This is exactly what Lantolf and Aljaafreh (1994) found in their study: mental systems “is not a smooth and linear process, but simultaneously entails forward movement and regression” (p. 619). In other words, SCT believes that L2 development is not a simple
incremental or linear process. Developmental processes can move forward and backward, especially when L2 learners struggle to regulate their thinking through an L2.

**4.3.4 Source of L2 development**

For PT, L2 development is a psychological accomplishment that takes place only in one’s brain. Non-cognitive external environmental factors are inconsequential for L2 development. PT claims that development is wholly dependent on cognitive factors.

While the cognitive approach to SLA views learning as an individual accomplishment, the SCT approach to SLA views learning as a social accomplishment, an accomplishment that is made possible only using social, cultural and historical contexts. Recall from our earlier discussion that the key argument proposed by Vygotsky is that mental processes are mediated by cultural artifacts and culturally organized activities (Lantolf & Thorne, 2006). These artifacts and activities, operating interdependently, are the very source of human development (Vygotsky, 1986). Lantolf (2007) provides a good description of the development of human psychology from the sociocultural perspective:

…uniquely human forms of mental processing (intentional memory and attention, rational thinking, planning and learning, and development) are mediated by cultural artifacts (for example, signs, symbols, numbers, arts, music, etc.) and culturally organized activities (for example, play, education, leisure, labor, etc.). These artifacts and activities, which do not operate in isolation from each other but interdependently in what Luria (1982) called ‘functional systems’, do not merely trigger or influence human development, but are the very source of this development (Vygotsky 1986). It is through the internalization of cultural affordances, which occurs during participation in interpersonal activities that
humans gain control (i.e. achieve self-regulation) over the psychological functions provided by their biological endowment ... (p.39)

While PT is mainly interested in how the brain works and it describes with specificity how the brain functions when processing an L2, SCT focuses on the sources of development and seeks to make changes to our brain functions. It should be noted that a major difference between cognitive psychology and cultural psychology is their divergent views both on the sources of development and on the nature of knowledge.

4.4 Summary

This comparison between Processability Theory and Sociocultural Theory suggests that each is fundamentally different in regards to language, the source of development, and the role of education/instruction in development. These differences stem from each theory’s philosophical underpinning with regard to the relationship between mind and culture. For Pienemann’s PT, function of the mind primarily reside in the brain, and the brain’s information processing capacity then constrains human development. Development is sequential and cannot be altered by non-cognitive factors. On the other hand, with SCT, function of the mind extends beyond the brain and is always mediated by outside factors. Development is a process of internalizing mediation. These differences between the two theories lead to their different views on the role of instruction in development. The Teachability Hypothesis associated with PT understands instruction as subordinate to cognitive function and as being dependent on a person’s cognitive and developmental readiness. Antithetically, SCT assigns instruction and
education a primary role and understands them as the causes of fundamental changes in
cognitive development because mediational tools are in fact a cognitive factor.

It follows then, that for Vygotsky (1987), schools—sites of education and
instruction—are special places that facilitate cognitive development in ways that the
experiences of everyday life cannot. The next chapter will focus discussion on how
Vygotsky understands instruction and pedagogy to be central to the acquisition and
mastery of scientific knowledge.
Chapter 5

Systemic Theoretical Instruction in Promoting Scientific Concepts

5.1 Everyday Concept vs. Scientific Concept

Vygotsky (1986) distinguished between two types of concepts: everyday concepts and scientific concepts. Everyday concepts can be either spontaneous or non-spontaneous. Spontaneous concepts are usually formed by direct observation of object properties (Kozulin, 1995). They are “the result of generalization of everyday personal experience in the absence of instruction” (Karpov, 2003, p.63). Indeed, spontaneous concepts are heavily empirical and cannot be separated from concrete everyday experiences. They are usually voluntary and are not readily brought to conscious awareness. Our first language grammar is a good example of what Vygotsky would consider everyday concepts. For example, we usually cannot explain why a sentence in our first language follows a specific word order, unless we are explicitly taught the grammar of word order. Different from spontaneous concepts, non-spontaneous concepts can be brought to conscious awareness. Non-spontaneous concepts are taught intentionally and are learned consciously (Lantolf, 2011) through either everyday life or formal education. For example, parents may intentionally teach their children the concept of washing machine by telling the children how to use a washing machine to wash clothes. Although non-spontaneous concepts are usually consciously learned, it does not require deep understanding of the mechanism underlying the concepts in order to use them.
example, one does not need to know the mechanical principles of a washing machine in order to wash clothes. One only needs to understand the procedure of loading the tub, adding soap and selecting an appropriate water temperature to use the washing machine.

Scientific concepts, on the other hand, “represent the generalization of experience of humankind that is fixed in science” (Karpov, 2003, p. 66). In contrast to spontaneous concepts that are based on direct observation of object features, scientific concepts represent essential object features. These features can be abstract and thus may not be directly observable. According to Karpov (2003), acquisition of scientific concepts can transform everyday empirical spontaneous concepts into structured and conscious concepts. As mentioned before, Vygotsky considered formal education as the unique site for development, which differs greatly from development that occurs through everyday experience (Karpov, 2003). For Vygotsky, formal education should not be organized in a way that reflects everyday effortless learning as Herbert Spencer and others suggested (Egan, 2002). Instead, formal education should be properly organized around scientific concepts, which can result in deep understanding and control over objects (Lantolf, 2011).

Vygotsky (1987) pointed out that both spontaneous concepts and scientific concepts have their strengths and weaknesses. Spontaneous concepts are empirical and they lie in the center of our daily life experience (Karpov, 2003). Since they are automatic and spontaneous, they can be accessed without difficulty. However, acquisition of spontaneous concepts usually requires a good deal of practical experience (Karpov, 2003). Moreover, spontaneous concepts lack generalizability and only rarely are transferrable to other unfamiliar circumstances. Spontaneous concepts may be unsystematic, incomplete, and sometimes erroneous (Lantolf, 2011). In contrast,
scientific concepts are systematic, and as accurate and a complete representation of knowledge as possible (Lantolf & Thorne, 2006). Because they are abstract and generalizable, scientific concepts are transferable to other unfamiliar circumstances. Scientific concepts are accessible through consciousness because they are systematically constructed and learned. However, scientific concepts often lack empirical experience on the part of individuals living in the everyday world and therefore may not be connected to personal activities (see Luria, 1976). If scientific concepts are separated from practice, they become what Vygotsky (1986) called pure verbalism, which does not promote significant development. Disconnecting scientific concepts from daily practice is a major problem of school education nowadays (Ilyenkov, 1982).

Vygotskian theory of scientific concepts has laid down the theoretical basis for concept-based teaching. But Vygotsky did not propose pedagogical means for mastering scientific concepts. Following Vygotsky, Gal’perin and Davydov developed pedagogical approaches to enhance the learning of scientific concepts, which are based on a dialectic unity of theory and practice that overcomes pure verbalism and promotes real cognitive development (Arievitch & Stetsenko, 2000).

Gal’perin (1992) proposed systemic theoretical instruction (STI), a stage-by-stage formation of mental actions as an approach to implementing Vygotsky theoretical framework on the importance of scientific concepts for educational development. This approach was developed based on observation of human actions that consist of three stages: orientation, execution and control. Gal’perin’s approach follows a specific sequence of instruction and uses readily-made cognitive tools (orientation schema) to help learners capture the essence of scientific concepts. Following Vygotsky’s proposal
to regard scientific concepts as the minimum unit for school instruction, Davydov developed a pedagogical approach (e.g. 1988a, 1988b, 2004) to teach scientific concepts in order to avoid pure verbalism. Davydov’s approach, known as the movement from the abstract to the concrete (MAC), uses theoretical thinking as an orientation schema in order to connect learners’ activity to the object of study. Instead of being oriented by verbal concepts, students would engage in concrete activities that allow them to understand how scientific concepts are constructed and how these concepts are linked to real world experience.

A major difference between STI and MAC lies in the use of orientation schema. Gal’perin’s approach uses ready-made cognitive schemas as the major educational means to support deep understanding of scientific concepts. After students understand the concepts, STI engages students in practical activities in order to internalize the object of learning. Davydov’s approach, on the other hand, favors human activities as the educational means for learning scientific concepts (Ferreira, 2005). Although there are differences between STI and MAC, both Gal’perin and Davydov followed Vygotsky’s conviction that instruction leads development, which highlights the core argument of the Vygotskian theory: human mind is mediated. Moreover, both approaches follow Vygotsky’s argument that scientific concepts lie at the center of school instruction.

A further discussion of Gal’perin’s approach will be the focus here because the current study employs STI to teach the concept of topicalization in Chinese. The reason for adopting Gal’perin’s STI is because this approach has been proven to be very effective in teaching L2 grammar (e.g. Garcia, 2012; Lai, 2012; Negueruela, 2003). As a majority of our participants were beginning Chinese learners, their vocabulary was very
limited. It may take a long time for these L2 beginning learners to build by themselves a systematic and accurate understanding of the concept to be taught. Using a ready-made orientation schema, or SCOBA (Schema for Orienting Basis of Action) that was systematically developed based on Chinese grammar theory will be effective in helping L2 learners to develop a deep understanding of the target L2 feature.

5.2 Implicit/Explicit Knowledge & Procedural/Declarative Memory

Before entering into further discussion of STI, it is necessary to consider the notions of implicit and explicit knowledge, which are related to everyday knowledge and scientific knowledge. R. Ellis (2008) defined implicit knowledge as “intuitive, procedural, systematically variable, automatic, and thus available for use in fluent, unplanned language use” (p. 418). According to this definition, implicit knowledge is spontaneous and not accessible to consciousness. In this sense, implicit knowledge is somehow similar to spontaneous concepts. L1 grammar is usually a form of implicit knowledge.

Explicit knowledge, on the other hand, is “conscious, declarative, anomalous, and inconsistent… and generally only accessible through controlled processing in planned language use … It is verbalizable, in which case it entails semi-technical or technical metalanguage … It is potentially learnable at any age” (R. Ellis, 2008, p.418). Explicit knowledge can be accessed consciously, and therefore it manifests some characteristics of scientific knowledge/concept. But explicit knowledge does not equal scientific knowledge (Lantolf, 2011). Explicit knowledge can be unsystematic and inaccurate. However, scientific knowledge must be systematic and accurate.
There is controversy about how implicit and explicit knowledge are related to each other. One major disagreement is whether there is an interface between implicit knowledge and explicit knowledge, which allows conversion between the two types of knowledge. Three positions are reflected in the literature: the strong interface position, the weak interface position and the non-interface position (R. Ellis, 2008). The strong interface position, believes that explicit knowledge can directly transform into implicit knowledge with adequate practice. Others, such as N. Ellis (2005), hold the weak interface position. They believe that explicit and implicit knowledge can interact with each other. Explicit knowledge can have an indirect impact on implicit knowledge. R. Ellis (1994, 2006, 2008) also supports the weak interface position and believes that explicit knowledge can convert into implicit knowledge but only when a learner is ready for development (R. Ellis, 2008).

Paradis (2004, 2009) holds the non-interface position. The non-interface position insists that implicit and explicit knowledge have no interface. Paradis present neural evidence to suggest that implicit knowledge and explicit knowledge are supported by two different memory systems: implicit knowledge is supported by the procedural memory system that consists of the frontal lobe, basal-ganglia, parietal lobe and cerebellum circuit (Paradis, 2004); explicit knowledge is supported by the declarative memory system that consists of the medial temporal lobe, the hippocampus, the entorhinal cortex, perirhinal cortex, and parahippocampal cortex (Paradis, 2004). These two neural systems are not connected to each other. Paradis (2009) insisted that explicit knowledge cannot be converted into implicit knowledge because there is no direct neural connection between the two memory systems. For Paradis, implicit knowledge can grow. However, growth of
implicit knowledge is not a result of a direct conversion between implicit and explicit knowledge.

Both the strong and weak interface positions draw evidence from behavioral and performance data. The non-interface position, on the other hand, is supported by neural evidence (e.g. Paradis, 2004). In the case of SLA, Paradis (2004, 2009) suggested that a great deal of L2 (including L2 metalinguistic knowledge) learned through explicit instruction is sub-served by the declarative memory system. The definition of explicit knowledge by R. Ellis (2008) also seems to support the idea that a second language learned after puberty is explicit knowledge because explicit knowledge can be learned at any age while implicit knowledge is learnable within the ‘critical period’ (p.418). Paradis (2004) pointed out that adult learners who have learned an L2 after acquiring their first language rely on conscious metalinguistic knowledge to compensate the lack of implicit competence. Through extensive practice, access to explicit knowledge can speed up, while at the same time, implicit knowledge may grow under the right conditions (Paradis, 2009). To repeat, however, Paradis argues that explicit knowledge cannot directly convert to implicit knowledge. For Paradis, the process of L2 acquisition is fundamentally different from L1 acquisition:

L2 learners have the greatest difficulty acquiring the features that native speakers acquire incidentally and of which they remain unaware for the rest of their lives unless they take a course in Linguistics. Hence, L2 speakers are aware of and learn what can be fairly easily noticed, and they consciously control their performance both in learning and practice. (In other words, they deliberately learn the rules when these are provided in a formal setting, or deduce a set of rules by conscious analogy, induction or deduction, in
addition to memorizing chunks and phrases; they then use these structures consciously."

All of these processes are sustained by declarative memory and are under deliberate control. (Paradis, 2009, p.8)

If Paradis is right, high quality explicit knowledge would be highly important for L2 development. This is because adult L2 learners mainly rely on the declarative memory system to learn and use an L2, which is explicit and accessible to consciousness. In sum, for L2 instruction, the quality of the explicit knowledge is of central pedagogical concern (Lantolf, 2007). Gal’perin’s STI is a pedagogical approach that emphasizes the quality of explicit knowledge. I will provide a brief description of STI below.

**5.3 Gal’perin’s Stepwise Approach**

Systemic Theoretical Instruction (STI), as proposed by Gal’perin, follows a specific sequence of instruction: systematically explaining the concept → materializing the concept → communicative activities → verbalizing the concept → internationalization (source, cited in Lantolf, 2011). This process reflects Vygotsky’s idea that educational development should integrate systematic conceptual knowledge with concrete practical activities (Lantolf, 2011).
5.3.1 The initial stage

The initial phase involves verbally explaining and visually presenting the concepts. Lantolf (2011) suggested that this phase matches nicely with cognitive linguistics theory because it prioritizes meaning and relies heavily on the visual modality.

5.3.2 The materialization stage

As a concept will be better understood by adult learners if the concept is visualized rather than being limited to verbalized explanation (Talyzina, 1981, as cited in Lantolf, 2011), Gal’perin’s notion of SCOBA serves well for the purpose of materialization. Lantolf (2011) pointed out that SCOBA can “systematize relevant knowledge in a holistic way and avoid rote memorization of purely verbal formulations of knowledge” (p.313).

5.3.3 The communication stage

After verbally and visually presenting the concept, the next phase of instruction focuses on communication, during which learners engage in communicative activities in order to apply the concept depicted in a SCOBA to communicative events (Lantolf, 2011). A variety of communicative activities in either written or spoken form can be used to enhance learning.
5.3.4 The verbalization stage

Following the communicative phase, the verbalization phase encourages learners to use the target language in explaining to themselves the concept as well as how the concept can be used in communication. The concept depicted in the SCOBA is brought to the “plane of audible speech” (Gal’perin, 1970), a process that is based on one principle of SCT: language mediates not only social activities but mental behaviors (Lantolf & Thorne, 2006). The process of how language mediates the mental function is what Swain calls “languaging” (e.g. Swain Lapkin, Knouzi, Suzuki, & Brook, 2009).

Based on Vygotskian theory, a number of studies have applied Gal’perin’s pedagogical approach in the L2 domain. It has been found that instruction that emphasizes high quality explicit knowledge promotes long term L2 development. I will provide an overview of studies that apply STI or Concept-Based Teaching to L2 learning below.

5.4 Studies Using STI and CBT on L2 Instruction

STI, different from rule-of-thumb instruction, provides systematic and high-quality concept-based instruction, which is largely overlooked in the empirical studies under PT’s framework. Most studies looking at grammar development under SCT framework usually involve STI, at least to a certain extent.

Early studies that applied STI to teaching L2 grammar were mainly conducted in Europe. Carpay (1974), cited in Lantolf & Thorne, 2006, designed visual diagrams to teach the concept of aspect in Russian to L1 Dutch speakers. When diagrams were
presented, learners were required to verbalize the diagrams. The teaching process followed Gal’perin’s step-by-step approach: visualization, materialization and verbalization. Another study carried out by Gal’perin’s student was reported in van Parreren (1975). This study followed Carpay’s procedure to teach German attribute declension to L1 Russian speakers. The study found positive effects for concept based teaching and supported Carpay’s results: 1) time of instruction was less than traditional instruction; 2) students gained higher accuracy in declining attributive adjectives (cited in Lantolf & Thorne, 2006).

Kabanova (1985) used STI to teach German passive voice to students in a Russian university. One purpose of the study was to raise learners’ consciousness of L2 linguistic categories of voice. The STI instruction spanned 16-17 academic hours. Kabanova constructed different types of visual diagrams for instruction. Using sentence construction and translation tasks, Kabanova compared the performance of learners receiving STI to the performance of learners receiving regular instruction, and found that students taught by STI had similar or even better translation quality as compared with those taught by standard instruction. Since the STI instruction only took a very short period of time, while standard instruction took about 1-2 years, Kabanova showed that STI was more effective for acquisition of some specific grammar features as compared with standard instruction.

Following Gal’perin’s theory to materialize abstract concept, Oboukhova et al. (2002) used an animated cartoon story to teach French past tense and aspect. Computerized activities and materialization of concepts were first presented at the concrete level and later became abstract. A set of questions were given to learners to
explain how French verbs were formed. After all the activities, learners verbalized the concept of aspect. Computer programs were built to provide exercises for learners to explain their understanding of the concepts. These activities helped learners externalize their understanding during the course of learning. Compared with learners who did not receive the instruction, learners receiving STI instruction performed significantly better in a narration task.

One of the major studies that applied STI to teach grammar outside Russia was Negueruela’s (2003) dissertation. Negueruela conducted his study in a fourth semester Spanish class in a major research university in Northern America. He designed a syllabus that reflected three principles of STI: 1) coherent and theoretical conceptual unit; 2) materialization through didactic models; 3) verbalization of concept-based explanations (Negueruela, 2003). Based on these principles, Negueruela taught three grammatical topics in Spanish: tense/aspect, articles, and mood. Negueruela relied on the work of Dwight Bolinger and William Bull to construct a coherent conceptual unit, which served as a complete and sophisticated set of scientific concepts. SCOBA systems were used to materialize complex abstract concepts such as aspect in Spanish. This SCOBA systematically presented information necessary for students to make appropriate grammatical decisions during the act of communicating in Spanish. Students were asked to perform a variety of oral and written activities serving to verbalize the concepts. During the course of study, learners' performance and verbal data showed that learners’ development of the grammatical concepts reflected the internalization process (Lantolf & Thorne, 2006): at the beginning of the study, participants’ knowledge of Spanish verbal aspect relied on a vague rule of thumb that was incomplete and unsystematic. Over time,
the students were capable of providing a systematic definition of the concept of verbal aspect based on the SCOBA and they gradually achieved a clear understanding of the concept. Eventually, the learners were able to explain the grammatical concept without the physical presence of the SCOBA, an indication that they had internalized it.

As pointed out by Lantolf and Thorne (2006), an important contribution of Kabanova, Negueruela, and others is that they demonstrated how our mind is shaped by our cultural environments. Following Gal’perin’s distinction between cognitive consciousness (the perception of reality objectively) and linguistic consciousness (being carried out in real time interaction with others), they showed how our cognitive consciousness is shaped by linguistic consciousness (Lantolf and Thorne, 2006).

Lapkin, Swain and Knouzi (2008) reported a pilot study that investigated how verbalization may help L2 learners enhance understanding of French voice. Lapkin et al. scrutinized “explicit” teaching of voice in French textbooks, which consists mainly of rules-of-thumb. For Negueruela & Lantolf (2006), “explicit” instruction based on rule-of-thumb textbooks are usually incomplete and misleading and thus may fail to promote development. After reviewing the explanations of voice in textbooks (many explanations were noted as being fragmented and misleading), Lapkin et al. established four principles for using French voice and designed a coherent explanation, accompanied by SCOBAAs illustrating the concept. Learners first entered a pretest stage to verbalize their understanding of voice. Then they were presented with the explanations and SCOBAAs along with exemplar sentences illustrating the use of voice in French. In the post-test and the delayed post-test, participants again self-explained the concept of voice presented by highlighted verbs in a text. Analysis of students’ self-explanation/languaging showed that
learners were able to develop a correct and deep understanding of the concept of voice, which highlights Vygotsky’s claim on the importance of speech in facilitating learning.

In fact, with further analysis of the same data, Swain et al. (2009) found that languaging played a crucial role in internalizing concepts, as higher “languagers” were found to have a deeper understanding of the concept of voice than lower “languagers”. In other words, Swain et al. (2009) had established a correlation between quality of performance and quantity of languaging. One issue is that the significant correlation between performance and languaging may not show is that languaging has a causal effect on performance. We still do not know whether languaging leads to better performance or whether learners with better performance are good at languaging.

Lai (2012) applied STI to teach temporal grammar to L2 Chinese learners in a US university. Lai constructed a SCOBAn to visualize the temporal particles of “up” as past and “back” as future in Chinese. A five-day training period based on STI instruction was provided to a group of students in a beginning level Chinese class. Two groups of learners, one from a beginning level class and one from an intermediate level class, were used as control groups because they did not receive STI training. Compared with the beginning level control group, who received traditional instruction on Chinese temporal grammar, learners receiving STI training performed better in a post-test on a narrative writing task, and there was no difference between the STI group and intermediate level group, which had greater exposure and instruction on temporal grammar than did the students in the experimental class. This result suggested that the STI is effective in helping L2 Chinese learners to acquire temporal features of the language.
5.5 Summary

Vygotsky argued that schooling should be organized around scientific concepts, which differ from everyday concepts in a fundamental way. According to Vygotsky (1986), teaching in school should not resemble children’s everyday learning experience, which is in contrast to Spencer, Dewey and Piaget (Egan, 2002), who argue that school instruction must take account of children’s so-called natural learning processes. The unit of instruction in schooling, for Vygotsky, should be scientific concepts rather than everyday concepts.

Following Vygotsky, Gal’perin and Davydov formulated special pedagogical interventions to promote the internalization and use of scientific concepts. Empirical evidence showed that Systemic Theoretical Instruction and Concept-Based Teaching can effectively provoke L2 development. But STI and CBT must rely on an accurate system of scientific knowledge. The pedagogical explanations and the SCOBAs that provide a systematic and accurate description of the concept of topicalization in Chinese are presented in the following chapter.
Chapter 6
Topic and Subject in Chinese and the SCOBAs

6.1 The Topic-comment account of Chinese

Li and Thompson (1981) viewed Chinese as a topic-prominent language: “the description of Mandarin [Chinese] must also include the element ‘topic’ ” (p.15). According to Li and Thompson, Topic of a sentence refers to what the sentence is about, which is usually given in the initial position of the sentence. “It always refers to something about which the speaker assumes the person listening to the utterance has some knowledge” (p.15). Chafe (1976) pointed out that the Topic sets the personal, spatial or temporal framework for a sentence. The rest of the sentence functions as the comment that describes the Topic.

Li and Thompson pointed out that the syntax or word order of a sentence in Chinese is mainly governed by semantic information, rather than by grammatical function. In fact, it has been argued that “the grammatical meaning of Subject and predicate in a Chinese sentence is topic and comment, rather than actor and action” (Chao, 1968, p.69). To illustrate the idea, Example 5.1 has NP+NP+verb+NP structure, a special structure containing two Subjects.
Example 6.1.

na       pingguo     wo       xue      pi       le
那       苹果       我       削       皮       了
that     apple       I       peel      skin          ASP(aspect marker)
I have peeled the apple

It is difficult to use the actor-action approach to describe Example 6.1. The sentence is better described using the topic-comment orientation. The first NP “pingguo, apple” is the Topic of the sentence and the rest of the sentence describes what happened to the topic. The topic-comment approach is a widely adopted in analyzing Chinese syntax (Li & Thompson, 1981).

Due to the importance of the Topic in Chinese, the Topic of a sentence is usually placed in initial position. Indeed, the initial position of a sentence in Chinese is usually the focus, the semantic information of which may vary according to the purpose of a speaker. In other words, different sentence constituents (such as Subject, Object or Adverbial Phrase) may take up the initial position (the Topic of a sentence) as the constituent to be brought into an interlocutor’s focus. The topic-prominent characteristic of Chinese makes the word order of the language flexible.

6.2 Word Order in Chinese

The canonical structure of Chinese is Subject + Verb + Object (SVO) structure because the SVO structure was found to be the most frequent sentence structure in Chinese in written and spoken discourses (Li & Thompson, 1981). Keep in mind
however, that unlike in a language such as English, the SVO order is not syntactic, but reflects a typical topic-comment order, as illustrated in example 6.2.

Example 6.2.

women wan youxi
我们玩游戏
we play games
We play games

In example 6.2, *women* ‘we’ is the Subject and it occupies the prominent, or Topic position, of the sentence. So, for the SVO structure, the emphasis is the Subject. If a time phrase and/or a locative phrase are to be included in a SVO sentence, they are usually placed in preverbal position and the sentence structure becomes S+XP+VO, as in example 6.3:

Example 6.3.

women zaoshang zai xueyiao wan youxi
我们早上在 学校 玩 游戏
we morning at school play games
We play games at school in the morning.

In Example 6.3, the topic position is occupied by the Subject and the Subject is in focus. In some situations, however, the topic position may be occupied by a verb. In such a case, the Subject is omitted, an option not usually permitted in a syntactic SVO
language such as English. The sentence structure becomes V(O) or Adverbial +V(O). An example is given below in example 6.4:

Example 6.4.

Chi  guo  le  
吃  过  了  
eat  ASP  ASP  
Have eaten.

In this case, the sentence means “I have eaten the apple”, depending on what precedes the utterance in the discourse domain.

The topic position can also be occupied by adverbial phrases such as a time phrase or a locative phrase. The structure of the sentence becomes: Adjunct + Subject + Verb + Object (ADJ.+SVO). In example 6.5, the time phrase is placed at the head of the sentence and zaoshang ‘morning’ becomes the focus of the sentence. In example 6.6, the locative phrase occupies the Topic position and location is brought into focus.

Example 6.5.

zaoshang  women  zai  xuexiao  wan  youxi  
早上  我们  在  学校  玩  游戏  
morning  we  at  school  play  games  
We play games at school in the morning.
Example 6.6.

In the morning, we play games at school.

Besides adverbial phrases, the Object can also appear in topic position. The structure of the sentence then becomes Object + Subject + Verb (OSV). Example 6.7 illustrates this structure. Similar to SVO, OSV can also contain time phrases and locative phrases, which are also placed before the verb. An example is given in Example 6.8.

Example 6.7.

I have eaten the apple.

Example 6.8.

I have eaten the apple at school this morning.
Beside SVO structure, there is another high frequency-word order structure in Chinese: SOV. In a SOV sentence, the Object is placed between the Subject and the verb. Example 6.9 gives a simple SOV sentence.

Example 6.9.

他钥匙丢了
he key lost
He lost his key.

Different from the OSV structure that focuses on the Object, the focus of a SOV structure is the verb (Ho, 1993) as the verb describes what has happened to the Object. In this sense, the SOV structure is also different from the SVO because the focus of the SVO is the Subject.

Besides the simple SOV structure, there is a special type of SOV structure: the so-called ba-construction (a relatively complex structure in Chinese). In fact, the ba-construction is unique to Chinese. The basic structure of the ba-construction is: Subject + (ba + NP) + VP. In the ba-construction, the Subject occupies the traditional Topic position. The Object NP occurs before the VP and particle ba- is inserted. An example of the ba-construction is given below:
Example 6.10.
he  ba  clothes  wash  ASP
He washed the clothes.

Since the word order of a Chinese sentence is largely governed by meaning rather than by grammatical functions (Li & Thompson, 1981), the structure of the *ba-* construction can be described using the topic-comment orientation (e.g., Chen, 1983; Tsao, 1987). Accordingly, a sentence with the *ba-* construction can be broken into two parts: the Topic and the comment. Generally speaking, the *ba-NP* is the Topic. The VP is the comment. In Example 6.10, the *ba-NP* “yifu, clothes” is the topic and the verb “xi, wash” is the comment that explains what has happened to the clothes. In this sense, the *ba-*construction is similar to the SOV in that the comment, being described by the verb, becomes the focus of the sentence.

### 6.3 The Topic Hypothesis and Topic-Comment Approach

The “topic-prominent” feature of Chinese seems to match nicely with the Topic Hypothesis. Connecting features of Chinese word order to the Topic Hypothesis, Zhang (2007) formulated three L2 developmental stages for Chinese syntax. Because the SVO structure is the most prominent structure in Chinese, it is regarded as the canonical structure. According to PT, at the second developmental stage, learners can produce the canonical structure of a language. Therefore, the SVO structure is placed at the second
stage of development. The third stage contains the ADJ+SVO structure, in which the initial sentence position is occupied by an adverbial phrase such as a time phrase or a locative phrase. The fourth stage is the OSV stage. At this stage, learners can place the Object in the Topic position of a sentence. The SOV was also placed at the fourth stage because the object was topicalized, which deviate from the linear alignment of the SVO structure (Zhang, 2007). Gao (2009) and Wang (2011) extended the hierarchical stages by including a fifth stage: the ba-construction stage.

How the ba-construction is regarded as the fifth stage structure is explained by Bender (2000), who viewed the ba-construction as a topic-comment structure. Example 6.11 and Figure 6.1 describe how the ba-NP as the Topic is realized through “the functional control of the f-structure” using LFG (Bender, 2000, p. 127):

Example 6.11.

\[
\begin{align*}
\text{ta} & \quad \text{ba} & \quad \text{wan} & \quad \text{dapo} & \quad \text{le} \\
\text{他} & \quad \text{把} & \quad \text{碗} & \quad \text{打破} & \quad \text{了} \\
\text{ta} & \quad \text{ba} & \quad \text{bowl} & \quad \text{break} & \quad \text{ASP}
\end{align*}
\]

He broke the bowl.
The f-structure:

```
PRED 'ba <(SUBJ)(OBJ)(COMP)>'
SUBJ 'ta'
OBJ 'wan'
COMP PRED 'dapo<(SUBJ)(OBJ)>'
  SUBJ 'wan'
  OBJ 'wan'
  Topic
```

Figure 6.1. The f-structure of Example 6.10.

Bender treated the *ba*-NP as the Topic and the *ba*-VP as the complement of the predicate. According to LFG, the *ba*-construction involves movement of the Object to preverbal position. Inversion of the predicate and the Object calls for feature unification, which generates information exchange between the Object and the predicate at the sentence level. In Figure 6.2, the *ba*-NP is the Object and the topic that are the complement of the verb. According to Gao (2009), information exchange involved in the *ba*-construction is a second stage of the S-procedure (the stage that requires information exchange between clauses). In other words, inversion of the Object and the predicate in the *ba*-construction requires information exchange within a sentence: “further development of grammatical functions consolidates the constituent boundaries within a sentence and allows information exchange between internal constituents” (Gao, 2009, p.162).
The f-structure:

```
[ PRED 'ba<(SUBJ)(OBJ)(COMP)>'
 SUBJ 'ta'
 OBJ 'wan'
 COMP [ PRED 'dapo<(SUBJ)(OBJ)>'
 SUBJ 'wan'
 OBJ 'wan'
 Topic ] ]
```

Figure 6.2. The f-structure and the *ba*-construction.

Based on Gao’s argument, the four stages of L2 Chinese syntactic processing are:
Stage 2: SVO → Stage 3: ADJ+SVO → Stage 4: OSV → Stage 5: the *ba*-construction (also see Table 6.1).

Table 6.1. An extension of L2 Chinese developmental stages.

<table>
<thead>
<tr>
<th>Stages</th>
<th>Processing Procedure</th>
<th>Information Exchange</th>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>S-bar procedure</td>
<td>Main and sub-clause</td>
<td><em>The ba-construction</em></td>
</tr>
<tr>
<td>4</td>
<td>S-procedure</td>
<td>Inter-phrasal information</td>
<td>Topicalization: OSV, SOV</td>
</tr>
<tr>
<td>3</td>
<td>Phrasal procedure</td>
<td>Phrasal information</td>
<td>XP SV(O): adv-fronting</td>
</tr>
</tbody>
</table>
|        |                      |                      | *Adverbial*
|        |                      |                      | *Subordinate clause*
|        |                      |                      | *Wh-adverbial* |
| 2      | Category procedure   | Lexical morphology   | Canonical SV(O): *
|        |                      |                      | *Declarative*
|        |                      |                      | *Interrogative* |
| 1      | Word/Lemma           | Words                | Formulaic expressions |

Note: Adapted from Gao (2009) and Wang (2011).
6.4 Materialized and Material Mediations

6.4.1 Materialized mediation: Schema for the Orienting Basis of Action

Following the topic-comment approach to Chinese word order, schema for the orienting basis of action (SCOBA) were used to help learners visualize the function of topicalization: to focus the Topic. Because the Topic can be the Subject, the Object or an adverbial phrase, two SCOBAs were developed. Both SCOBAs are animated schemas that contain pictures and words.

The first SCOBA introduces the OSV structure by showing the movement of the Object from its canonical position to the Topic position. In this SCOBA, pictures and words in SVO order would be shown to learners in the first session of instruction (see Figure 6.3). As shown in Figure 6.3, the picture of “a strong man” represents the Subject “HE”. The picture of “a cat with an opened mouth and fingers pointing at the mouth” represents the verb “ATE”. The picture of “a bowl of rice” represents the Object “RICE”. The corresponding Chinese and English vocabulary items are given below the pictures. These vocabulary items are contained in colored blocks. The green color represents the Subject. The blue color represents the verb and the yellow color represents the Object. These colors are intended to provide extra visual information to help learners internalize the schema.
Figure 6.3. The first SCOBA (animation snapshot-1).

After the pictures and words are shown, the verbal explanation of the concept is prompted at the top right corner of the SCOBA: “In Chinese, if we want to emphasize what has been eaten, you can also do this:” (see Figure 6.4). The word “emphasize” is in red because the pragmatic function of topicalization is to emphasize the Topic.
In Chinese, if we want to emphasize what has been eaten, you can also do this:

![Example](image)

Figure 6.4. The first SCOBA (animation snapshot-2).

After the verbal explanation is shown, the picture of “a bowl of rice” moves to sentence initial position (Figure 6.5). It should be noted that all movement in the SCOBA are animated, which are intended to attract learners’ attention and help them visualize the concept of topicalization. After the picture of “a bowl of rice” moves, the word “rice” then moves to initial position (see Figure 6.6).
Figure 6.5. The first SCOBA (animation snapshot-3).

Figure 6.6. The first SCOBA (animation snapshot-4).
The second SCOBA focuses on the ADJ+SVO structure. It shows movement of an adverbial phrase. This SCOBA first shows a longer canonical SVO sentence with both time and location included. Similar to the first SCOBA, both pictures and words are used. In Figure 6.7, the Subject, the Verb and the Object are the same as in the first SCOBA. The picture of a clock is used to represent the time phrase and the picture of a house represents the locative phrase. The order shown in the picture is to introduce the canonical position of the adverbial phrases. In fact, the time phrase and the locative are most often placed between the Subject and the Verb. The insertion of time and/or location into a sentence does not alter the canonical SVO order.

Figure 6.7. The second SCOBA (animation snapshot-1).
Below the pictures English and Chinese words are given in the colored blocks. Similar to the first SCOBA, the Subject is in a green block, the verb is in a blue block and the Object is in a yellow block. The time phrase is in a beige block and the locative is in a red block. At the top right corner of the SCOBA, verbal explanation of the topicalization concept is also given: “In Chinese, we can place different parts of the sentence (except the verb) at the beginning of a sentence”.

After the verbal explanation is given, the time phrase moves to the Topic position (Figure 6.8). The movement visually demonstrates that the time phrase can be moved to sentence initial position in order to emphasize the time when the event takes place.

![Figure 6.8. The second SCOBA (animation snapshot-2).](image)

After showing movement of the time phrase, the phrase returns to its original position. Then the locative phrase moves to the Topic position (see Figure 6.9). The
movement visually demonstrates that a locative phrase can be moved to focal position of a sentence in order to emphasize the location where the event occurs.

Figure 6.9. The second SCOBA (animation snapshot-3).

After the animated topicalization of the locative phrase, the adverbial phrase of location returns to its original position. The next animated movement shows the movement of the Object to initial position (Figure 6.10). Although the sentence in the second SCOBA is longer as compared to the example in the first SCOBA, the pragmatic function is the same: to emphasize the Topic.
6.4.2 Material mediation: Cuisenaire rods

Cuisenaire (colored) rods are also given to participants to practice the topicalization structure. Each rod, with its special physical length and color, was used to represent different sentence constituents. In Figure 6.11, for example, the green rod represents the Subject, the blue rod represents the verb, and the yellow rod represents the Object. The red rod represents the locative phrase and the beige rod represents the time phrase. These rods also have different length. The long blue rod is used to represent the verb, which is like an anchor that does not move. The shorter rods, which are used to represent the time and location, have more freedom to move.
The purpose of the rods is to help learners master the concept of topicalization. They are encouraged to play with the rods and in this way physically experience repositioning the constituents of a sentence. These real material schemas have been proven to be very effective in supporting grammar learning (Negueruela, 2003). Using the rods for instruction has another purpose: by observing how learners use the rods during the instruction session, it is also possible to observe whether the process of higher mental function of learning an L2 grammar follows this trajectory: from object-regulated mental activities to self-regulated mental activities (Lantolf and Thorne, 2006) by recording how the participants use the rods to support their language production over time.

Figure 6.11. Cuisenaire rods representing the concept being taught

6.5 Summary

This chapter provides an overview of Chinese word order and how this was presented to the learners who participated in the study. As Chinese can be regarded as a topic-prominent language (Li & Thompson, 1981), the topic position has an important pragmatic function. The sentence-initial position is normally the site where the topic is
situated. This position can be occupied by the Subject, an adverbial phrase (e.g. time phrase) or the Object. Based on LFG and the typological features of Chinese, it has been proposed that there are four hierarchical stages of syntax development. These developmental stages were tested and confirmed by Gao (2009), Wang (2011), and Zhang (2007).

Based on the topic-comment approach, two SCOBAs were developed to show the pragmatic function of topicalization. Cuisenaire rods were also used to allow learners to deepen their understanding of the concept of topicalization. Both the SCOBAs and the rods were important components of the instructional approach which was designed to provoke a different developmental route from the one predicted by the Topic Hypothesis.
Chapter 7

Study 1

7.1 Methodology

7.1.1 Purpose

Piaget and Vygotsky hold different positions regarding the role of instruction. Piaget sees instruction as a subordinate factor that follows the steps of development. On the other hand, Vygotsky regards instruction as the very leading factor that promotes development. Following Piaget (Pienemann, 1987), Pienemann (1998) insists that instruction cannot reverse or skip the developmental sequence laid out by PT. The theory makes specific predictions of L2 development and these predictions are testable. For this reason, PT is a good testing ground for evaluating the respective claims of Piaget and Vygotsky.

The main purpose of this study is to test the claims of the Teachability Hypothesis. To do so, it is necessary to choose a sequence pre-specified by PT. The current study adopts L2 Chinese developmental sequence predicted by the Topic Hypothesis (the sequence is given below). Because a discussion of the Topic Hypothesis has been given in Chapter 2, I will not repeat it here.
Stage 2 (SVO): TOP = SUBJ: TOP\textsubscript{subj} V(O)

  e.g. The boy ate an apple.
  TOP=SUBJ V OBJ

Stage 3 (Adv+ SVO): TOP = ADJ: TOP\textsubscript{adj} SV(O)

  e.g. Yesterday the boy ate an apple.
  TOP=ADV SUBJ V OBJ

Stage 4 (OSV): TOP = OBJ: TOP\textsubscript{obj} SV

  e.g. An apple, the boy ate.
  TOP=OBJ SUBJ V

7.1.2 Instruments

Five different types of tasks were used in the current study to test the Teachability Hypothesis. They include three speech production tasks, a grammaticality judgment task and two cognitive ability tasks to assess working memory and cognitive control.

The Grammaticality Judgment Task

The GJT was administered orally rather than in written form. Sixty sentences with grammar structures at Stage 2, Stage 3 and Stage 4 (with 20 sentences at each stage), thirty ungrammatical sentences and twenty distracter sentences were read twice to the participants. The sentences were randomly presented. Participants were required to
decide whether each sentence was acceptable or not within 3 seconds after each sentence was read. If no judgment was made within 3 seconds, the next stimulus was presented.

The Elicited Imitation Task

In this task, participants first listened to three different sentences read in a row. A question about the content of the three sentences was then asked. This was intended to reduce the possibility that the participants would be able to memorize the sentences by rote memory. Afterward, participants were required to repeat the three sentences. In order to avoid rote memory, the target structures (OSV and ADJ+SVO) were always presented in the middle sentences of each three-sentence sequence.

Three versions of tests were developed to be used in the elicited imitation task. The first battery was used in the pretest and the delayed post-test. The second version was used in post-test-1 and the third version was used in post-test-2. There were 72 sentences in the first version. Forty-eight sentences contained the SVO structure; twelve contained ADJ+SVO, and twelve contained the OSV structure. Both the second and the third version contained 60 sentences. Forty sentences contained the SVO structure. Ten contained the ADJ+SVO structure and 10 contained the OSV structure.

Since participants in this study were beginning Chinese learners, their vocabulary size was restricted. The elicited imitation tests were constructed on the basis of the participants’ vocabulary size based on their Chinese level in order to avoid the problem that too many unknown words would hinder comprehension. A list of Chinese words was selected from the first 11 chapters of the textbook that had been covered in their regular Chinese classes. This list together with their Pinyin and their English translation was
given to the participants to identify words that they recognized. Only words recognized by most of the participants (no less than 70%) were used to construct the elicited imitation tests.

The three versions of EI were administered to five native Chinese speakers. It was predicted that native Chinese speakers would be able to process and reproduce the target structures. The results supported the prediction as all five native Chinese speakers were able to reproduce the target structures consistently.

The Cartoon Description Task

Five short silent clips from the Tom & Jerry cartoon were selected. Each clip lasted for about 1 minute. Participants watched each clip twice before describing the events in the clip. If participants produced a small number of sentences, either questions or hints would be raised to elicit more spontaneous speech.

The Question & Answer Task

Participants were asked to answer in Chinese five to ten questions. All questions were read in English in order to avoid comprehension problems (see examples below). The Cartoon description and the Q&A tasks are considered to be valid elicitation with regard to spontaneous speech samples (see Pienemann, 2011). The elicited imitation task may be questioned by some as a valid measure of spontaneous performance, however, it was used in the Teachability study carried out by Zhang (2007). Moreover, EI has been frequently used in L2 studies to elicit specific structures (see Flynn, 1987) involves sentence comprehension, which is associated with a number of factors such as memory.
and vocabulary. Cartoon description and Q&A are less sensitive to the influence of these factors.

**Sample Questions:**

Can you tell me something about your country?

Can you tell me something about your family?

What do you usually do at home?

Where do you usually study Chinese?

When did you eat lunch today?

What movie do you like most? Can you describe it?

Tell me something about your roommate.

**The Letter-Number Sequencing Task**

Two letter-number sequencing tasks, one in English and one in Chinese, were used to measure the participants’ working memory capacity. A participant would listen to a mixed sequence of numbers and letters (e.g. K-9-4-W-S) and rearrange the sequence by first entering the numbers in numeric order and then the letters in alphabetic order (e.g. 49KSW). In the Chinese version, numbers are read in Chinese and letters in English. In the English task, both numbers and letters are read in English. Administering the letter-number sequencing task did not serve to test the claims of the PT. However, these two tasks may allow us to investigate whether instruction will be effective in helping learners with different cognitive ability to internalize the target grammar structure. In other words, information obtained from these two tasks would be useful to evaluate whether
instruction can help participants who might have small working memory learn the target grammar structure.

The interview at the end of the study

An interview was also arranged at the end of the study. The interview was conducted in English and was designed to elicit learner attitudes toward the instructional procedures used in the study. All questions in the interview are given below:

1) What did you learn in the study?

2) Can you describe the sentence structure you have learned in the study? Why do you use that structure?

3) Did you know the sentence structures before you took part in the study?

4) How did you learn the sentence structures?

5) Do you think the method we applied (e.g. the color rods, the visualized PPT) in the current study useful or helpful for you to learn the sentence structure?

6) If it helped, how did the PPT or the color rods help you? Describe the process through which you learned the sentence structure?

7) Which grammar structure is more difficult for you? Or do they have equal difficulty?

8) In your daily life conversation, did you use the sentence structure that you have learned in the study? Can you give me some examples?
7.1.3 Participants

The current study limited the range of participants to those Chinese learners who could process only Chinese SVO structure. To identify qualified participants, the textbooks and syllabi of Chinese courses offered at Penn State University were collected. In addition, I conducted conversations with the Chinese instructors in order to obtain information on the types of grammar structures covered at each level in the Chinese language program. Based on the information collected, learners at the beginning level (Chinese 001) would be suitable to take part in the study because they had studied some Chinese vocabulary and had encountered only the SVO structure in the Chinese classes. Six qualified participants were selected for this study. All of them were first year college students between 18 and 19 years of age. All of them were L1 English speakers. Both ADJ+SVO and OSV were completely new to these participants when they took part in the study. Each participant received 60 dollars for taking part in the study. Following the IRB procedures, all participants signed a consent form before they took part in the study.

7.1.4 Procedure

At T1, participants received the pre-test, which consisted of an elicited imitation task, a Q&A task, a cartoon description task and a grammaticality judgment task. One to two days later, they received the first instruction section that taught the OSV structure. One week afterward, participants received post-test-1 that consisted of an elicited imitation task, a Q&A task, and a cartoon description task. Immediately after post-test-1, participants took part in the second instructional session, which focused on the
ADJ+SVO structure. One week later, they took post-test-2 that included an elicited imitation task, a Q&A task, a cartoon description task, two letter-number sequencing tasks (one in Chinese one in English). Immediately after post-test-2, participants took part in the third instruction session aimed at helping them practice the new structures. One month after post-test-2, participants took the delayed post-test, which included an elicited imitation task, a Q&A task, a cartoon description task, and a grammaticality judgment task.

7.2 Results

7.2.1 The grammaticality judgment task (GJT)

It should be emphasized that the GJT task was a timed judgment task and it was delivered in an oral rather than written format. Participants were required to judge each sentence within a limited period of time. The main purpose of this timed task was to force learners to make a quick judgment without much thinking.

Since the GJT required participants to make simple “yes/no” judgments, there would be some measurement errors. Assume, for instance, that the OSV structure is not in a learner’s grammatical system; under this circumstance it would not be surprising that some OSV sentences would be judged as grammatical. Therefore, a low acceptance rate or a high rejection rate would suggest that the OSV structure is unlikely to be present in the grammar. The current study used an acceptance rate of between 0% and 30% and a rejection rate between 70% and 100% to decide whether a grammar structure was or was
not in a participant’s L2 linguistic system. For example, if a participant accepted 10% OSV sentences and rejected 70% OSV sentences, there was a high possibility that the OSV structure was not in the learner’s grammar.

The results of the GJT tasks are given in Tables 7.1 through 7.6. Regarding the OSV structure in the pre-test, all participants, except Myla, had a low acceptance rate of 10% - 20%. They also had a high rejection rate between 60% and 80% (except for Myla and Eller). Eller had a relatively low rejection rate of 30%; but she failed to response to 50% of the OSV sentences. The GJT task in the pre-test suggested that the OSV structure was new to these learners.

Regarding the ADJ+SVO sentences, four participants had a low acceptance rate of between 10% to 25%, suggesting that these four participants regarded ADJ+SVO as an unacceptable sentence structure. Myla and Eller had a relatively high acceptance rate. We will discuss Myla’s performance on the GJT a bit later. Eller had an acceptance rate of 55%. In fact, Eller produced a couple of ADJ+SVO sentences in the speech production tasks in the pre-test, suggesting that the ADJ+SVO structure might be processable for her. Indeed, at the end of the study Eller mentioned that her Chinese teacher had told her that adverbial phrases could be placed sentence initial position. This explained Eller’s relatively high acceptance rate of ADJ+SVO sentences.

Regarding the SVO structure, the acceptance rate of all the participants ranged between 50% and 90%. The rejection rate ranged between 10% and 30% (John had a rejection rate of 40%). This pattern suggested that the participants accept SVO sentences as grammatical.
Myla seemed to be an exceptional case. She accepted 40% of the OSV sentences but she also rejected 40% of the sentence containing this structure. She had an acceptance rate of 45% and a rejection rate of 30% for the ADJ+SVO sentences. She also had a 50% acceptance rate and a 30% rejection rate on the SVO sentences. Acceptance rate of all three types of sentence structures was around 50%. In fact, Myla also had a 47% acceptance rate on ungrammatical sentences. Because the acceptance rate of both grammatical and ungrammatical sentences was around chance (50%) there was a high possibility that she was guessing rather than making appropriate judgments.

To summarize the result, the GJT indicated that all participants could process the canonical SVO structure. The OSV structure was new to most of the participants (no conclusion could be made for Myla at this point). The ADJ+SVO structure was completely new to at least four of the participants.

Comparing the GJT result on the pretest with the GJT result on the delayed post-test (Table 7.1 ~ Table 7.6), significant progress was reflected in the learners’ performance following the instruction. The acceptance rate for the OSV structure and the ADJ+SVO structure increased dramatically. Leo accepted 40% OSV sentences and 90% ADJ+SVO sentences as grammatical. Alisa accepted 70% of the OSV sentences and 100% of the ADJ+SVO sentences. John accepted 50% of the OSV sentences and 80% ADJ+SVO sentences. Amy accepted 30% of the OSV sentences and 80% ADJ+SVO sentences. Eller accepted 80% of both the OSV sentences and the ADJ+SVO sentences. Compared with the acceptance rates of the GJT in the pre-test, the acceptance rate in the delayed post-test was fairly high. Acceptance rate of the SVO sentences also increased significantly: four participants had an acceptance rate above 85%.
Table 7.1. GJT results for Leo.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Acce</th>
<th>unacc</th>
<th>Unanw</th>
<th>Acc%</th>
<th>acce</th>
<th>unacc</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>10%</td>
<td>2</td>
<td>12</td>
<td>6</td>
<td>40%</td>
<td>8</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ SVO</td>
<td>20</td>
<td>20%</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>90%</td>
<td>18</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>60%</td>
<td>12</td>
<td>6</td>
<td>2</td>
<td>100%</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc%=accurate rate
Accep = number of accepted sentences
Unacc= number of unaccepted sentences
Unanw = number of unanswered sentences

Table 7.2. GJT results for Alisa.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Acce</th>
<th>unacc</th>
<th>Unanw</th>
<th>Acc%</th>
<th>acce</th>
<th>unacc</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>20%</td>
<td>4</td>
<td>16</td>
<td>0</td>
<td>70%</td>
<td>14</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ SVO</td>
<td>20</td>
<td>25%</td>
<td>5</td>
<td>15</td>
<td>0</td>
<td>100%</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>70%</td>
<td>14</td>
<td>6</td>
<td>0</td>
<td>70%</td>
<td>14</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc%=accurate rate
Accep = number of accepted sentences
Unacc= number of unaccepted sentences
Unanw = number of unanswered sentences

Table 7.3. GJT results for John.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Acce</th>
<th>unacc</th>
<th>Unanw</th>
<th>Acc%</th>
<th>acce</th>
<th>unacc</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>15%</td>
<td>3</td>
<td>15</td>
<td>2</td>
<td>50%</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ SVO</td>
<td>20</td>
<td>10%</td>
<td>2</td>
<td>14</td>
<td>4</td>
<td>80%</td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>50%</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>85%</td>
<td>17</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc%=accurate rate
Accep = number of accepted sentences
Unacc= number of unaccepted sentences
Unanw = number of unanswered sentences
Table 7.4. GJT results for Myla.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Accep</th>
<th>unaccep</th>
<th>Unanw</th>
<th>Acc%</th>
<th>accep</th>
<th>unaccep</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>40%</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>90%</td>
<td>18</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ SVO</td>
<td>20</td>
<td>45%</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>40%</td>
<td>8</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>50%</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>80%</td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc% = accurate rate
Accep = number of accepted sentences
Unaccep = number of unaccepted sentences
Unanw = number of unanswered sentences

Table 7.5. GJT results for Amy.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Accep</th>
<th>unaccep</th>
<th>Unanw</th>
<th>Acc%</th>
<th>accep</th>
<th>unaccep</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>15%</td>
<td>3</td>
<td>16</td>
<td>1</td>
<td>30%</td>
<td>6</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ SVO</td>
<td>20</td>
<td>25%</td>
<td>4</td>
<td>10</td>
<td>6</td>
<td>80%</td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>70%</td>
<td>14</td>
<td>6</td>
<td>0</td>
<td>90%</td>
<td>18</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc% = accurate rate
Accep = number of accepted sentences
Unaccep = number of unaccepted sentences
Unanw = number of unanswered sentences

Table 7.6. GJT results for Eller.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Accep</th>
<th>unaccep</th>
<th>Unanw</th>
<th>Acc%</th>
<th>accep</th>
<th>unaccep</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>20%</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>80%</td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ SVO</td>
<td>20</td>
<td>55%</td>
<td>11</td>
<td>6</td>
<td>3</td>
<td>80%</td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>90%</td>
<td>18</td>
<td>2</td>
<td>0</td>
<td>100%</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc% = accurate rate
Accep = number of accepted sentences
Unaccep = number of unaccepted sentences
Unanw = number of unanswered sentences
7.2.2 Development of Processability

Pre-test results

The performance of each participant in the speech production tasks is summarized in Tables 7.7 to 7.12. The pre-test showed that all six participants could process and produce SVO structures. All sentences produced by the participants (except Eller) across the speech production tasks were of the SVO category.

Table 7.7. Speech production on the pre-test, post-tests and delayed post-test (Leo).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test-1 (T2)</th>
<th>post-test-2 (T3)</th>
<th>delayed post-test (T4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ + SVO</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>40</td>
<td>37</td>
<td>50</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ + SVO</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>21</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ + SVO</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>11</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>SUM</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>25</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ + SVO</td>
<td>0</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>72</td>
<td>67</td>
<td>78</td>
</tr>
</tbody>
</table>
### Table 7.8. Speech production on the pre-test, post-tests and delayed post-test (Alisa).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test-1 (T2)</th>
<th>post-test-2 (T3)</th>
<th>delayed post-test (T4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>45</td>
<td>40</td>
<td>38</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>19</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>8</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>SUM</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>72</td>
<td>52</td>
<td>57</td>
</tr>
</tbody>
</table>

### Table 7.9. Speech production on the pre-test, post-tests and delayed post-test (John).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test-1 (T2)</th>
<th>post-test-2 (T3)</th>
<th>delayed post-test (T4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>44</td>
<td>40</td>
<td>52</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>13</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>SUM</td>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>77</td>
<td>72</td>
<td>69</td>
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</tbody>
</table>
Table 7.10. Speech production on the pre-test, post-tests and delayed post-test (Amy).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test-1 (T2)</th>
<th>post-test-2 (T3)</th>
<th>delayed post-test (T4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>10</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>1</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>21</td>
<td>42</td>
<td>48</td>
<td>53</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>6</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>19</td>
<td>7</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>9</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>8</td>
<td>10</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>SUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>25</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>1</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>48</td>
<td>59</td>
<td>77</td>
<td>79</td>
</tr>
</tbody>
</table>

Table 7.11. Speech production on the pre-test, post-tests and delayed post-test (Myla).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test-1 (T2)</th>
<th>post-test-2 (T3)</th>
<th>delayed post-test (T4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>1</td>
<td>8</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>2</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>44</td>
<td>38</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>9</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>10</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>9</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>SUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>1</td>
<td>26</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>3 top=ADJ</td>
<td>ADJ +SVO</td>
<td>0</td>
<td>2</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>73</td>
<td>56</td>
<td>61</td>
<td>60</td>
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</tbody>
</table>
Table 7.12. Speech production on the pre-test, post-tests and delayed post-test (Eller).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test-1 (T2)</th>
<th>post-test-2 (T3)</th>
<th>delayed post-test (T4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td>OSV</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>ADJ+SVO</td>
<td>3</td>
<td>3</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>55</td>
<td>33</td>
<td>43</td>
<td>52</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>OSV</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>ADJ+SVO</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>25</td>
<td>9</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td>OSV</td>
<td>0</td>
<td>9</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>ADJ+SVO</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>18</td>
<td>6</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>SUM</td>
<td>OSV</td>
<td>1</td>
<td>21</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>ADJ+SVO</td>
<td>3</td>
<td>3</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>98</td>
<td>48</td>
<td>64</td>
<td>105</td>
</tr>
</tbody>
</table>

The elicited imitation task showed that both the ADJ+SVO structure and the OSV structure were not “processable”. When encountering ADJ+SVO sentences, participants could not reproduce the complete sentence. In some cases, they omitted the adverbial phrases; in others they produced incomprehensible sentences; and in some cases they produced the adverbial phrase but located it in the sentence-final or preverbal positions. When encountering the OSV structure, in most cases participants could not produce a comprehensible sentence. In other cases, they would confuse the object with the subject. As a result, they would switch the position of the subject and the object. Excerpts 7.1 and 7.2 include examples produced by John and Amy.
Excerpt 7.1: Examples of John’s performance on the EI in the pre-test:

The interlocutor read (the three sentences were read in a row):

李老师 给 我 一本 书，
Mr. Li gave me a book.

李老师 给 我 一本书，
Mr. Li gave me a book.

李老师 喜欢 一本书，
Mr. Li like a book.

John produced two sentences after answering a question,

李老师 给 我 一本书，
Mr. Li gave me a book.

李老师 喜欢 一本书，
Mr. Li likes a book.

The interlocutor read (the three sentences were read in a row):
Jay zuó tiān qǐng wǒ chī fàn
Jay yesterday invited me have dinner,
Jay invited me to dinner yesterday.

zǎo shàng wǒ men dǎ qiú (ADJ+SVO)
早上 我们 打球
Morning we play ball
In the morning we play ball

wǒ xǐng qǐng Jay chī fàn
我 唤 Jay 吃饭
I invite Jay have dinner
I would like to invite Jay to dinner

John responded after answering a question:

nǐ hé Jay shì péng yǒu ?
你 和 Jay 是 朋友?
You and Jay are friends?
Jay and you are friends?

nǐ men shì … dǎ qiú ,
你们 是 … 打球,
You are … play ball
You play ball

nǐ men xǐ huān … chī fàn ..
你们 喜欢 … 吃饭..,
You like eating
You like foods.
Excerpt 7.2: Examples of Amy’s performance on the EI in the pre-test

The interlocutor read (the three sentences were read in a row):

李老师给 我 一本 书，
Mr. Li gave me a book.

李老师 我 喜欢
Mr. Li I like

我 谢谢 李老师
I thanked Mr. Li.

Amy responded after answering a question

李老师 送 我 一本书
Mr. Li gave me a book.

我 喜欢 一本书
I like a book.
wǒ xiè xiè tā, běn shū

I thank him.

The interlocutor read (the three sentences were read in a row):

Jerry hé wǒ shàng wǔ fù xí
Jerry and I did some review in the morning.

zhōngwǔ wǒmen chī fàn (ADJ+SVO)

中午 我们 吃饭
Noon we eat
We ate lunch at noon.

wǒmen xià wǔ huí jiā
我们 下午 回家
We afternoon go home.
We went home in the afternoon

Amy responded after answering a question

wǒ huí jiā xià wǔ
我 回家 下午
I go home afternoon.
I go home in the afternoon.

chī zhōng fàn
吃 中饭
Eat lunch.
Eat lunch.

我复习…
I review…

As shown in the above examples, both the ADJ+SVO sentences and the OSV sentences were not processable by the participants. For example, John was unable to even comprehend the meaning of the OSV sentence. Similarly, Amy could not reproduce OSV or ADJ+SVO sentence, suggesting that the Chinese OSV and ADJ+SVO structure were not in Amy’s L2 linguistic system.

In the Q&A and cartoon description task, no participant was capable of producing OSV or ADJ+SVO sentences. Based on the learners’ performance on the three tasks during the pre-test, it is reasonable to conclude that the grammar structures at stage 3 (the ADJ+SVO structure) and stage 4 (the OSV structure) were not processable by these participants (except Eller who might have learned the ADJ+SVO structure). In fact, these participants also told us in the final interview that they had never encountered or learned the ADJ+SVO or OSV structures before they took part in the study.

**Post-test-1 results**

After the pre-test, the participants receive the first instructional session, which focused exclusively on the OSV structure. The instruction followed Gal’perin’s STI (1986). The concept of topicalizing the object was first demonstrated to the participants
using the SCOBA developed exclusively for this study. This SCOBA provided animated representation of the object moving to the front of a sentence. After demonstrating the concept, learners were asked to explain the OSV structure and the function of topicalization. Participants were also given colored rods with each rod representing a specific component of the relevant sentence structure. Thus, a yellow rod stood for the object argument, a blue rod represented the verb, a green rod stood for the Subject. The rods helped the student practice constructing sentences by rearranging the rods to reflect word-order shifts from SVO to OSV (see appendix Chapter 6 for an illustration). The learners were then given a variety of exercises to practice OSV structure, including sentence construction, sentence completion, translation, and picture & cartoon description.

At T2, one week after the first instruction session, the participants received post-test 1. Five of these participants demonstrated that they were capable of processing and producing OSV structures, without the ability to process ADJ+SVO structure (except Eller who was able to produce ADJ+SVO sentences). In the elicited imitation task, Leo produced 4 OSV sentences (10 possible contexts), Alisa 7, and John 5 OSV, Amy10, Myla 8 and Eller 5. In the Q&A task, Leo produced 6 OSV (9 possible contexts), Alisa 5, John 4, and Amy 6 instances of OSV sentences. Excerpt 4 gives an example of an OSV sentence produced by John in the Q&A task. In the cartoon description task, Leo produced 15 OSV sentences, Alisa 5, John 10, and Amy 9. None of the participants produced ADJ+SVO sentences in either of the final two tasks (there were 10-13 possible contexts in the Q&A task).

Although the participants could produce OSV structures, the ADJ+SVO structure was not processable (see Table 7.7 ~ Table 7.12). The results of the elicited imitation task
provided important evidence to show that these learners were not “ready” for the ADJ+SVO structure. Excerpt 7.3 and 7.4 offer examples to show the participants performance on the OSV structure and the ADJ+SVO structure.

Eller did not skip from stage 3 to stage 4. She produced the ADJ+SVO structure in the pre-test and other post-tests, suggesting that she might have learned the ADJ+SVO before the study. Different from the other five participants, Eller’s father was a native Chinese speaker (Eller was not a heritage speaker as she did not learn Chinese in her early childhood), which might have some influence on her Chinese. Eller might have encountered ADJ+SVO structure before the study and her Chinese teacher also told her that adverbial phrases could be placed in sentence-initial position

Excerpt 7.3. John’s performance in EI task on post-test-1:

The interlocutor read (the three sentences were read in a row):

李老师 有 五个 学生，
Mr. Li has five students

李老师 学生 很 喜欢，
Mr. Li students very like
Students like Mr. Li a lot.

李老师 和 学生 吃饭
Mr. Li and students eat
Mr. Li and students eat (together).

John responded after answering a question:

李老师有五个学生，
Mr. Li has five students

李老师和学生吃饭
Mr. Li and students eat

李老师学生喜欢，
Mr. Li students like

Students like Mr. Li a lot.

The interlocutor read (the three sentences were read in a row):

我们不喝酒，
We don’t like alcohol.

在日本我们喝酒，
We drank alcohol in Japan
We don’t drink alcohol in China.

John responded after answering a question:

We don’t drink alcohol.

zhōng guó… bú, hē pí jiǔ? zhōng guó rén
China… not, drink beer? Chinese?

China doesn’t drink beer? Chinese?

Excerpt 7.4. Amy’s performance on the EI task in post-test-1:

The interlocutor read (the three sentences were read in a row):

tā hē le kě lè
He drank cola
He drank cola

fàn tā yě chī le
Rice he also ate
He also ate rice.
He is ready for a sleep.

Amy responded after answering a question:

I ate rice.

I drank tea

I am sleeping

The interlocutor read (the three sentences were read in a row):

The waiter is a Chinese

The waiter and Xiao Li speak Chinese in the coffee shop.
But I don’t know Chinese.

Amy responded after answering a question:

服务员  中国人  认识
Waiter  Chinese people  know

The Chinese people knew the waiter

服务员  给  茶  中国人?
Waiter  give  tea  Chinese people?

The waiter gave tea to the Chinese people.

中国人  不  认识  服务员
Chinese people  no  know  waiter

Chinese people didn’t know the waiter

All in all, the data shows that participants could not produce ADJ+SVO structure.

On the other hand, they could process and produce OSV structure. This suggests that participants skipped the third stage (ADJ+SVO) and were able to process sentence structure at the fourth stage (OSV).

It should be noted that in the elicited imitation task, Amy reproduced one ADJ+SVO sentence and Myla reproduced two. Although they did reproduce ADJ+SVO sentences, these instances were not consistent across the rest of the task. Given that they
had not been formally exposed to the structure prior to the current study, I regard sporadic instances of the structure as random and treat them as “measurement error”. The learners’ random performance on the structure could be due to the format of the elicited imitation, which embedded three Chinese sentences in one “trial”, with the target sentence structures always being placed in the middle sentence. The reason for placing the target sentence in the middle was that the middle sentence is less likely to be affected by rote memory as compared to the first or the last sentence. However, this does not rule out completely the possibility that the middle sentence is not subject to rote memory. Attention might well have been focused on the second sentence, given that it is not always possible to control participants’ attention. In light of the fact that ADJ+SVO sentences were not consistently produced across the full EI task the few instances when they were accurately reproduced cannot be taken as evidence that the two learners were able to process ADJ+SVO structure.

Besides the elicited imitation task, the participants also produced sentences with OSV structure in the Q&A task and the cartoon description task. In the Q&A task, Leo produced 5 OSV, Alisa produced 5 OSV sentences, John produced 4 OSV sentences, Amy produced 6 OSV sentences and Myla produced 9 OSV sentences (out of 10-13 possible contexts). In the cartoon description task, Leo produced 15 OSV sentences, Alisa produced 5 OSV sentences, John produced 10 OSV sentences, Amy produced 9 OSV sentences, Myla produced 9 OSV sentences and Eller 6. Besides OSV sentences, these learners produced only canonical SVO sentences, suggesting that the learners had reached the fourth stage without ADJ+SVO.
Post-test-2 results

Immediately after post-test-1, participants took part in a second instructional session, during which ADJ+SVO structure was taught. This session followed the same procedure as the first instructional session. The SCOBA that focuses on ADJ+SVO structure (see the second SCOBA in Chapter 6) was first shown to participants in order to demonstrate the concept of topicalizing adverbial phrases. Then learners verbally explained the concept, after which they practiced the newly learned sentence structure in various exercises such as cartoon description, translation and free talk.

At least one week after the second instructional session, learners took post-test-2 at T3, which included an elicited imitation task, a Q&A task and a cartoon description task. Results suggested that all participants were able to process and produce the OSV and the ADJ+SVO structure. In the elicited imitation task, Leo produced 6 out of 10 OSV sentences and 9 out of 10 ADJ+SVO sentences (see Table 7.7). Alisa produced 7 out of 10 OSV sentences and 12 out of 10 ADJ+SVO sentences (she converted some SVO sentences into ADJ+SVO sentences, Table 7.8). John produced 6 out of 10 OSV sentences and 9 out of 10 ADJ+SVO sentences (Table 7.9). Amy produced 5 out of 10 OSV sentences and 13 out of 10 ADJ+SVO sentences (Table 7.10). Myla produced 7 out of 10 OSV sentences and 10 out of 10 ADJ+SVO sentences (Table 7.11). Excerpt 7.5 provides examples of John’s respective performances on the EI task.
Excerpt 7.5. John’s performance on the elicited imitation section of post-test-2:

The interlocutor read (the three sentences were read in a row):

wǒ měi tiān zài jiā chī zhōng guó fàn,
我 每天 在家 吃 中国饭，
I eat Chinese food every day.

zài xué xiào wǒ bú chī zhōng guó fàn,
在学校 我 不 吃 中国饭，
I don’t have Chinese food at school.

wǒ chī rì běn fàn
我 吃 日本饭
I eat Japanese food.

John responded after answering a question

wǒ chī rì běn fàn
我 吃 日本饭
I eat Japanese food.

zài jiā wǒ chī rì běn fàn? … That’s a guess.
在家 我 吃 日本饭？ … That’s a guess.
I have Japanese food at home. … That’s a guess.

The interlocutor read (the three sentences were read in a row):
I like coffee.

I also like tea.

I drink coffee and tea everyday.

John responded after answering a question

I like coffee.

I like tea. Oh, no, I am sorry
Excerpt 7.5 shows that John was capable of producing ADJ+SVO structure. Although John could not repeat the first two sentences, he created his own ADJ+SVO sentence (zài jiā wǒ chī rì běn fàn) when trying to repeat the third sentence (wǒ chī rì běn fàn, I eat Japanese food). It is worth pointing out again the power of the elicited imitation task. In this task, a learner can not repeat all the sentences because the information in the task is usually a burden on a participant’s working memory. Learners usually have to create some new sentences in order to convey the information they understand. When creating new sentences, however, they still have to use their L2 grammar. Excerpt 7.6 shows similar type of performance when she used an ADJ+SVO sentence (zài wǒ jiā fù xī gōng kè, At my home I review lessons) in place of the S+ADJ+VO sentence (wǒ zài jiā fù xī gōng kè, I at home review lessons) of the model.

Excerpt 7.6. Amy’s performance on the EI task in post-test 2:

The interlocutor read (the three sentences were read in a row):

wǒ zài kāfēiguǎn kànshū,  
我 在咖啡馆看书,  
I in the coffee shop read book.

I read books in the coffee shop.
在家我不看书，
At home I not read books.
I don’t read books at home.

在家我复习功课
I at home review lessons.
I do some review at home.

Amy responded after answering a question

我在家看书,
I in the coffee shop read book.
I read books in the coffee shop.

在家我不看书,
I at home no read books.
I don’t read books at home.

在家我复习功课
At my home I review lessons.
I do some review at home.

The interlocutor read (the three sentences were read in a row):

妈妈喜欢法国饭，
Mum like French food.
Mum likes French food.
Amy responded after answering a question

In the other two tasks, all participants were able to produce both the OSV and the ADJ+SVO structures. In the Q&A task, Leo produced 7 OSV sentences and 4 ADJ+SVO sentences. Alisa produced 3 OSV sentences and 6 ADJ+SVO sentences. John produced 4
sentences OSV and 1 ADJ+SVO sentence. Amy produced 7 OSV sentences and 4 ADJ+SVO sentences. Myla produced 3 OSV sentences and 5 ADJ+SVO sentences. In the cartoon description task, Leo produced 5 OSV sentences and 4 ADJ+SVO sentences. Alisa produced 4 OSV sentences and 2 ADJ+SVO sentences. John produced 2 OSV sentences and 4 ADJ+SVO sentences. Amy produced 4 OSV sentences and 6 ADJ+SVO sentences. Myla produced 2 OSV sentences and 3 ADJ+SVO sentences. These results suggest that one week after the second instruction session the learners were capable of processing and producing both OSV and ADJ+SVO structures in Chinese (see some examples in Excerpt 7.7 and Excerpt 7.8). The delayed post-test, which was administered more than one month after post-test-2, reinforces that both OSV and ADJ+SVO were processable to the learners.

Excerpt 7.7. John’s performance on the Q&A task in post-test 2:

The interlocutor asked: when do you study Chinese?

John responded,

shàng wǔ wǒ xué xí zhōng wén

Morning I study Chinese.

I study Chinese in the morning.

Excerpt 7.8. Amy’s performance on the Q&A in post-test 2:

zài jiā lǎo shǔ kàn jiàn le niú nǎi

在家老鼠看见了牛奶 (ADJ+SVO)

At home mouse saw milk.

The mouse saw some milk at home.
猫今天在家喝了牛奶
The cat drank milk at home today.

**The delayed post-test results.**

In the delayed post-test, participants were capable of processing and producing the ADJ+SVO and OSV structures. The last columns of Tables 7.6 to 7.12 summarize the numbers of sentences with ADJ+SVO and OSV structures produced by each participant. ADJ+SVO and OSV sentences had a significant increase as compared to the pre-test. As the duration between post-test-2 and the delayed post-test was approximately one month, it is reasonable to conclude that the structures were well preserved in their L2 linguistic system. Examples of speech production in these tasks are included in Excerpts 7.9 through 7.14.

Excerpt 7.9. John’s performance on the EI task of the delayed post-test:

The interlocutor read (the three sentences were read in a row):

Jerry shì wǒ péng yǒu
Jerry is my friend
Jerry and I go to school every day.

We talk every day.

We have classes everyday.

Jerry talks with me everyday.

Mr. Li gave me a book.
I like Mr. Li.

I thanked Mr. Li.

John responded after answering a question

Mr. Li gave me a book.

I like Mr. Li very much.

I thank Mr. Li.
Excerpt 7.10. John’s performance on Q&A in the delayed post-test:

Interlocutor asked, what do you buy every year?

John responded,

```
手机 我 每年 买
```

Cell-phone I every year buy.

I buy cell-phone every year.

Interlocutor asked, when do you study Chinese?

John responded,

```
上午 我 学习 中文
```

Morning I study Chinese.

I study Chinese in the morning.

Excerpt 7.11. John’s performance on the cartoon description task of the delayed post-test:

```
在家 猫 喝 牛奶
```

At home cat drink milk.

The cat drinks some milk at home.

```
老鼠 猫 吃了
```

Mouse cat ate.

The cat ate the mouse.
Excerpt 7.12. Amy’s performance on the delayed post-test:

The interlocutor read (the three sentences were read in a row):

小李 是 我 朋友,
Xiao Li is my friend.

星期一 他 和 我 坐车,
Monday he and I ride bus

我们 昨天 考试
We yesterday took a test

Amy responded after answering a question

小李 是 我 的朋友,
Xiao Li is my friend.

他 和 我 昨天 坐车,
He and I yesterday took a bus.

Yesterday we take a test.
We had a test yesterday.

The interlocutor read (the three sentences were read in a row):

李老师 有 一个 弟弟
Mr. Li  have  a brother.

Mr. Li has a brother.

他 弟弟 我 认识
His brother I know.

I know Mr. Li’s brother.

他 是 英文 老师
He is an English teacher.

Amy responded after answering a question

李老师 有 一个 弟弟,
Mr. Li  has  a brother.

Mr. Li has a brother.

弟弟 我 认识
Brother I know.

I know his brother.
弟是英文老师
Brother is English teacher.
His Brother is an English teacher.

Excerpt 7.10. Amy’s performance on Q&A in the delayed post-test:

Interlocutor asked, when do you go to the coffee shop?

一点 我 去 咖啡馆
One o’clock I went to coffee shop.
I went to coffee shop at one o’clock.

Interlocutor asked, what do you usually do at home?

Amy responded,

我在家 跳
I practice dancing at home.

Excerpt 7.11. Amy’s performance on the cartoon description task of the delayed post-test:

The cat bit the dog’s hand in the dog-house in the afternoon.
7.3 Summary

To sum up the major findings of this chapter, with the support of the STI, five out of six participants were able to process the higher stage OSV structure without the lower stage ADJ+SVO structure. Instruction was the major factor that determines L2 development. When OSV was taught to the learners, visualized concept of topicalization was provided aiming at helping them get a good understanding of the concept. Color rods are materialized mediations that support learners’ L2 production when they had difficulty in producing the target grammar structures. Practices allowed learners to become more fluent when producing the grammar structures.
Chapter 8

Study 2

8.1 Method

8.1.1 Purpose & hypothesis

According to the Topic Hypothesis, Chinese learners should not process OSV structures unless they can also process the ADJ+SVO structures. For this reason, I hypothesized that the OSV structure would not emerge simultaneously with the ADJ+SVO structure. The purpose of this study was to evaluate whether both the OSV structure and the ADJ+SVO structure could be produced by the two learners simultaneously if these structures were taught at the same time.

8.1.3 Instruments

There were three tests in this study: the pre-test at T1, the post-test at T2 and the delayed post-test at T4. Both the pre-test and delayed post-test were identical to the ones in Study 1. The post-test in this study was identical to the post-test-2 in Study 1.
8.1.2 Participants

We assigned two L1 English first-year college students studying at the Pennsylvania State University to Study 2. They were beginning Chinese learners, who were enrolled in the course *Chinese 001* and had studied Chinese for one semester when they took part in the study. Their first language was English. Similar to the participants in Study 1, these two participants could only process and produce Chinese SVO sentence structure in the pre-test.

8.1.4 Procedure

The two participants received the pre-test at T1 to evaluate their knowledge of Chinese grammar. Similar to Study 1, these tests included an elicited imitation task, a Q&A task, a cartoon description task and a grammaticality judgment task. After the pre-test, they received instruction that taught both OSV and ADJ+SVO structure at the same time. At the end of the instructional section, the participants described a cartoon scene from Tom & Jerry. One week after the instruction, these participants were given the post-test, which consisted of an elicited imitation task, a Q&A task and a cartoon description task, and the letter-number sequencing task that were identical to the post-test-2 in Study 1. One month after this post-test, they took the delayed post-test. This delayed post-test was identical to the delayed post-test in Study 1, which included an elicited imitation task, a Q&A task, a cartoon description task and a grammaticality judgment task. After the delayed post-test, they received an interview.
8.2 Results

8.2.1 The GJT results

Table 8.1 and Table 8.2 present the GJT results for the pre-test. Steven accepted 95% of sentences with canonical SVO structure. Such high acceptance rate was well above chance, indicating that Steven understood the sentence structure well and believed that the canonical SVO structure was a grammatical sentence structure. On the other hand, Steven only accepted 15-20% of sentences with ADJ+SVO or OSV structures. About 50% of the ADJ+SVO and the OSV were not acceptable to him. The remaining 25%-35% of the items received no response. All these patterns suggested that these two types of sentences were ungrammatical for Steven. As the GJT was a timed judgment task that requested a fast response, there could be false alarms (a false alarm is a ‘yes’ response to an ungrammatical sentence) or Mr.es (a ‘no’ response to a grammatical sentence). As we have discussed earlier, false alarms could be due to various reasons. I would not repeat here. But it should be emphasized again that a low acceptance rate and a high rejection rate would mean that a grammar structure was unlikely to be processable.

Similar to Steven, Kris also had low acceptance rates of 30% and 15% for ADJ+SVO and OSV sentences. Kris rejected 85% of the sentences with OSV structure and 60% sentences with ADJ+SVO structure, suggesting that neither the ADJ+SVO nor the OSV was acceptable to Kris. However, Kris accepted 75% and rejected 25% of the canonical SVO sentences (well above chance). Therefore, it is reasonable to believe that SVO was acceptable to Kris. The GJT pre-test results also matched the results of the speech
production tasks, in which Steven and Kris were unable to produce either ADJ+SVO sentences or OSV sentences.

Table 8.1. GJT results for Steven.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Accep</th>
<th>Unaccep</th>
<th>Unanw</th>
<th>Acc%</th>
<th>accep</th>
<th>unaccep</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>15%</td>
<td>3</td>
<td>10</td>
<td>7</td>
<td>90%</td>
<td>18</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ SVO</td>
<td>20</td>
<td>20%</td>
<td>4</td>
<td>11</td>
<td>5</td>
<td>85%</td>
<td>17</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>95%</td>
<td>19</td>
<td>0</td>
<td>1</td>
<td>90%</td>
<td>18</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc% = accurate rate  
Accep = number of accepted sentences  
Unaccep = number of unaccepted sentences  
Unanw = number of unanswered sentences

Table 8.2. GJT results for Kris.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Accep</th>
<th>Unaccep</th>
<th>Unanw</th>
<th>Acc%</th>
<th>accep</th>
<th>unaccep</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>15%</td>
<td>3</td>
<td>17</td>
<td>0</td>
<td>60%</td>
<td>12</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ SVO</td>
<td>20</td>
<td>30%</td>
<td>6</td>
<td>12</td>
<td>2</td>
<td>70%</td>
<td>14</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>75%</td>
<td>15</td>
<td>4</td>
<td>1</td>
<td>75%</td>
<td>15</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Acc% = accurate rate  
Accep = number of accepted sentences  
Unaccep = number of unaccepted sentences  
Unanw = number of unanswered sentences

The GJT in the pre-test showed that neither the ADJ+SVO sentences nor the OSV sentences were acceptable to the participants. The GJT in the delayed post-test, on the other hand, showed that both the ADJ+SVO and the OSV were acceptable to the two participants. One month after the post-test, Steven accepted 85% ADJ+SVO sentences and 90% OSV structures, a high percentage rate and well above chance. Kris accepted 70%
ADJ+SVO sentences and 60% OSV sentences. Although 60% was only slightly above chance, this percentage was much higher than the one in the pre-test. A significant increase in the acceptance rates of the ADJ+SVO and the OSV structures suggested that there was qualitative change in their grammar knowledge after instruction.

8.2.2 Development of processability

Pre-test results: Neither ADJ+SVO nor OSV was processable

Similar to the participants in Study 1, the pre-test showed that neither the ADJ+SVO nor the OSV structure was processable by these two learners: neither ADJ+SVO nor OSV was produced in any of the three speech production tasks. Similar to the participants in Study 1, these participants could not reproduce OSV or ADJ+SVO sentences in the elicited imitation task. They would either produce incomprehensible broken sentences or confuse the object with the subject when encountering OSV sentences. They would place adverbial phrase at the end of the sentence or dismissed the adverbial phrase when encountering ADJ+SVO sentences. Examples would be given below. The results for the two participants are summarized in Table 8.3 and Table 8.4. Steven produced 83 SVO sentences across the three tasks. However, he did not produce any ADJ+SVO or OSV sentence. Similarly, Kris produced 66 sentences, all of which were SVO sentences.
Table 8.3. Speech production on the pre-test, post-test and delayed post-test (Steven).

<table>
<thead>
<tr>
<th>Elicit imitation</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>8/113</td>
<td>11/125</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>7/113</td>
<td>9/125</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>57/83</td>
<td>44/113</td>
<td>53/125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q&amp;A</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>9/113</td>
<td>7/125</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>10/113</td>
<td>4/125</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>15/83</td>
<td>14/113</td>
<td>16/125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cartoon Descp.</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>6/113</td>
<td>3/125</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>3/113</td>
<td>3/125</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>11/83</td>
<td>12/113</td>
<td>19/125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUM</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>23/113</td>
<td>21/125</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>20/113</td>
<td>16/125</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>83/83</td>
<td>70/113</td>
<td>88/125</td>
</tr>
</tbody>
</table>

Table 8.4. Speech production on the pre-test, post-test and delayed post-test (Kris).

<table>
<thead>
<tr>
<th>Elicit imitation</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>11/122</td>
<td>13/113</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>12/122</td>
<td>6/113</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>36/66</td>
<td>49/122</td>
<td>44/113</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q&amp;A</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>4/122</td>
<td>17/113</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>6/122</td>
<td>11/113</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>17/66</td>
<td>21/122</td>
<td>7/113</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cartoon Descp.</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>6/122</td>
<td>3/113</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>6/122</td>
<td>2/113</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>13/66</td>
<td>7/122</td>
<td>10/113</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUM</th>
<th>Structure</th>
<th>Pre-test (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj.</td>
<td>OSV</td>
<td>0</td>
<td>21/122</td>
<td>33/113</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>24/122</td>
<td>19/113</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>66/66</td>
<td>77/122</td>
<td>61/113</td>
</tr>
</tbody>
</table>

The elicited imitation task might best illustrate that the two participants could not process OSV structures prior to instruction. In Excerpt 8.1, Steven showed that he could
not understand the OSV structure. In fact, he confused the object with the subject when encountering the OSV sentences, a typical mistake of beginning learners of Chinese.

Excerpt 8.1. Steven’s speech production in the elicited imitation section of the pre-test:

The interlocutor read (the three sentences were read in a row):

李老师 给 我 一本 书,
Mr. Li gave me a book.

李老师 我 喜欢
Mr. Li I like

我 谢谢 李老师
I thanked Mr. Li.

Steven responded after answering a question

李老师 给 我 一本书,
Mr. Li give I a book.

李老师 喜欢 我,
Mr. Li like I.
Mr. Li likes me.

xiè xiè …. wǒ …. 谢谢…. 我….
Thank…. I

wǒ xiè xiè  lǐ lǎoshī 我 谢谢 李老师
I thank Mr. Li
I thank Mr. Li.

In this example, the second sentence “李老师我喜欢”（Mr. Li, I like ➔ I like Mr. Li），which was an OSV sentence, was not processable by Steven, who interpreted the sentence as “李老师喜欢我”（Dr. Li likes me）. This result suggested that the learner did not understand the OSV structure.

ADJ+SVO was not in Steven’s Chinese grammar either, as is illustrated in Steven’s response to the Q&A task given in Excerpt 8.2 where he placed the locative phrase at the end of the sentence when he was asked where he usually ate dinner. It shall be noted that it is not acceptable to place the locative phrase at the end of a sentence. But beginning Chinese learners with an L1 English background tend to make this kind of mistakes. As their linguistic system does not have the L2 grammar knowledge (either supported by declarative memory or procedural memory), they will have to rely on their L1 grammar knowledge to support their L2 production.
Excerpt 8.2. Steven’s speech production in the Q&A section of the pre-test:

The interlocutor asked: what did you eat?

Steven responded:

wǒ chī wǒn fàn, 
我 吃 晚饭,  
I eat supper.

The interlocutor asked: where did you usually eat your dinner?

Steven responded:

wǒ chī wǒn fàn wǒ de jiā 
我吃 晚饭 我的家  
I eat dinner my home.

I ate supper at my home.

In Excerpt 8.2, Steven placed the locative phrase at the end of a sentence, suggesting he was using his L1 to support L2 production. Similarly, Kris was not capable of processing either of the structures. The following example in Excerpt 8.3 was produced in the elicited imitation pre-test task:

Excerpt 8.3. Kris’s speech production in the elicited imitation section of the pre-test:

The interlocutor read (the three sentences were read in a row):

tiān qì jīn tiān hěn hǎo 
天气 今天 很好 
Weather today nice.
The weather today is nice.

wǒ jiāo xiǎo lǐ bú rèn shí (OSV)
我家 小李 不 认识,
My home Xiao Li not know
Xiao Li did not know my home (did not know where my home is)

wǒ hé tā lái (wǒ jiā)
我和他来 (我家)
I and he come
He and I come together.

Kris responded after answering a question

tiān qì jīn tiān hěn hǎo
天气 今天 很好
Weather today nice.
The weather today is nice.

xiǎo zhāng err… bú zhī dào tā
小张 err… 不 知道 他
Zhang not know he
Zhang doesn’t know him.

xiǎo zhāng hé wǒ lái jiā
小张 和 我 来 家
Zhang and I come home.
Zhang and I came back home.

Excerpt 8.3 shows that Kris did not understand the OSV structure. When
encountering the OSV sentence (wǒ jiāo xiǎo lǐ bú rèn shí, My home Xiao Li does not
know), Kris could not comprehend the sentence and produced a completely different sentence with a SVO structure.

The following two examples, given in Excerpt 8.4, were produced in the Q&A task and the cartoon description tasks on the pre-test. Similar to Steven, Kris also placed the locative phrases in sentence final position.

Excerpt 8.4. Kris’s speech production in the Q&A section of the pre-test:

Interlocutor asked: where do you dance (你在哪里跳舞，where did you dance)?

Kris responded,

\[
\begin{align*}
\text{wǒ} & \quad \text{tiào wǔ} & \quad \text{xiào} \\
\text{我} & \quad \text{跳舞} & \quad \text{学校} \\
& \quad \text{I dance} & \quad \text{school.}
\end{align*}
\]

I dance at school.

Interlocutor asked: where do you study?

Kris responded,

\[
\begin{align*}
\text{wǒ} & \quad \text{xué xí wǒ de sùshè hé tú shū guǎn} \\
\text{我} & \quad \text{学习 我的 宿舍 和 图书馆} \\
& \quad \text{I study my dorm and library.}
\end{align*}
\]

I study in my dorm and in the library.

In Excerpt 8.4, the last sentence produced by Kris (wǒ xué xí wǒ de xiū shè hé tú shū guǎn, I study in my dorm and library) was not grammatical in Chinese, suggesting that the ADJ+SVO structure was not in her linguistic system.
Post-test results: both ADJ+SVO and OSV were processable

The post-test administered one week after the instruction suggested that the learners could produce ADJ+SVO and OSV structures. Tables 8.3 and 8.4 above contain the results of the speech production tasks in the post-test. In the elicited imitation task, Steven produced 8 sentences with OSV structure and 7 sentences with ADJ+SVO structure. Excerpt 8.5 gave some of these examples with the OSV and ADJ+SVO structures produced by Steven. In the other two tasks, Steven produced a total of 15 OSV sentences and 13 ADJ+SVO sentences. Excerpt 8.6 gave an example from the Q&A section. All these results suggest that Steven had developed the ability to process OSV and ADJ+SVO structures as a result of instruction.

Excerpt 8.5. Steven’s speech production in the elicited imitation section of the post-test:

The interlocutor read (the three sentences were read in a row):

dì dì mǎi le pí jiǔ,
弟弟买了啤酒,
Brother bought beer
    (My) Brother bought beer.

zài jiā wǒ hé dì dì hē pí jiǔ
在家我和弟弟喝啤酒
At home I and brother drink beer
    My brother and I drink beer at home.

wǒ men zài xué xiào bù hē pí jiǔ
我们在学校不喝啤酒
We at school not drink beer
We don’t drink beer at school

Steven responded after answering a question:

弟弟买了啤酒,
Brother bought beer.

在家我们喝啤酒,
At home we drink beer.

我们在学校不喝啤酒
We don’t drink beer at school.

The interlocutor read (the three sentences were read in a row):

老师 昨天 买了 手机
The teacher bought a cell phone yesterday.

手机 老师 今天 丢了
The teacher lost his cell phone today.
The teacher is not happy.

Steven responded after answering a question

The teacher bought a cell-phone yesterday.

The teacher lost his cell-phone today.

Excerpt 8.6. Steven’s speech production in the Q&A section of the post-test:

The interlocutor asked, where do you usually drink coffee?

Steven responded:

I drink some coffee in the dorm.
The interlocutor asked, what did you study every day?

Steven responded:

中文  我  每天  一点半  在大学  学习

I study Chinese at one thirty at university every day.

In the elicited imitation task of the post-test as shown in Table 8.4, Kris reproduced 11 out of 10 OSV sentences and 12 out of 10 ADJ+SVO sentences (Kris turned some SVO sentences into OSV sentences). In the Q&A and the cartoon description task, Kris produced 10 OSV sentences and 12 ADJ+SVO sentences. Excerpts 8.7 and 8.8 provide sample OSV and ADJ+SVO sentences produced in the elicited imitation task and the cartoon description task, which suggested that Kris had developed the ability to process both the OSV and the ADJ+SVO structures.

Excerpt 8.7. Kris’s production in the elicited imitation task of the post-test:

我 三点 回家了,

I went back home at three o’clock.

四点 我 做饭,

I cooked at four o’clock.
Kris responded after answering a question:

我们五点吃饭.
We had dinner at five o’clock.

I went back home at three o’clock.

I cooked at four o’clock.

The interlocutor read the three sentences in a row:

妈妈喜欢法国饭.
Mum likes French food.

Mum has French food every day.
Mum has a lot of French food.

Kris responded after answering a question

Mum likes French food.

Mum has French food every day.

Mum has a lot of French food.

Excerpt 8.8. Kris’s speech production in the cartoon description task of the post-test:

In the Cartoon description task, Kris produced the following sentence:

Jerry ate cheese at his home
Delayed post-test results: both ADJ+SVO and OSV were preserved

In the delayed post-test administered one month after the post-test, Steven produced 21 sentences with OSV structures and 16 sentences with ADJ+SVO structures. Eleven OSV sentences and 9 ADJ+SVO sentences were produced in the elicited imitation task. Excerpt 9.9 provides examples of Steven’s performance on the EI delayed post-test.

Excerpt 9.9. Steven’s production on the elicited imitation section of the delayed post-test:

The interlocutor read (the three sentences were read in a row):

李老师 有 一个 弟弟
Mr. Li have a brother.

他 弟弟 我 认识
His brother I know.

He is a brother.

He is an English teacher.
Steven repeated after answering a question

李老师 有 一个 弟弟
Mr. Li have a brother.

李老师 弟弟 我 认识
Mr. Li brother I know.
I know Mr. Li’s brother.

他 是 英文 老师
He is an English teacher.

The interlocutor read (the three sentences were read in a row):

Jerry 和 我 上午 复习
Jerry and I morning review.
Jerry and I did some review in the morning.

中午 我们 吃饭
Noon we eat
We ate lunch at noon.

我们 下午 回家
We afternoon go home.
We drank beer and went home in the afternoon
Steven responded after answering a question

Jerry 和 我 上午 复习
Jerry and I morning review.

Jerry and I did some review in the morning.

中午 我们 吃饭 … 吃中饭
Noon we eat… eat lunch.

We ate lunch at noon.

我们 下午 喝 酒 回家
We afternoon drink beer go home.

We drank beer and went home in the afternoon.

In the cartoon description task, Steven described the scene as follows:

在大狗的手的上 小狗 喝 牛奶
In the big dog’s arm, little dog drink milk.

The little dog drank milk in the big dog’s arm.

The big dog scolded Tom near the house.
Likewise, on the delayed post-test Kris produced 33 sentences with the OSV structure and 19 sentences with the ADJ+SVO structure. Among these 13 OSV and 6 ADJ+SVO structures were produced in the elicited imitation task. Excerpt 8.10 provides some examples of sentences produced by Kris.

Excerpt 8.10. Kris’s production on EI for the delayed post-test:

The interlocutor read (the three sentences were read in a row):

李老师 有 一个 弟弟
Mr. Li has a brother.

他 弟弟 我 认识
I know Mr. Li’s brother.

He 是 英文 老师
He is an English teacher.

Kris repeated after answering a question

李老师 有 一个 弟弟,
Mr. Li has a brother.
弟弟 我 认识
brother I know.
I know his brother.

他 是 英国 老师
He is English teacher.

The interlocutor read (the three sentences were read in a row):

Jerry 和 我 上午 复习
Jerry and I morning review.
Jerry and I did some review in the morning.

中午 我们 吃饭
Noon we eat
We ate lunch at noon.

我们 下午 回家
We afternoon go home.
We went home in the afternoon

Kris responded after answering a question

中午 我们 吃饭
Noon we have lunch.
We have lunch at noon.
We went home.
We went back home.

We went back home in the afternoon.

In the cartoon description task, Kris described the scene as follows:

Spike and Tike took a nap at noon at Tom’s home.

They woke Jerry up in the park.

It shall be pointed out that Kris produced both ADJ+SVO and S+ADJ+VO sentences, suggesting that Kris did not use the ADJ+SVO as the canonical structure. For example, in cartoon description task, Kris put the locative phrase between the subject and the object (tō men Jerry zài gōng yuán jiào xǐng le, They, Jerry in the park wake up).

The number of OSV and ADJ+SVO sentences produced by the two learners suggests that both structures had emerged in the post-test. After instruction, both
participants could distinguish the object from the subject in the OSV sentences in the elicited imitation task in the delayed post-test, which indicated significant progress. As the delayed post-test was one month after the post-test, we believe that both the OSV and the ADJ+SVO structures were well established in the participants’ L2 processing capacity.

8.3 Summary

The Topic Hypothesis predicts that topicalization in Chinese emerges sequentially. In other words, topicalization must emerge in the specific order predicted by PT and that the two structures associated with topicalization in Chinese should not emerge simultaneously. Our finding does not support such a prediction. In contrast, both participants were capable of producing both the OSV and the ADJ+SVO structure in a cartoon description task given at the end of the instructional section, and both sustained this ability on the post-test and delayed post-test. We take this as evidence that the learners had indeed developed the capacity to process the word order associated with Chinese topicalization.
Chapter 9

Study 3

9.1 Method

9.1.1 Purpose

As mentioned in the previous chapter, the \textit{ba}-construction is a special case of object fronting. Gao (2009) and Wang (2011) provided empirical evidence to suggest that the OSV structure is learned at Stage 4 and the \textit{ba}-construction is learned at stage five. According to PT, L2 Chinese learners would not be able to process the \textit{ba}-construction unless they can first process the OSV structure. On the other hand, the \textit{ba}-construction is frequently used in Chinese as compared to the OSV structure (Li & Thompson, 1981). According to N. Ellis (2002), frequency of input plays a crucial role in L2 learning. If PT is correct, frequency of input, which is an external non-cognitive factor, should not affect the L2 processing sequence. If frequency of input does matter, it may have an effect on the processing trajectory. This study intends to examine whether there are cases where the \textit{ba}-construction can be processed without the OSV grammar. If there are such cases, we may find one among heritage Chinese speakers, who are exposed to a great deal of heritage language in the communicative activities of their everyday lives.
9.1.2 Instruments

**Instruments in the pre-test**

The pre-test included two parts. The first part was identical to the pre-test in Studies 1 and 2. This part of the test was intended to identify participants who could not process and produce OSV sentences. The second part contained an elicited imitation task, a cartoon description task and a Q&A task. This part of the test mainly focused on eliciting ba-construction sentences. The elicited imitation task contained 60 sentences (40 SVO sentences, 10 ADJ+SVO sentences and 10 ba-construction sentences). The ADJ+SVO sentences and the ba-construction sentences were always placed between two SVO sentences. The cartoon description task was a one-minute cartoon clip. The Q&A task contained questions that required participants to describe a process, such as making a cup of coffee or washing clothes. This task was very useful in eliciting the ba-construction (only the heritage speakers were tested on the ba-construction).

**Instruments in the post-test and delayed post-test**

The post-test and delayed post-test included an elicited imitation task, a cartoon description task and a Q&A task. The elicited imitation task contained 60 sentences (40 SVO sentences, 10 OSV structure sentences, 10 the ba-construction sentences). As the OSV and the ba-constructions were the targets, they were always placed between two SVO sentences. The cartoon description task and the Q&A task had the same format as those in the pre-test.
9.1.3 Participants

Two heritage Chinese speakers were qualified to take part in this study. These two participants’ parents were Chinese immigrants to US with Chinese as the first language. The two participants were at the age of 19 and they spoke Chinese at home with their parents. Despite that, they did not attend formal Chinese classes before they entered university.

Similar to the other participants in Studies 1 and 2, their dominant language was English. However, they were more proficient than the non-heritage participants, even though they spoke Chinese with an English accent. They also had a more extensive Chinese vocabulary as compared to the other participants.

9.1.4 Procedure

At T1, the participants took an EI task, a Q&A task, a cartoon description task and a GJT as the first part of the pre-test. The EI task, which contained sentences with ADJ+SVO and OSV structures, was used to identify participants who could not process the OSV structure (Stage 3 learners with ADJ+SVO structure). After the EI task, participants were given a Q&A task, which asked them to describe a process such as washing clothes or making a cup of coffee. After the Q&A task, the participants were asked to describe a Tom & Jerry cartoon scene. Participants who could produce the ba-construction in the Q&A or in the cartoon description task would take the second part of the pre-test, which included an EI task, a Q&A and a cartoon description task. This part
of the pre-test was intended to confirm that the learners could process and produce the *ba*-construction.

After the pre-test, the two heritage speakers were given an instructional session that taught the concept of topicalization as well as the *ba*-construction. As in the previous studies, the instructor used a SCOBBA and Cuisenaire rods to introduce the concept of topicalization. As their vocabulary was quite large, the heritage speakers practiced both the OSV structure and the *ba*-construction in free talk, process description, translation and cartoon descriptions etc (these tasks were practiced only in the instructional sessions).

One week after the first instructional session, participants were given the post-test to evaluate whether they could produce OSV. One month after the post-test, they were given the delayed post-test, which elicited the OSV structure as well as the *ba*-construction. After the delayed post-test, the participants received the final interview.

9.2 Results

9.2.1 The GJT results

Tables 9.1 and 9.2 give the results for the GJT. Both participants rejected a majority of the ungrammatical sentences (roughly 83%). The high accuracy rate suggested that their Chinese level was quite advanced (their knowledge was implicit knowledge because participants had received no formal instruction in Chinese before they entered university. Their only exposure to the language was in everyday conversations.
Cathy accepted all 20 SVO sentences as grammatical. Evan judged 18 SVO sentences as grammatical. Such a result suggests that the SVO structure was well known to the two participants. Cathy also accepted 12 ADJ+SVO sentences and Evan accepted 14. The accuracy rates (60% and 70%) were not very high but above chance, suggesting that they knew the ADJ+SVO structure. However, the structure might not be highly systematic in their grammar. Regarding the OSV structure, Cathy accepted 2 OSV sentences but rejected the other 18 OSV sentences. Likewise, Evan accepted 3 OSV sentences but rejected the other 17. Similar to other ungrammatical sentences, the OSV structure was not grammatical for these speakers. Summing up the GJT result, both the SVO structure and the ADJ+SVO structure were acceptable to the two heritage speakers. But the OSV structure was not known to these participants.

Table 9.1. GJT results for Cathy.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Accep</th>
<th>unaccep</th>
<th>Unanw</th>
<th>Acc%</th>
<th>accep</th>
<th>unaccep</th>
<th>unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>10%</td>
<td>2</td>
<td>18</td>
<td>0</td>
<td>100%</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ SVO</td>
<td>20</td>
<td>60%</td>
<td>12</td>
<td>8</td>
<td>0</td>
<td>100%</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>100%</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ungr</td>
<td></td>
<td>30</td>
<td>83%</td>
<td>5</td>
<td>25</td>
<td>0</td>
<td>90%</td>
<td>3</td>
<td>27</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 9.2. GJT results for Evan.

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>num.</th>
<th>Acc%</th>
<th>Accep</th>
<th>Unaccep</th>
<th>Unanw</th>
<th>Acc%</th>
<th>accep</th>
<th>Unaccep</th>
<th>Unanw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Top=Obj</td>
<td>OSV</td>
<td>20</td>
<td>15%</td>
<td>3</td>
<td>17</td>
<td>0</td>
<td>65%</td>
<td>13</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>3 top=ADJ.</td>
<td>ADJ SVO</td>
<td>20</td>
<td>70%</td>
<td>14</td>
<td>6</td>
<td>0</td>
<td>80%</td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2 top=Subj.</td>
<td>SVO</td>
<td>20</td>
<td>90%</td>
<td>18</td>
<td>2</td>
<td>0</td>
<td>90%</td>
<td>18</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>ungr</td>
<td></td>
<td>30</td>
<td>83%</td>
<td>4</td>
<td>25</td>
<td>1</td>
<td>90%</td>
<td>2</td>
<td>27</td>
<td>1</td>
</tr>
</tbody>
</table>
Tables 9.1 and 9.2 also give the results of the GJT task in the delayed post-test. Compared with the pre-test, the OSV structure was acceptable to these learners. Cathy regarded all of the OSV and ADJ+SVO sentences as grammatically acceptable, a significant increase from the pre-test. Evan accepted 13 OSV sentences. Although the accuracy rate was not very high, it was well above chance and was much higher than the pre-test. The instruction systematically taught the concept of topicalization, which not only helped the participants learn the OSV grammar but also enabled them to consolidate the ADJ+SVO structure.

9.2.2 Results of the speech production tasks

The pre-tests results

In the elicited imitation task in the first part of the pre-test (Tables 9.3 and 9.4), Evan reproduced 13 ADJ+SVO sentences and Cathy reproduced 6, suggesting that the ADJ+SVO structure was processable. However, both learners could not produce any OSV sentence. Neither did they produce any OSV sentence in the other two speech production tasks. Excerpts 9.1 and 9.2 provide some example sentences produced by Cathy and Evan.
Table 9.3. Speech production on the pre-test, post-test and delayed post-test (Cathy).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test 1 (T1)</th>
<th>Pre-test 2 (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td>Ba-construct</td>
<td>-</td>
<td>7</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>-</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>52</td>
<td>41</td>
<td>48</td>
<td>57</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>Ba-construct</td>
<td>0</td>
<td>10</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>30</td>
<td>12</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td>Ba-construct</td>
<td>15</td>
<td>13</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>0</td>
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<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>11</td>
<td>16</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>SUM</td>
<td>Ba-construct</td>
<td>15</td>
<td>30</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>0</td>
<td>38</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>7</td>
<td>4</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>93</td>
<td>69</td>
<td>68</td>
<td>89</td>
</tr>
</tbody>
</table>

Table 9.4. Speech production on the pre-test, post-test and delayed post-test (Evan).

<table>
<thead>
<tr>
<th>Topic Hypoth</th>
<th>Structure</th>
<th>Pre-test 1 (T1)</th>
<th>Pre-test 2 (T1)</th>
<th>post-test 1 (T2)</th>
<th>delayed post-test (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit imitation</td>
<td>Ba-construct</td>
<td>-</td>
<td>8</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>-</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>13</td>
<td>7</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>84</td>
<td>57</td>
<td>52</td>
<td>49</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>Ba-construct</td>
<td>0</td>
<td>4</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>45</td>
<td>25</td>
<td>36</td>
<td>62</td>
</tr>
<tr>
<td>Cartoon Descp.</td>
<td>Ba-construct</td>
<td>7</td>
<td>10</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>8</td>
<td>21</td>
<td>29</td>
<td>13</td>
</tr>
<tr>
<td>SUM</td>
<td>Ba-construct</td>
<td>7</td>
<td>22</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>OSV</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>ADJ. +SVO</td>
<td>13</td>
<td>7</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>SVO</td>
<td>137</td>
<td>103</td>
<td>117</td>
<td>124</td>
</tr>
</tbody>
</table>
Excerpt 9.1. Examples of Cathy’s performance on the EI task in the pre-test:

The interlocutor read (the three sentences were read in a row):

李老师 来 我家,
Mr. Li come my house.

Mr. Li came to my house.

我 李老师 很 了解,
I Mr. Li very know
Mr. Li knew me well.

He know I like book
He knew that I like books.

Cathy responded after answering a question

李老师 来 我家,
Mr. Li come my house.

Mr. Li visits my house.

He know I like books.
As we all know, he knows we like books.

Excerpt 9.2. Examples of Evan’s performance on the EI task in the pre-test:

The interlocutor read (the three sentences were read in a row):

天气 今天 很好，
Weather today nice.
The weather today is nice.

我家 小李 不 认识，
home Xiao Li not know.
Xiao Li doesn’t know the way to my home.

我 和 他 来
I and he come.
I come with him.

Evan responded after answering a question

今天 天气 很好，
Today weather nice.
The weather today is nice.

我 不 认识 小... 小张
I do not know Xiao Zhang.

我 不 认识 他
I don’t know him.

In the cartoon description task of the first part of the pre-test, the two participants produced a number of sentences with the *ba*-construction (see Tables 9.3 and 9.4), suggesting that the *ba*-construction is indeed processable for both heritage speakers. Excerpts 9.3 and 9.4 offer some examples of the sentences they produced on the cartoon description task

**Excerpt 9.3.** *ba*-construction sentences produced by Cathy on the cartoon description task:

他 把 纸张 拿出来?
He ba paper take out.

He took out the paper.

How to say “open”? (the interlocutor provided the word “打开”)

他 把 纸张 打开
He ba paper open
He opened the paper.
Excerpt 9.4. *ba*-construction sentences produced by Evan on the cartoon description task:

```
nà  gè  lǎo  shǔ  bǎ  nàgèmāo  de  niúnǎi  gěi  le  xiǎo  lǎo  shǔ
那个老鼠  把  那个猫的  牛奶  给了  小老鼠
That mouse  ba  that cat’s milk  gave  the little mouse.
```

```
tō  bǒ  diàn  huà  ná  le  qǐ  lái
他  把  电话  拿了起来
He  ba  phone  pick up.
```

```
tō  bǒ  pán  zī  fàng  dào  zhuō  zǐ  shàng  miàn
她  把  盘子  放到  桌子上面
She  ba  plates  put  on the table.
```

Results of the first part of the pretest suggested that the *ba*-construction was in their grammatical system. To confirm this, they were given the second part of the pre-test, which provided more evidence to suggest that the *ba*-construction was in their grammar. Tables 9.3 and 9.4 gave the number of sentences produced across all the tasks in the pre-test. In all three speech production tasks on the second part of the pre-test, both participants consistently produced the *ba*-construction. Cathy reproduced 7 *ba*-
construction sentences in the EI and 23 *ba*-construction sentences in total across the Q&A and the cartoon description task. Evan reproduced 8 *ba*-construction sentences in the EI task and a total of 32 *ba*-construction sentences in the other two spontaneous speech production tasks. Excerpts 9.5 and 9.6 give examples of *ba*-construction sentences produced by Cathy and Evan respectively.

Excerpt 9.5. Examples of Cathy’s performance in the second part of the pre-test:

The interlocutor read (the three sentences were read in a roll):

I bought a lot of things.

I ran out of my money.

I can’t buy anything else any more.

Cathy responded after answering a question

I have bought a lot of things.
I ran out of my money.

I can’t buy anything else any more.

Interlocutor asked, can you describe how to wash the face?

Cathy responded,

I boiled water.

I put the towel into water.

I used a towel to wash my face.
Excerpt 9.6. Examples of Evan’s performance in the second part of the pre-test:

The interlocutor read (the three sentences were read in a roll):

nǐ  xiǎn qù  xǐ zǎo
你 先 去 洗澡，
You first go shower.

You go to take a shower first.

rán hòu nǐ  bō  yī fú fàng  xǐ yī jī  xǐ  gàn jìng，
然后 你 把 衣服 放 洗衣机 洗 干净，
Then you ba clothes put washing machine wash clean.

Then you put the clothes into the washing machine to get them cleaned.

nǐ  jiù kě yǐ  hǎo hǎo  xiū xī le
你 就 可以 好好 休息了
You then can good take a rest.

You can take a good rest.

Evan responded after answering a question

nǐ  xiǎn qù  xǐ zǎo，
你 先 去 洗澡，
You first go shower.

You take a shower first.

rán hòu bō  yī fú fàng  zài xǐ yī jī  xǐ  gàn jìng，
然后 把 衣服 放 在洗衣机 洗 干净，
Then ba clothes put washing machine wash clean.

Then you put the clothes into the washing machine to get them cleaned.
你才做完？
Then you finished?

Interlocutor asked, how do you cook an egg?
Evan responded,
把那个鸡蛋砸开了，
Break the egg
要把那个油放在那个盘子上面
Put the oil in the plate

During the instructional session, the two participants were asked whether the OSV structure was grammatical. Both of them believed that the OSV structure was not grammatical. They also indicated that they had never encountered the structure before. All the evidence thus suggested that the participants could not process the OSV structure. However, they could produce the ba-construction sentences without any difficulty. I take this as counter-evidence to predictions of Gao (2009) and Wang (2011) regarding the processing stages for Chinese topicalization. Either ba- is not a stage 5 structure or the prediction that learners must progress through the precessability hierarchy in a stepwise procedure is incorrect.
The post-test results

One week after the instructional session that taught the concept of topicalization, a post-test to elicit the OSV structure and the ba-construction was administered. Test results showed that both participants were able to process OSV structure as they could produce both the OSV and the ba-construction in all speech production tasks. Table 9.3 and 9.4 above summarize the number of sentences with the OSV structure and the ba-construction across each task. Cathy correctly reproduced 5 out of 10 OSV sentences and 8 out of 10 ba-construction sentences in the EI task. Cathy also produced 16 OSV sentences and 6 ba-construction sentences in the other two tasks. Evan produced 4 out of 10 OSV sentences and 9 ba-construction sentences in the EI task. In the other two tasks, Evan produced 14 OSV and 14 ba-construction sentences. Examples of the OSV sentences and the ba-construction sentences produced by the two learners are given in Excerpts 9.7 and 9.8.

Excerpt 9.7. Examples of Cathy’s performance in the post-test

The interlocutor read (the three sentences were read in a roll):

小王要来我家做客，
Xiao Wang will come to my house as a guest.

小王会先买，
Xiao Wang will buy some vegetables.

The post-test results

One week after the instructional session that taught the concept of topicalization, a post-test to elicit the OSV structure and the ba-construction was administered. Test results showed that both participants were able to process OSV structure as they could produce both the OSV and the ba-construction in all speech production tasks. Table 9.3 and 9.4 above summarize the number of sentences with the OSV structure and the ba-construction across each task. Cathy correctly reproduced 5 out of 10 OSV sentences and 8 out of 10 ba-construction sentences in the EI task. Cathy also produced 16 OSV sentences and 6 ba-construction sentences in the other two tasks. Evan produced 4 out of 10 OSV sentences and 9 ba-construction sentences in the EI task. In the other two tasks, Evan produced 14 OSV and 14 ba-construction sentences. Examples of the OSV sentences and the ba-construction sentences produced by the two learners are given in Excerpts 9.7 and 9.8.

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小王会先买，
Xiao Wang will buy some vegetables.

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小王要来我家做客，
Xiao Wang will come to my house as a guest.

小王会先买，
Xiao Wang will buy some vegetables.

The post-test results

One week after the instructional session that taught the concept of topicalization, a post-test to elicit the OSV structure and the ba-construction was administered. Test results showed that both participants were able to process OSV structure as they could produce both the OSV and the ba-construction in all speech production tasks. Table 9.3 and 9.4 above summarize the number of sentences with the OSV structure and the ba-construction across each task. Cathy correctly reproduced 5 out of 10 OSV sentences and 8 out of 10 ba-construction sentences in the EI task. Cathy also produced 16 OSV sentences and 6 ba-construction sentences in the other two tasks. Evan produced 4 out of 10 OSV sentences and 9 ba-construction sentences in the EI task. In the other two tasks, Evan produced 14 OSV and 14 ba-construction sentences. Examples of the OSV sentences and the ba-construction sentences produced by the two learners are given in Excerpts 9.7 and 9.8.

Excerpt 9.7. Examples of Cathy’s performance in the post-test

The interlocutor read (the three sentences were read in a roll):

小王要来我家做客，
Xiao Wang will come to my house as a guest.

小王会先买，
Xiao Wang will buy some vegetables.
Cathy responded after answering a question

Xiao Wang came to my house.

He has already bought some vegetables.

We don’t need to prepare anything.

Excerpt 9.8. Examples of Cathy’s performance in the post-test

The interlocutor read (the three sentences were read in a row):

I went back home.
Mother turned the radio off.

She began to talk to me.

Cathy responded after answering a question

I went back home.

Mother and I began to talk.

Interlocutor asked, what do you eat for dinner every day?
Interlocutor asked, Where do you drink coffee and tea?

Cathy responded,

咖啡 我在咖啡馆喝,
Coffee I in the coffee shop drink.

I drank some coffee in the coffee shop.

茶 我在家喝
Tea I at home drink.

I drank some tea at home

Excerpts 9.9. Cathy’s production of the ba-construction.

Interlocutor asked, how do you fry an egg?

Cathy responded,

你把鸡蛋打破
You ba egg broken
You break the egg

你把锅放火炉上面
You ba pan put on the stove
You put the pan on the stove
Excerpt 9.10. Examples of Evan’s performance in the post-test

The interlocutor read (the three sentences were read in a roll):

wǒ mǎi le shū,
I bought a book

dì tú wǒ zài xué xiào mǎi le,
Map I at school bought.

wǒ men jīn tiān shàng kè
We today have classes.

Evan responded after answering a question

wǒ yǐ jǐng mǎi le shū
I already bought some books.

dì tú wǒ yě mǎi le
Map I also bought.

wǒ kě yǐ qù shàng kè le
I can go to class.
I’m ready to go the class.

The interlocutor read (the three sentences were read in a row):

míng tiān yào shàng xué,
明天要上学，
Tomorrow need go to school.
(We) need to go to school tomorrow.

nǐ bǎ shū dōu fāng zài shū bāo lǐ，
你把书都放在书包里，
You put the books into the bag.

wǒ men zǎo yī xiē shuì jiào
我们早一些睡觉
We earlier a little bit go to bed.
We should go to bed a little bit earlier.

Evan responded after answering a question

wǒ men míng tiān yào shàng xué
我们明天要上学
We tomorrow need go to school.
We need to go to school tomorrow.

nǐ bǎ nǐ de shū fāng zài nǐ de shū bāo lǐ miàn
你把你的书放在你的书包里面
You put all your books into a bag.
Interlocutor asked, what do you drink every day?
Evan responded,

水 我 每天 喝
Water I every day drink.
I drink water every day.

Interlocutor asked, what kind of movies do you like?
Evan responded,

动作电影 我 非常 喜欢
Action movie I very like.
I like action movies very much.

Interlocutor asked, how do you make a cup of coffee?
Evan responded,

我 把 那个杯子 放了 在微波炉里面 烤 5 分钟
I ba that cup put in the microwave bake 5 minutes.
I put that cup in the microwave to bake for five minutes.

To sum up, the OSV sentences produced by the two heritage speakers indicated that the OSV structure became processable. Besides, the ba-construction was still preserved in their linguistic system.
The delayed post-test

In the delayed post-test administered one month after the post-test, both participants demonstrated that the OSV structure was preserved. They could still produce OSV structure freely. The ba-construction was also well preserved, suggesting that the learners did not confuse the OSV structure with the ba-construction. Tables 9.3 9.4 above include the number of OSV sentences and ba-construction sentences produced in the delayed post-test. Cathy produced 5 out of 10 OSV sentences and 6 out of 10 ba-construction sentences in the EI task. In the Q&A and the cartoon description task, Cathy produced 4 OSV sentences and 12 ba-construction sentences. In a similar fashion, Evan produced 8 out of 10 OSV sentences and 6 out of 10 ba-construction sentences in the EI task. In the other two tasks, Evan produced 4 OSV sentences and 16 ba-construction sentences. Excerpts 9.11 and 9.12 provide some of these examples produced by the two participants on the delayed post-test.

Excerpt 9.11. Examples of Cathy’s performance in the delayed post-test

The interlocutor read (the three sentences were read in a row):

爸妈 去年 送了 我 一本书，
Dad last year gave me a book.

那本书 我 读了 10遍，
That book I read 10 times.
I have read that book ten times.
I very like that book.

Cathy responded after answering a question

Dad last year gave me a book last year.

I have read that books for ten times.

The interlocutor read (the three sentences were read in a row):

Dad got up.

Mum ba breakfast prepared.
Mum has prepared breakfast.

爸 妈 一起 吃 早餐
Dad mum together eat breakfast.
Dad and Mum had breakfast together.

Cathy responded after answering a question

爸 妈 起床了,
Dad got up.
Dad got up.

妈 把 早餐 做了
Mum ba breakfast prepared.
Mum has prepared breakfast.

爸 妈 一起 吃 早餐
Dad and mum together eat breakfast.
Dad and Mum had breakfast together.

Interlocutor asked, what is your favorite food?
Cathy responded,

家常菜 我 最 喜欢
Home made cuisine I the most like
I like home made cuisine the most.
Cathy described the scene in the cartoon.

他看见橘子，把橘子都吃掉了
He saw orange, ba orange all eaten
He saw the oranges and ate all of them.

Excerpt 9.12. Examples of Evan’s performance in the delayed post-test

The interlocutor read (the three sentences were read in a row):

妈妈去了工作,
Mum go to work.
Mum went to work.

饭我们先煮了,
Rice we first cook.
We prepare rice first.

妈妈回来就能吃饭
Mum return can eat.
We can eat when mum is back.

Evan responded after answering a question

妈妈去工作
Mum go to work.
Mum went to work.
饭 我们 已经 做好了
Rice we already cook.

We have prepared rice.

妈妈 回来 以后 我们 就可以 吃饭
Mum return after we can eat

When Mum’s back, we can have dinner then.

The interlocutor read (the three sentences were read in a roll):

我家 有 啤酒
My home have beer

We have some beer at home.

你 可以 把 啤酒 都 喝了
You can ba beer all drink.

You can drink up all the beer

但是 你 不要 喝 汽水
But you don’t drink beverage

But you don’t drink beverage

Evan responded after answering a question

你 可以 把 啤酒 喝完
You can ba beer drink

You can finish all beer
dàn shì bù... bù yào hē qì shuǐ
但是不要喝汽水
But don’t drink beverage.

kāfēi wǒ zài kāfēiguǎn hē
咖啡我 在咖啡馆喝
Coffee I at the coffee shop drink.

Interlocutor asked, can you describe how to borrow a book from the library?

Evan responded,

... jiù bǎ nà gè shū... shū gěi yī gé túshūguǎnrén
... Then ba the book... book give a librarian

Give the book to a librarian.

In sum, the delayed post-test that was carried out one month after the post-test provided evidence to suggest that the OSV structure was still processable and it was preserved in participants’ linguistic system.

The interview at the end of the study

In the interview session after the delayed post-test, the two participants again indicated that they had never encountered the OSV structure before this study. They also indicated that when they learned the OSV structure, the OSV was quite awkward for them to use. For the ba-construction, one participant indicated that she did not know the
function of the *ba*-construction, even though she could use it. This is not surprising for those who learn languages in everyday immersion settings. After the instruction session, she had developed a much better understanding of the function of the *ba*-construction.

### 9.3 Summary

According to the results of the pre-test, the two participants were capable of processing and producing the SVO structure and the ADJ+SVO structure. On the other hand, they could not process the OSV structure. Interestingly, they were capable of producing the *ba*-construction, a Stage 5 structure according to Gao (2009) and Wang (2011) and which should only be processable following emergence of Stage 4 OSV structures. Given the circumstances under which the heritage speakers initially acquired their ability in Chinese this study suggests that it is possible for someone to skip a stage in the processing hierarchy even in a naturalistic setting. This finding corroborates a similar finding reported in Tarone and Liu (1995) with regard to an L2 English learner who attained stage 4 and 5 in English question formation prior to stage 3 in the home setting.

Comparing the pre-test and the post-test, it can be argued that instruction effectively taught the concept of topicalization. This concept was systematically formed. The delayed post-test shows the explicitly learned grammar structure was preserved. Because OSV was processable in the delayed post-test, it is believed that the instruction was every effective in teaching L2 grammar.
Chapter 10
Discussion 1

10.1 Stage Skipped: OSV without ADJ+SVO

PT’s hierarchical stages are claimed to be non-skippable. All L2 learners must reach a lower stage before they can reach a higher stage in the processing hierarchy. The Topic Hypothesis, an extension of the PT hierarchies (Pienemann et al., 2005), is aligned with the basic claim of PT. Based on information exchange between the functional structures and the constituent structures, the Topic Hypothesis states that:

In second language acquisition learners will initially not differentiate between SUBJ and TOP. The addition of an XP to a canonical string will trigger a differentiation of TOP and SUBJ, which first extends to non-arguments and successively to arguments thus causing further structural consequences (Pienemann et al., 2005, p.239).

As I have discussed in the previous chapter, the three stages of syntactic development in L2 Chinese are canonical SVO structure (Stage 2), ADJ+SVO structure (Stage 3) and OSV structure (Stage 4). According to PT, an L2 Chinese learner would not be able to process Stage 4 OSV structure unless Stage 3 ADJ+SVO structure is processable. Likewise, a learner would not be able to process Stage 3 ADJ+SVO structure unless the SVO structure is processable. Because the sequence of stages is determined by cognitive processing constraints, non-cognitive factors such as teaching cannot reverse these stages. What teaching can do is to speed up or slow down the
developmental process. PT’s claim of stage-by-stage development is under the influence of Piaget’s developmental psychology (Pienemann, 1987).

In contrast to Piaget, Vygotsky (1987) rejected a universal and predetermined stage-by-stage developmental trajectory. For Vygotsky, development is shaped and led by instruction. In other words, the only good instruction is that which leads development (1987). The clash between Piaget and Vygotsky provides the theoretical background for the current study.

To test Piaget’s and Vygotsky’s claims, the current study examines whether PT’s pre-determined L2 developmental route can be reversed by instruction. One of the predetermined routes has been defined by the Topic Hypothesis, which was supported by three studies: Gao (2009), Wang (2011), and Zhang (2007).

The current study employed an interventional design. The intervention, which was in fact instruction organized in accordance with Vygotsky’s principles of developmental education, artificially constructed a developmental route different from the one predicted by the Topic Hypothesis. The unit of instruction was the concept of topicalization in Chinese. To allow learners to fully internalize the concept, instruction followed Gal’pein’s STI, a pedagogical proposal to teach scientific concepts systematically.

The results of Study 1 showed that beginning L2 Chinese learners at Stage 2 in the processing hierarchy were capable of processing Stage 4 OSV structures without first developing the ability to process Stage 3 ADJ+SVO structures. Under instruction, five of the six participants skipped Stage 3. In the initial stage of instruction the participants learned the pragmatic function of object topicalization in Chinese and they received no instruction on adjunct topicalization. All participants were capable of processing and
producing OSV sentences in post-test-1 administered one week after instruction. Only one student, Eller, had previously encountered Stage 3 topicalization prior to the study. None of the remaining five students were capable of producing Stage 3 ADJ+SVO on post-test 1. This result challenges the claim of the Teachability Hypothesis, which argues that no instruction can reverse the pre-determined developmental route because non-cognitive factors such as instruction cannot influence the route of development. On the other hand, SCT argues that instruction, when properly organized, is a cognitive activity that promotes development. Historically and culturally constructed artifacts and activities mediate cognitive development (Lantolf & Thorne, 2006).

Vygotsky’s psychological theory on human mental development is supported by the current study as this study found that instruction was able to shape L2 development and therefore the cognitive constraints posited by PT were overcome. High quality instruction is one of the key factors that allow learners to skip a stage, a phenomenon that was found among five of the six learners, the only exception was Eller, who, it turned out had prior, though limited, knowledge of ADJ+SVO.

At this point, it is worth examining more closely Eller’s performance, which showed that she was capable of topicalizing the temporal adverbs prior to instruction. In one of the instruction sessions when the concept of topicalization was taught, Eller mentioned that her Chinese teachers had told her that time phrases (apparently they had said nothing about locative phrases) could appear in sentence initial position. However, her teachers did not explain the discourse function of pre-posing time adverbs. Therefore, not knowing the function of pre-position, Eller avoided producing such structures even though she did know it was a possibility in Chinese. STI helped Eller understand the
concept of topicalization in Chinese. As a result, she was able to produce ADJ+SVO sentences more freely after ADJ+SVO was taught. She was also capable of topicalizing the locative phrase after the second instruction session, suggesting that she had formulated a more holistic and systematic understanding of topicalization in Chinese. Her improvement in the GJT task also demonstrated that her knowledge of the ADJ+SVO structure had also developed. A further discussion of quality of metalinguistic knowledge will be given in a later part of this chapter.

### 10.2 Simultaneous Emergence of OSV and ADJ+SVO Structures

According to PT, grammatical structure at a high level stage can only emerge after a structure at a lower level stage emerges. In other words, grammar structures at two different stages should not emerge simultaneously; this would include OSV and ADJ+SVO, Stage 4 and Stage 3 structures respectively. The OSV structure is supposed to appear at a later time because processability of the OSV structure is built on the processability of the ADJ+SVO structure. Study 2 taught both the OSV and the ADJ+SVO structures at the same time. This was done to investigate whether the two structures could emerge at the same point in time. The basic finding suggested that indeed both structures could emerge together as is evidenced by the post-test performance of the two learners who participated in this part of the study.

One potential problem for Study 2 is that because the post-test was given a few days after the instruction, the learners might somehow have developed the ability to process the ADJ+SVO structure before the OSV structure in the time lag between
instruction and the post-test. A post-test given immediately after the instruction session might have been a more appropriate way to evaluate the relative status of the structures with regard to their co-emergence. I will address this issue below.

First, there was no evidence to suggest that participants could not learn the OSV structure. Study 1 showed that Chinese learners could process the OSV structure without prior ability to process the ADJ+SVO structure. Moreover, there is no evidence to suggest that the two learners were able to process the ADJ+SVO structure before the OSV structure. The ADJ+SVO would not have been covered in their Chinese class during the course of the study. Since there was no other way for them to encounter the ADJ+SVO structure (both of them indicated in the last interview that they had never encountered these two grammar structures before), it is unlikely that the learners could automatically learn the ADJ+SVO structure. Given the fact that participants in Study 1 did skip the ADJ+SVO stage, it is reasonable to argue that both structures emerged at the same time.

Second, it is true that a post-test given right after the instruction session might have been better than a post-test at a later time if the purpose had been to evaluate the sequence of emergence. However, an immediate post-test is not perfect at capturing the emergence order either. It could be argued that an immediate post-test would not necessarily reveal the developmental sequence because the ADJ+SVO structure could have been learned before the OSV structure during the instruction session. Therefore, to obtain a clear picture of what transpired with regard to the developmental sequence, one may need to look at the specifics of the instruction session in which both structures were
presented. This would include learner performance as they practiced producing the structures.

Although the OSV and the ADJ+SVO structures were introduced in the same instructional session, there was a sequential order followed during instruction. The concept of object topicalization was introduced first. Recall, that according to PT learners should not be able to process Stage 4 OSV structures if they have not yet attained the ability to process Stage 3 structures. However, the evidence suggests that participants were capable of understanding and producing the OSV structure after learning the concept of object topicalization and before they received instruction on ADJ+SVO. Excerpt 10.1 provides some of the examples of object fronting.

Excerpt 10.1.

Kris: Kělè jiějie mǎi le
    可乐 姐姐 买 了
    Cola sister buy ASP
    (My) sister bought cola

Steven: Shū wǒ kànle
    书 我 看了
    Book I read
    I have read the book.

Later on in the same session, the ADJ+SVO structure was taught. Learners produced the following sophisticated sentences after some practice when they practiced
the grammar structure in a Q&A task, suggesting that they were capable of producing the ADJ+SVO structure.

Excerpt 10.2.

Kris: Yīdiǎn wǒmen zài xuéxiào kàn le shū
一点 我们 在学校 看 了 书
One clock we in the school read the book
At one clock we in the school read the book.

…

Kris: Zài xuéxiào wǒmen zuò le gōngkè
在学校 我们 做 了 功课
in the school we do ASP homework
We did homework in the school.

Steven: Zhège shàngwǔ wǒ zài wǒjiā tīng yīnyuè
这个上午 我 在我家 听 音乐
In this morning I at my home listen to music
I listen to music at home this morning.

…

Steven: Zài wǒ de sùshè wǒ xué xí zhōngwén
在我的宿舍 我 学习 中文
In my dorm I study Chinese
I studied Chinese in my dorm.

At the end of the instruction session, these learners were capable of producing both simple and more extended OSV and ADJ+SVO sentences (Excerpt 10.3). In sum,
the evidence shows that the OSV and the ADJ+SVO structure could co-emerge at the same instruction session.

Excerpt 10.3.

Kris:

wǒn　shǔng　wǒ　zài　sùshè　hé　péng　yǒu　kuò　lède　zuò　gōng　kè　le?
晚上　我　在宿舍　和同屋　快乐地　做　功课了？
At night　I　in the dorm　with my roommate　happily　studied　homework
I happily studied homework at night in the dorm with my friends.

…

Steven:

ekèlè　wǒ　jīn　tiān　xǐwǔ　zài　sùshè　hé　péng　yǒu　hēle
可乐　我　今天下午　在宿舍　和朋友　喝了
Cola　I　today afternoon　in the dorm　with my friends　drank
I drank cola today afternoon in the dorm with my friends.

10.3 The Process of Learning L2 Chinese Grammar: A Mediated Internalization Process

The process of learning the OSV and the ADJ+SVO structures was an internalization process mediated by socially constructed artifacts (the SCOBA and the Cuisenaire rods) through participation in social activities involving both the instructor and the learners. The OSV and the ADJ+SVO structures were completely new to the participants (with the exception of Eller, as explained earlier). Internalization of the concept of topicalization was mediated by the SCOBAs and the rods. After understanding
the topicalization concept conveyed in the SCOBAs, participants used the rods to support their production of the newly learned structures. Physically moving the rods helped the learners experience and embody the concept of topicalization. At the very beginning, this concept was abstract to the learners. The SCOBAs and rods converted the abstract concept into something more concrete. Later on, learners moved away from overt reliance on the rods as they gained greater proficiency in use of the targeted grammar. At this point, the concrete materialization and the physical movement of objects had been internalized as the structures became integrated into the learners’ L2 system.

Although each learner is different from the others, all of them followed the same internalization process, even though it took longer for some learners than it did for others. In order to appreciate the process, I would like to consider the following example taken from the pilot study for the project.

In the final interview, one of the participants in the pilot study, Jane, was asked how she felt about the learning experience. The following conversation showed that she understood the targeted structures; but more importantly, her learning process was also disclosed:

Q: Can you describe the sentence structure that you have learned in this study?

Jane: In the normal sentence structure, you have subject, your time, location, then emotions, verb and object. However, if you like to emphasize the object, you put it in front of the subject and keep everything else in place. Likewise, with the time and location, they can be treated the same as the object.
Q: Did you know the sentence structure that we learned in this study before you took part in this study?

Jane: No, I haven’t been studying Chinese very long, so this is very helpful.

Q: So that means they are all completely new to you?

Jane: Yes.

Q: Do you think this method is useful or helpful for you to learn this sentence structure?

Jane: It was very helpful. I tend to be somewhat of a visual learner, so having the rods actually represent the parts in the sentence helped me form a sentence when I was speaking it, because I could look at it or I could remember the rods, and it would help me form the sentence.

Q: Did you give up the rods in the later time?

Jane: Emm, Yes. After a while, you kind of got the feel of what the sentence structure was, and you got to a point where you don’t really have to think…like… visually think about the rods in the head when you are trying to form a sentence….

The answer to the first two questions showed that Jane understood the concept of topicalization, and she knew nothing about OSV or ADJ+SVO structures before this study. At the very beginning of the study, the Cuisenaire rods helped her produce the target structures and Jane relied heavily on them to regulate her production. Later on in the same instruction session, she no longer needed the rods when producing the targeted structures. However, she reported visualizing the rods in her head. In the second and third instruction sessions, she did not need to consciously think about the rods when producing the targeted structures. Her description of how she used the rods to support her language
production disclosed how L2 grammar learning could be mediated by physical objects. The internalization process of was captured in the instruction sessions. At the very beginning, Jane used the rods extensively to construct OSV sentences (Excerpt 10.4).

Excerpt 10.4.

苹果 他 吃了
píng guǒ tā chī le
The apple he ate.

He ate the apple.

She found it necessary to look at the rods continually when the concept of topicalization was first introduced to her. She even physically put her fingers on the rods and then moved her finger along the rods one by one when she produced an OSV sentence (Figure 10.1). The speed of OSV production was slow at this time and she struggled to produce even the simplest OSV sentence.

Figure 10.1. Jane relied on the rods to keep sentence order.
At a later time in the very same instruction session following additional practice, Jane was able to produce complex OSV sentences without the presence of the rods, as is illustrated in Excerpt 10.5.

Excerpt 10.5.
手表  他  昨天  买了
shǒu biǎo  tō  zuó tiān  mǎi le
Watch  he  yesterday  bought.
He bought the watch yesterday.

Although she produced the sentence in Excerpt 10.5 with some difficulty, Jane did not look at the rods. It suggests that her language production was no longer regulated by a physical object. In the second instruction session, Jane produced a lengthy OSV sentence (Excerpt 10.6).

Excerpt 10.6.
芒果汁  我  昨天  在家  高兴地  和弟弟  喝了
máng guǒ zhī  wǒ  zuó tiān  zài jiā  gāo xìng dì  hé dì dì  hē le
Mango juice  I  yesterday  at home  happily  with my brother  drank.
Yesterday at home, my brother and I happily drank the mango juice.

Right after Jane produced the sentence in Excerpt 10.6, the instructor was curious about what Jane was thinking and asked how she was able to produce such a complex
sentence. The following conversation (Excerpt 10.7) ensued, which provides some insight into how Jane was able to construct the complex sentence.

Excerpt 10.7.
T: Tell me what you are thinking when you are making this sentence.
Jane: I am thinking about the rods to keep the order.
T: You said you are thinking about the rods?
Jane: Maybe not thinking about the rods specifically, but remembering the order of the words I am presenting.
T: Now think about simple sentences. Do you need to think about the order?
Jane: No, I think the more you use it the more you don’t really need to think about the order, because it’s just concept.
T: OK, so if you want to emphasize the object, suppose that there are only three words, or three parts in the sentence. You can say you can make sentence with that? Can you?
Jane: Emphasizing the object? A simple sentence?
T: Yes.
Jane: 西瓜 我 吃了
Watermelon I ate.
Jane did not memorize the specific sentence. In fact, she produced the sentence online. The word order, which had earlier been regulated by the rods, had become part of her conceptual knowledge that regulated her L2 production. To produce a simple OSV sentence, she did not need to consciously think about the word order. The simple OSV sentence in Excerpt 10.7 was produced quickly and spontaneously, without hesitation or signs of conscious thinking.

Jane’s example shows how development might take place. It is a process of internalizing external affordances through participation in sociocultural activities (Ratner, 2002). Development largely depends on the types of external affordance and social activities available. For this reason, external affordances and social activities play a fundamental role in shaping development. In the context of L2 Chinese development, instruction, the external affordance and activities made available to the L2 learners, can create artificially constructed L2 development.

10.4 Declarative/Procedural Memory, Implicit/Explicit Knowledge and Processability Theory

Two types of memory systems are involved in language learning: the declarative memory system and the procedural memory system (Paradis, 2004; Ullman, 2001). Both systems are necessary for learning a language. But they take on different responsibilities during the learning process.

The declarative memory system depends on neural structures in the medial temporal lobe (the hippocampal region), the entorhinal cortex, the perirhinal cortex, the parahippocampal cortex, as well as the lateral temporal lobe structures (Ullman, 2004).
This memory system is involved in learning and representation. It stores semantic knowledge (e.g. facts) and episodic knowledge (e.g. events) (Ullman, 2004). The declarative memory system “is important for the very rapid learning … of associative binding of information” and some knowledge within the system can be “consciously recollected” (Ullman, 2004, p.235). According to Ullman’s Declarative/Procedural (DP) model, explicit semantic knowledge, such as the form-meaning association of the lexicon, is supported by the declarative system:

The system sub-serves the acquisition, representation and use not only of knowledge about facts and events, but also about words; it stores all arbitrary, idiosyncratic word-specific knowledge, including word meanings, word sounds, and abstract representations such as word category. (Ullman, 2004, p.244-245)

The procedural memory system is composed of a set of neural network structures including the frontal lobe, the basal-ganglia, the parietal lobe and the cerebellum. Different from the declarative memory system that supports rapid learning, the procedural memory system supports gradual learning, which “occurs on an ongoing basis during multiple presentations of stimuli and responses” (Ullman, 2004, p.237). Information stored in the procedural memory system is rule-like. These “rules apply quickly and automatically, in that the response is triggered by the stimulus rather than being under conscious control” (Ullman, 2004, p.237). According to the DP model, automatic implicit knowledge, such as that of the L1 grammar, is supported by the procedural memory system:
The brain system underlying procedural memory subserves the mental grammar. This system underlies the learning of new, and the computation of already-learned, rule-based procedures that govern the regularities of language—particularly those procedures related to combining items into complex structures that have precedence (sequential) and hierarchical relations. (Ullman, 2004, p. 245)

Although both systems are important for learning, the functions of these two systems are different. In the language domain, these two memory systems support two different types of linguistic knowledge. The declarative memory system supports explicit linguistic knowledge such as the mental lexicon. The procedural memory system supports implicit linguistic knowledge such as the L1 grammar. Neuroimaging data provides support for the distinctive functions of the two memory systems. When processing semantic and lexical knowledge, the temporal regions and the medial temporal structures would be activated (e.g. Newman, Pancheva, Ozawa, Neville, & Ullman, 2001). When processing or producing L1 syntax, the frontal basal ganglia circuits would be activated (Embick, Marantz, Miyashita, O’Neil, & Sakai, 2000; Friederici, 2002).

The distinctive functions of the two systems in supporting L1 processing are straightforward. How the two systems support L2 processing is more complicated. The differences arise from L2 grammar processing. Depending on various factors such as age-of-acquisition and proficiency levels, L2 grammars may be supported by either the procedural memory system or the declarative memory system. There may also be a sensitive period in terms of how L2 grammars are supported by the two memory systems: after puberty, the procedural memory becomes less efficient for learning; the declarative memory system tends to remain relatively efficient until much later in life (Ullman, 2001). In other words, learning an L2 after puberty could lead to a marked difference in how L2
grammars are supported by the two memory systems. Early bilinguals (e.g. before age 4 or 5) rely heavily on the procedural memory system to learn L2 grammars (Paradis, 2009). When early bilinguals process L2 grammars, their procedural memory system may take charge. On the other hand, late L2 learners (learning an L2 after puberty) rely heavily on the declarative memory system to learn L2 grammars, especially in instructed settings. Therefore, their L2 grammar is often supported by the declarative memory system (Paradis, 2009).

In the L2 classroom setting, it is not easy for an L2 learner to obtain a great deal of exposure to the kind of L2 input available for learners in immersion settings, whether L1 or L2 (Singleton, 1989). To learn an L2 grammar implicitly is very difficult in the absence of sufficient exposure. L2 grammars learned through formal instruction are usually stored as explicit knowledge sub-served by the declarative memory system and access to the explicit knowledge can be sufficiently fast to allow speakers to use the language spontaneously (Paradis, 2009). A large number of studies support the fact that adult language learners are different from early bilinguals in terms of how L2 grammars are learned and processed (e.g. Coppieters, 1987; Hahne, 2001; Dehaene et al., 1997; Johnson & Newport, 1989; Patkowski, 1980; Weber-Fox & Neville, 2001). To be brief, L2 adult learners in the classroom setting often rely on the declarative memory system to control L2 production due to a lack of automatic procedural processes to support L2 production.

In Paradis’s (2009) words: “to the extent that a language has been internalized, its implicit grammatical competence is processed by procedural memory; to the extent that there are gaps in the implicit competence for one of the languages, the speakers will
compensate for them by using explicit knowledge sustained by declarative memory” (p. 29). That’s why L2 learners, especially at the beginning level, often struggle to control their L2 production because they lack an implicit L2 grammar to support their L2 production. Suppose that an L2 speaker has an L2 stored in the procedural memory system, this speaker is expected to use the L2 in a way similar to the L1. The learner would be able to understand and produce sentences “at the rate of 14 morphemes per second” (Paradis, 2009, p. 41). This is very demanding even for advanced, not to mention beginning, L2 learners. Therefore, beginning adult L2 learners are unlikely to use the procedural memory system to store L2 grammatical knowledge.

What might have been ignored by PT is that adult L2 depends on explicit learning. Pienemann assumes that L2 processing mechanisms are the same as L1 processing mechanisms. If an L2 learner satisfies the emergence criteria (e.g. production of no less than 3 instances of a grammatical structure when the context is present), the grammar is regarded as processable (implicit knowledge), which is assumed to be supported by the procedural memory system (according to Ullman’s model). In other words, PT assumes that its emergence criteria can measure implicit knowledge (or knowledge that is supported by the procedural memory system). However, no neural evidence is provided to support this assumption. And according to Paradis’s neurolinguistic theory and Ullman’s DP model, this assumption does not seem to rest on firm ground.
10.5 The Neurolinguistic Theory and the Teachability Hypothesis

If Paradis’s neurolinguistic theory is correct, a large amount of L2 development in the classroom setting is likely to comprise explicit knowledge stored in the declarative memory system. Therefore, the quality of this knowledge depends heavily on the quality of instruction. Developmental route of L2 explicit knowledge, supported by the declarative memory system, could be intentionally constructed. If L2 development has “stages”, these “stages” can be artificially constructed through high quality instruction that feeds into learners’ internal needs such as working memory, a factor that is closely related to learning explicit knowledge (Paradis, 2004). In other words, teaching does matter in shaping L2 development, which is in contradiction to the claims of the Teachability Hypothesis.

One difficulty of learning the OSV structure may be that this grammatical structure is seldom used in English (it should be emphasized that the PT hierarchy can be applied to all learners with different L1 backgrounds, Pienemann, 1998). L1 English learners often confused the object with the subject when they encountered an OSV sentence in Chinese (several participants had mentioned that the major difficulty of OSV is that English does not place object in the front). Our instruction, using mediation such as the SCOBA and the Cuisenaire rods, allowed learners to overcome the difficulty presented by topicalization, which was intentionally built and made available to the participants. Because the OSV structure was not present in learners’ procedural memory system, L2 learners have to employ explicit knowledge to support their production of OSV sentences. The SCOBAs and the rods helped the learners to establish high quality
visualized explicit knowledge of topicalization. The L2 Chinese learners could bring this knowledge to consciousness at any time when they had difficulty in understanding and producing the structure. With practice, access to the explicit knowledge of topicalization could accelerated (Paradis, 2004), allowing learners to produce the target grammar structure at a sufficiently fast rate to be able to comply with the requirements of the elicitation procedures. In fact, all participants in the current study were able to process and produce the OSV structure after instruction. As all targeted structures were still present in the learners’ linguistic system at the end of the study, as attested by the delayed post-test, the power of using SCOBAs and materialized behavior in the form of the Cuisenaire rods turns out to be very effective in mediating the internalization and preservation of L2 grammatical knowledge.

10.6 Quality Instruction on Sustainability of L2 Grammar

All the learners were able to maintain the concept of topicalization in their linguistic system after a one-month interval between the last session of instruction and the delayed post-test. In the final interview, all participants could verbalize the concept of topicalization, which suggests that the concept is explicit and can be brought to consciousness at any time when needed. This is because the concept is systematically taught, which can leave a strong memory trace in the long-term memory system. If the learners can understand the logic and the meaning behind a concept, it is not easy for them to forget it.
In the current study, the concept of topicalization, learned through materialized mediation, served learners’ L2 production in the long run. One of our participants, Kris, provided a good example to illustrate the idea. The rods allowed Kris to maintain production of the targeted structures throughout the study. Whenever Kris had difficulty in producing OSV sentences due to vocabulary issue, she would recruit the mental “rods” to support her L2 production. In Figure 10.2, Kris unconsciously produced co-expressive gestures when she struggled over vocabulary that hindered her OSV production (she had no difficulty in producing OSV using vocabulary she was familiar with). Materialized mediation can enable learners to consciously think about the materialized mediation to support their language production. In fact, Kris admitted that she was a visual person and the colors of the rods were very helpful for her to memorize each sentence element. She also mentioned in the first instruction session that she would picture the rods in order to help her maintain sentence structure.

Figure 10.2 was taken from the first instruction session when Kris was producing a long OSV sentence. It showed that Kris was looking at the table and she tapped her fingers along a straight line in a way that resembled the layout of the rods, which were arranged in a straight line.
When being asked what she was thinking at the time, she mentioned that she was thinking about the rods:

Excerpt 10.8.

Instructor: I see you are pointing… what are you pointing at?
Kris: Yeah. I just go by the order… just make sure the order.
Instructor: You mean the blocks?
Kris: Yeah. I just have a word in my head and I just wanna think about which one goes where.

As far as the concept was concerned, the learners could become quite creative when producing OSV sentences. They could use newly learned phrases and vocabulary. But using new phrases and vocabulary could increase the load on a learner’s working memory system. In the situation when a learner struggled to think about the newly learnt
phrases and vocabulary, the rods might help them reduce the cognitive load on working memory (I will discuss working memory further in the next chapter). Kris provided a good example of how she used the rods to regulate her sentence production when there was a heavy load on the working memory system. She was asked to describe a cartoon scene during an instruction session. In the cartoon, Jerry, the mouse, spat soup at Tom. Kris wanted to use the OSV structure as well as the Chinese phrase “at Tom”. As Kris had never learned the phrase, she asked for help. The instructor provided the term “at Tom” and Kris produced the following sentence (Excerpt 10.9).

Excerpt 10.9.
Kris: 唐 Jerry 向 Tom 吐
Soup Jerry at Tom spit
Jerry spit soup at Tom

The locative adverb “at Tom” in Chinese is placed in the pre-verbal position, which, as already explained, differs from normal English adverb placement. This structure created some conflicts between the L1 and the L2. The new phrases and the OSV structure place a heavy load on Kris’s working memory. To produce the target structure, Kris used the mental Cuisenaire rods in order to regulate her production (the left figure in Figure 10.3), despite the fact that the real rods were unavailable. The use of mental rods could be detected from her co-expressive gesture. When she produced the
target sentence, her fingers were pointing at the table and made jumping movements in a serial order fashion, which resembled exactly the layout of the rods. In some cases, her hand even mimicked the rods: her thumb and her index finger formed a gap, a gesture of holding the rods (the right figure in Figure 10.3).

Figure 10.3. Kris’s co-expressive gesture.

When she was asked about the pointing gestures, she said she was thinking about the meaning of the words and the word order (Excerpt 10.10). In fact, her co-expressive gesture showed that Kris thought about the rods in order to help her produce the target sentence structure that contained many new elements to her. This is a good example showing how human’s cognitive function is regulated by material mediation when the cognitive load becomes heavy.

Excerpt 10.10.

Kris: It's just like making sure of the words... the word order...
Instructor: You are thinking about the word order?
Krisit: Yeah. Like the words' meaning coz they are new to me. And then the Tom and Jerry thing (referring to the subject and object)... moving the object towards.... Tom was weird for me because in English we don't do that. You’re keeping like something in between like "and", "or" something...

Kris: Oh, their names are confusing me too… Okay, I am going to get this. (Kris is struggling with the names, the grammar and the new vocabulary. She unconsciously used the gestures that resemble the rods in series order to help her maintain the grammar structure). With the assistance from the mental images provided by the rods and the new vocabulary item provided by the instructor, Kris was able to produce a new OSV sentence that had not been taught during the lesson:

**Excerpt 10.11**

<table>
<thead>
<tr>
<th>Kris:</th>
<th>汤</th>
<th>Jerry</th>
<th>向</th>
<th>Tom</th>
<th>吐…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tang</td>
<td>Jerry</td>
<td>xiang</td>
<td>Tom</td>
<td>tu</td>
<td></td>
</tr>
<tr>
<td>Soup</td>
<td>Jerry</td>
<td>at</td>
<td>Tom</td>
<td>spit</td>
<td></td>
</tr>
<tr>
<td>Jerry spit soup at Tom.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the instruction session, the Chinese phrase 朝某人 (chao mou ren, at/towards someone) had not been taught. However, with the assistance of the mental rods, Kris was capable of producing the target sentence. The self-regulated language production represented how a higher mental function is formed, which supports Vygotsky’s (1987) argument that human higher order mental functioning has its origins in the external
sociocultural environment. Kris’s production of the target sentence is supported by two types of assistance: other regulation and self-regulation. The new words were provided by the instructor and the OSV sentence structure was maintained by her visual images of the rods, the self-regulation process that started from the object-regulation process (the rods and the SCOBA).

Despite the fact that Kris made gestures from time to time when she spoke Chinese, she did not always make co-expressive gestures. In fact, when she produced SVO structures, she seldom produced such gestures. In the last interview, Kris mentioned that she did not need to think about the rods when producing SVO sentences because English had the same sentence structure. On the other hand, the OSV structure was different because she did not use this structure in English. At an early stage when Kris learned to produce OSV sentences, she had to think about the rods to regulate her thinking. At a later stage following more practice Kris’s production of OSV structures became more fluent and speeded up. Her gestures co-occurred with OSV sentences reduced dramatically, a sign indicating that she had more self-regulated control over the OSV structure.

10.7 Processability of the Ba-construction and the OSV structure

One important finding of the current study is that the two heritage speakers could process and produce the ba-construction without the OSV structure in their linguistic system. The two heritage speakers did not receive formal training in Chinese and the ba-construction was learned through daily communication. In other words, they acquired the
ba-construction through implicit learning mechanisms. Although they could produce accurate ba-construction sentences, they could not explain the function of the construction, suggesting that the structure had been acquired implicitly and was under the control of their procedural memory system.

In short, the ba-construction was implicitly learned. As a result, this structure should be supported by the procedural memory system. Their grammar knowledge was different from the beginning Chinese learners whose explicit grammatical knowledge was largely supported by the declarative memory system. For these two heritage speakers, the OSV structure was completely new, suggesting that the OSV structure was not present in their procedural memory system. However, without stage 4 OSV structure, they were still capable of producing Stage 5 ba-construction.

As we have discussed in the previous chapter, SVO is the most common structure in Chinese (Li & Thompson, 1981). Therefore, it is regarded as the canonical word order (Gao, 2009; Wang, 2011; Zhang, 2007). But interestingly, SOV structure (many of them include the ba-construction) is also very common in Chinese (Li & Thompson, 1981). However, the OSV structure is relatively rare compared to the other two options. Frequency and saliency play a critical role in language learning (N. Ellis, 2007; Tomasello, 2003). The highly frequent ba-construction in Chinese would therefore be expected to have a significant impact on how this structure was learned by the two heritage speakers. According to PT, the frequency of a grammatical structure is not the key factor in determining the developmental order because frequency is not supposed to override PT’s processing constraints.
The two heritage speakers in the current study seem to provide counter evidence to Pienemann’s claims because they were able to process the highly frequent ba-construction (Li & Thompson, 1981), while the OSV structure was clearly not in their respective grammatical systems. Although the current study did not offer direct evidence to prove that frequency of a grammar structure can override the processability constrains, I hypothesize that there may be a potential effects of frequency on L2 grammar development.

10.8 Summary

Traditional cognitive theory is primarily interested in the cognitive function of the brain. However, human cognition cannot be formed without the environment. Vygotsky (1987) argued that human cognition is fundamentally social. As the mind is mediated, socially constructed mediation plays a fundamental role in shaping human cognition. Therefore, the quality of mediation can determine how human cognition develops, which is in contrast to the claim of the Teachability Hypothesis that rejects the deterministic role of instruction in L2 development.

Neurolinguistic theory proposed by Paradis and Ullman suggests that adult L2 learned through formal instruction is mainly supported by the declarative memory system. Adults are not good at using procedural memory system in learning an L2 because the procedural memory system declines dramatically after puberty (Paradis, 2009). Neural evidence suggests that adult learners rely heavily on their declarative memory system to learn an L2. In other words, adults’ learning mechanism of an L2 (mainly through the
declarative memory) is different from the learning mechanism of an L1 (mainly through
the procedural memory).

This does not mean that adult learners do not use procedural learning mechanism
at all. However, to allow procedural learning mechanism to take charge, a great deal of
input is needed. L1 learning environment provides this input for the procedural memory
system to learn the L1. For adult L2 learning in the classroom setting, things are different.
Using procedural learning mechanism to learn an L2 may not be efficient because
learning via the procedural memory depends heavily on input and requires a great deal of
time (Ullman, 2004) and knowledge supported by the declarative memory system cannot
be converted to knowledge in the procedural memory system (Paradis, 2009). Moreover,
adult learners are not good at procedural learning. But adults are good at using
declarative memory system to support learning (Ullman, 2004). Instruction that feeds into
the declarative learning mechanism becomes crucial for L2 learning. It has been shown
that instruction that promotes scientific concepts can create high quality explicit
knowledge that fits nicely with adult’s learning mechanism (the declarative memory
system). Adult learners would be able to compensate for the linguistic gap in their
procedural memory system with high quality explicit knowledge that can be brought to
consciousness at any time. Therefore, the quality of the explicit L2 knowledge cannot be
ignored when studying L2 development.
Chapter 11
Discussion 2

Our results also showed that L2 grammar acquisition is also associated with another important cognitive factor: working memory (WM). WM “refers to the system or systems that are assumed to be necessary in order to keep things in mind while performing complex tasks such as reasoning, comprehension and learning” (Baddeley, 2010, p.136). According to Paradis (2009), L2 grammar is mainly stored in the declarative memory system, which is closely related to working memory. Therefore, working memory is a crucial cognitive factor that influences adult second language acquisition. Indeed, studies have shown that working memory is closely related to L2 acquisition and performance (e.g. Baddeley, 2003b; see Michael & Gollan, 2005 for a review). Therefore, it is worthwhile to have a closer look at this important cognitive factor.

11.1 Extending the Phonological Loop

11.1.1 Baddeley’s working memory model

Before further discussion on how working memory may be associated with L2 production, it is necessary to have a brief introduction of working memory theory because working memory has been regarded as the central part of cognitive processing
Working memory “temporarily maintains and stores information, supports human thought processes by providing an interface between perception, long-term memory and action” (Baddeley, 2003a).

Baddeley and Hitch (1974) proposed a model to suggest that working memory has multiple components that deal with real time cognitive processing: the central executive (a component dealing with executive function), the phonological loop (a component dealing with phonological information), and the visuo-spatial sketchpad (VSSP, a component dealing with visual spatial information). Later, Baddeley (2000) extended the model to include a fourth component, the episodic buffer, which deals with integration of various types of information. Figure 11.1 (adapted from Principles of Cognitive Neuroscience, 2012) gives a nice visual representation of Baddeley’s model.

Figure 11.1. Baddeley’s working memory model.
The central executive plays a central role in the WM model. It is regarded as the most important but least understood component (Baddeley, 2003a). It can interact with the other three components of WM and is responsible for functions such as control of behavior and attention, activation of long-term memory, between-tasks shifting, etc. (Baddeley, 1996). In sum, the central executive is involved in all types of tasks that need to recruit the working memory system.

The phonological loop is a passive slavery system that maintains verbal information in the short-term memory system. It “comprises a phonological store, which can hold memory traces for a few seconds before they fade, and an articulatory rehearsal process that is analogous to subvocal speech” (Baddeley, 2003a). There are two ways to maintain the memory traces in the phonological loop: retrieval or re-articulation. In Figure 11.1, the retrieval process is represented by the blue double directional arrow and the re-articulation process is represented by the blue self-pointing round-shape arrow. As articulation takes place in real time, the phonological loop has a limited capacity (Baddeley and Hitch, 1974). One notable feature of the phonological loop is that it can deal with both auditory and visual input. This concept is demonstrated in Figure 12.2. Auditory input is encoded and directly enters the phonological store directly. On the other hand, visual input such as orthographic input is first coded into phonological information and then entered into the phonological store. This is how written information is processed and stored via the phonological loop.

The most important function of the phonological loop is related to language. It has been proposed by Baddeley and his colleagues that the phonological loop serves to facilitate language acquisition (Baddeley, Gathercole, & Papagno, 1998). Evidence came
from a patient who could not learn new vocabulary because of a deficit in the phonological loop (Atkins & Baddeley, 1998). Such a claim is also supported by the fact that disrupting the phonological loop (e.g. impairing the quality of the phonological representation in the phonological loop) would deteriorate the acquisition rate of new vocabulary (Gupta & MacWhinney, 1997; Martin & Gupta, 2004). So the capacity of the phonological loop is closely related to success of learning a new language. Indeed, it was found that the capacity of the phonological loop is a good predictor of the learning outcome of a new language (e.g. Atkins & Baddeley, 1998; Conway et al., 2008; Dörnyei, 2005; Dörnyei, 2009; Miyake, 1998; Robinson & Ellis, 2008).
Another module that runs parallel with the phonological loop is the visuo-spatial sketchpad (VSSP), which maintains visual nonverbal information in the short-term memory. According to Baddeley (1986), the VSSP is specialized for generating and manipulating mental images. Similar to the phonological loop, the VSSP also has a limited capacity. Within the VSSP, there are two dissociated sub-memory components: the visual memory store that maintains visual information and the spatial memory store that maintains spatial information. So the visual memory store deals with “what” and the spatial memory store deals with “where”.

The function of the VSSP is usually associated with non-verbal intelligence Baddeley (2003a). Studies have shown that the capacity of the VSSP is linked to the success in the field such as architecture and science (e.g. Verstijnen, et al., 1998). Baddeley (2003a) argued that the VSSP might serve to facilitate the acquisition of semantic knowledge such as the “appearance of objects and how to use them”, “complex systems such as machinery”, and “spatial orientation and geographical knowledge” (p.834).

The episodic buffer, a new component incorporated in the working memory model, has a limited storage capacity and “is capable of integrating information from a variety of sources” (2000, p. 421), which serves as an interface between the subsystems of working memory, long-term memory and the central executive (Baddeley, Allen & Hitch, 2011). The episodic buffer is under the control of the central executive and can be consciously accessed. Different from the phonological loop and VSSP, which are specialized in storing a specialized modality of information, the episodic buffer features a capacity to hold and process different forms of information. The main function of this component is to enable “a range of different subsystems to interact, despite being based on different codes, with a major function of the buffer being to bind together different sources of information to form integrated chunks.” (Baddeley et al., 2011, p.1393). Accordingly, the episodic memory may be associated with verbal, visual and spatial information processing.

One important feature of the working memory model is its relation to the long-term memory. As shown in Figure 11.1, the model assumes that the three slavery components of the working memory interact with their counter-parts in the long-term
memory system. For example, the phonological loop retrieves information from the long-
term memory system. Information in the phonological loop can be consolidated and then feeds into the long-term memory system to become part of the verbal long-term memory:

Language. The double directional blue arrows in Figure 11.1 between the phonological loop and Language represent the interaction between working memory and long-term memory. Based on this relation, it is not difficult to believe that a larger phonological loop is beneficial to the process of consolidating verbal information into long-term memory, which improves the rate of language acquisition.

11.1.2 Working memory and L2

As one might have also noticed, one similar characteristic shared by all three slave components (phonological loop, VSSP and episodic buffer) is that all of these components have a limited capacity. That is to say, only a limited amount of information can be maintained in the working memory system at a given period of time. It has been claimed that a difference in working memory capacity may lead to a difference in cognitive functioning (Conway et al., 2008). Indeed, as we have discussed above, working memory capacity is associated with a variety of cognitive functions, including learning a language. A larger working memory is related to a higher rate of language learning (see a review by Baddeley, Gathercole, & Papagno, 1998). Recent studies by Biedroń and her colleagues (Biedroń, 2012; Biedroń & Szczepaniak, 2012) found that gifted language learners usually have a higher capacity of the phonological loop, which
provides further evidence to support the advantage in learning a language with higher working memory capacity.

Previous evidence shows that people with a higher working memory capacity, especially in the phonological loop, would have an advantage in learning a new language. According to this relation, it can be predicted that learners with a smaller phonological loop may have a lower rate of language acquisition as compared to others. They would have more difficulty in acquiring the vocabulary and grammar of a new language because their phonological loop is not capable of holding a lot of information. Can L2 learners with a learning disadvantage due to a smaller phonological loop, be compensated for their disadvantage? Researchers say ‘yes’. In a longitudinal study by Gathercole and Tiffany (2005), children aged between 5 and 8 with poor verbal short-term memory skills (phonological loop) had a slower phonological learning rate. But this slow learning rate could be compensated by a large amount of exposure to language or by employing specific learning strategies. This seems to be true for L1 acquisition. Disregarding the working memory capacity, children usually do not have any problem in acquiring their L1. The environment provides a large amount of exposure and even a slow acquisition rate would not matter. But this is not true for L2 learning. For adult learners, they usually don’t have a large amount of L2 input unless they have an immersive experience.

Without the environment of learning, a small working memory would have a strong impact on the acquisition of a new language (Atkins & Baddeley, 1998; Martin & Gupta, 2004).

One solution for the adult learners with small working memory is working memory training. If training can enhance their working memory capacity, more
information will be held and learning rate may be improved as a result. Although working memory capacity is usually regarded as a stable trait, there is evidence to suggest that working memory can be improved through extensive training (see Klingberg (2010) for a review). For example, Klingberg, Forssberg, and Westerberg (2003) trained kids with ADHD (Attention Deficit Hyperactivity Disorder) over a 5 week period using a computerized program. Rewards were provided if there was improved performance on WM tasks. It was found that the trainees had significant improvements in WM tasks that were not used in the training program. Holmes, Gathercole, and Dunning (2009) used the adaptive and non-adaptive version of a same computer program to train children with low working memory capacity and found that training improved not only their performance in the working memory tasks, but also improved their mathematical ability six months after training.

11.1.3 Extending the phonological loop

Besides training, another solution may be to extend their working memory by recruiting other components of the working memory system, e.g. the VSSP, to work with the phonological loop. To do so, instruction and cognitive mediational tools are crucial. Teaching vocabulary or grammar of a new language through pure verbal explanation can be overwhelming. For learners with a smaller phonological loop capacity, verbal information may overload their working memory much faster compared to learners with a larger phonological loop. As less information is processed and rehearsed in the phonological loop, less memory trace can get into the long-term memory system, leading
to a lower learning rate. Instruction that taps into learners’ VSSP may be effective to overcome such a disadvantage. Gal’perin’s STI seems to be a powerful tool in this sense. STI does not rely solely on verbal explanation (as being discussed in the previous chapters, pure verbalism is not a good type of instruction). Instead, SCOBAs intend to turn abstract verbal concepts into concrete visible concepts.

In the current study, the movements of sentence elements in the SCOBAs are a visual and spatial representation of the topicalization concept in Chinese, which was a completely new syntactic structure for most of our participants. As shown in the SCOBAs, the pictures, together with the color blocks underneath the pictures, present sentence elements visually, which deals with the question of “what”. They allow learners to recruit visual storage in the VSSP to digest the concept of topicalization. In fact, one of the participants mentioned that she did not know the name of sentence elements (e.g. adverb, object). For this learner, the pictures could help her visualize each part of a sentence. The layout of the pictures (e.g. Subject+Verb+Object) contains spatial information that deals with the question of “where”. The movement of the Object to the front of a sentence is targeting at the VSSP as well. The color rods also serve the same purpose. They allow learners to form visuospatial images. The color rods enable learners to manipulate sentence elements and to “play” with the concept of topicalization. Through such a process, learners could actively engage in the moving sentence elements to construct sentences, which became their embodied experience. The VSSP, of course, would be recruited when learners manipulated the movement of the color rods. The embodied experience, together with rehearsal of the concept of topicalization in VSSP through the color rods, allows memory trace to consolidate in the long-term memory.
system. In the current study, the SCOBAs and the color rods turn out to be extremely powerful in supporting L2 learning.

Different from the pure verbal concept that may be stored in verbal long-term memory, learning based on visuo-spatial concepts feeds information into the VSSP. This information can be consolidated into visual semantics, another form of long-term memory (see Figure 11.1). The visual semantic can be retrieved by the VSSP at a later time when the concepts are needed to perform cognitive tasks. In fact, our data shows that visuo-spatially formed long-term memory served to facilitate language production.

11.2 The Small Working Memory Case

The Letter-number sequencing task (LNS) was used to measure working memory capacity. The LNS task requires the test takers to maintain and reorganize verbal information and it has been widely used to measure working memory capacity. As numbers and letters in the LNS are read, the task is tapping into learners’ ability to store verbal information. Therefore, the task is measuring the storage capacity of the phonological loop. Two versions of LNS had been administered: the English version and the Chinese version. These two versions measured phonological capacity in both L1 and L2. For the English version, the mean score of the task was 13.3 (Std.=2.6). For the Chinese version, the mean score was 7.7 (Std.=3.3). Among all of our participants, Kris had a very small working memory capacity because she had an extremely low score in the two versions of LNS.
In the English version of LNS, she scored 8 points, as compared to the mean score of 13.3 points (Std.=2.6) of the other nine participants. Kris scored about two standard deviations below the mean score of the other participants in the study. For the Chinese version of the LNS, Kris did not perform well (she had no problem with the Chinese numbers as she could fluently produce numbers in Chinese). She scored 2 points, about six points below the average score of 7.7 points (Std.=3.3). Since we do not have the average score of the Chinese version of LNS by L2 Chinese speakers as a reference, we could only use the scores of the participants in our study as the reference. But Kris scored more than one standard deviation from the mean score, suggesting her Chinese working memory capacity was quite small. Kris’s performance in the two tasks was given in Table 11.1. Because Kris’s performance in the two versions of the LNS was much lower than the others, we believe that she had a relatively low phonological loop capacity. Therefore, she could be regarded as a disadvantaged L2 learner.

Table 11.1. Raw scores of the working memory task.

<table>
<thead>
<tr>
<th></th>
<th>Chinese Version</th>
<th>English Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eller</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Cathy</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>John</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Myla</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Amy</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Kris</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Alisa</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Evan</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Leo</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Steven</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Mean</td>
<td>7.7</td>
<td>13.3</td>
</tr>
<tr>
<td>Std.</td>
<td>3.3</td>
<td>2.6</td>
</tr>
</tbody>
</table>
It seems that the working memory capacity appears to be correlated with the Chinese language performance. According to the vocabulary recognition task given before the pre-test, Kris had a smaller Chinese vocabulary size than others. Kris recognized 49 words in the recognition task, as compared with the average number of 60 words among other the participants (excluding the heritage speakers). This result suggests that Kris might be a disadvantaged learner.

However, despite the fact that Kris had a small phonological loop capacity, our instruction allowed Kris to process and produce the OSV structure. If Kris was a disadvantaged learner with low working memory capacity, it may be predicted that she might encounter extreme difficulty when producing OSV structure. She may also have a slower learning rate as compared with other participants. However, she did not show any difficulty in processing and producing OSV. In fact, the delayed post-test suggests that her OSV structure was well preserved one month after the last instruction session, indicating that OSV had been consolidated in her long-term memory system.

We believe that the SCOBAs and the color rods were very useful in extending her working memory. First, Kris learned the grammar through the SCOBAs and the color rods, which allowed her to employ VSSP in understanding the concept of topicalization and then turned the concept into visual semantics in her long-term memory. This long-term memory assisted her language production when she faced difficulty in producing the target sentence structures.

In her first instruction session, Kris mentioned that she would visualize the rods and the sentence elements when she produced complex sentences with OSV structures. Producing complex sentence in OSV structure is not easy for beginning learners,
especially when the focus is to retrieve the appropriate L2 vocabulary. During such a process, learners not only need to maintain information of word order, but they also need to retrieve the right lexicon, which could pose a very heavy load on their phonological loop. After all, for the beginning L2 learners, all this information (including word order and mental lexicon) is supported by the declarative memory system (Paradis, 2009). For learners with a smaller working memory, maintaining all this information in the phonological loop could easily overload the phonological loop system, which could slow down the production process or even lead to a breakdown in production. However, whenever Kris had difficulty producing sentence, she would think about the rods, which was reflected in her natural co-expressive gesture during production.

The following example is a typical co-expressive gesture. In this example, Kris described a scene in the cartoon. Because there were a lot of new words, she first asked about the new words. After the instructor provided some new vocabulary, she began describing the scene, during which she produced an OSV structure sentence:

汤 Jerry 喝了.
Soup Jerry drank.
Jerry drank the soup.

At the time when she produced this OSV sentence, she had her right hand placed on the table (Figure 12.4). As shown in the figure, her index finger and her thumb formed a gap, a hand shape that resembled a color rod. And she moved her hand from the right to the left while keeping the same hand-shape posture. This gesture was produced at the
same time when she constructed the OSV sentence. This co-expressive gesture opened a window for us to look into her cognitive processes. The visual color rods were in the learner’s “head” when the OSV sentence structure was produced. As visual information is stored in the VSSP, we believe that the learner has recruited the VSSP to support her language production.

Figure 12.4. Kris’s gesture.

Recruiting the VSSP allowed Kris to distribute information between the phonological loop and the VSSP. The phonological loop stored lexicon that Kris needed to produce the sentence. The VSSP stored the information of the word order, as shown by her co-expressive gesture. To produce sentences with plenty of new words and the newly learned word order structure, her working memory system needs to store a lot of information. The rods, together with the SCOBA, became a mediational means for Kris to perform difficult cognitive tasks. Without the rods, it is not clear how well Kris would perform. But one thing is clear: if the concept was taught with pure verbal instructions, the concept of topicalization would not have been consolidated in the visual semantic of
the long-term memory system. Kris knew little about the sentence parts (she did not know which sentence part was the subject and which sentence part was the object). As a result, the verbal component of the working memory, the phonological loop, would be the only system that supported her language processing and production. With the SCOB and the color rods, the working memory capacity extended from the phonological loop to include the VSSP. She could rely on the phonological loop to deal with lexicon and her VSSP to deal with syntax information. The recruitment of both the phonological loop and the VSSP would also help consolidation of long-term memory including Language and Visual Semantics. As a result, Kris did not encounter difficulty in processing and producing the “difficult” and “advance” sentence structures.

One may have a question about the role of working memory in grammar learning because implicit knowledge, such as grammar, shall not involve the working memory (Paradis, 2009). However, as we have discussed before, this may be true for L1 acquisition. However, for adult learners who rely heavily on the declarative memory system to learn an L2 (Ullman, 2004; Paradis, 2009), working memory plays a critical role. The importance of working memory in L2 learning is in alignment with Baddeley who believes that the phonological loop evolved for the purpose of learning a new language (Baddeley & Hitch, 1974; Baddeley, 2003a), and, as empirical evidence also supports, there is the close relation between working memory and second language acquisition (Baddeley, Gathercole, & Papagno, 1998).
11.3 Summary

This chapter provides a brief introduction of Baddeley’s working memory model, which contains four sub-modules: the central executive, the phonological loop, the visuospatial sketchpad and the episodic buffer. It has been found that working memory, such as the storage capacity of the phonological loop, is closely related to language learning. In this current study, it was found that through visualized concept of topicalization, such as the SCOBAs and the rods, the participant with a low performance in two working memory tasks were able to learn OSV sentences without difficulty. She would visualize the concept to help her maintain the accurate word order. Evidence comes from her co-expressive gesture when facing difficulty in producing the target grammar structure.
Chapter 12

Conclusion

12.1 A Summary of the Key Findings

This chapter will first summarize the key findings of the research project. The issue associated with developmental sequence of morphology and syntax will be then addressed. Finally, limitations and future research perspectives will be discussed.

This study investigates whether instruction may influence the developmental sequence of L2 Chinese syntax. The central claims of the Teachability Hypothesis are not supported by the current study. It was found that instruction can change the developmental sequence predicted by the Topic Hypothesis. For example, Stage X learners were able to skip Stage X+1 syntax to learn Stage X+2 syntax. Moreover, instruction also enabled Stage X learners to reach Stage X+1 and Stage X+2 grammar structures simultaneously. Summarizing these findings, several concluding remarks can be made.

First, L2 language development can be intentionally constructed through instruction. Second, L2 processing sequence is subject to the influence of L2 instruction. Third, instruction can provide cognitive support for L2 learning, which influences how L2 grammar is learned and sustained. Therefore, the quality of instruction is extremely important and can not be ignored. Fourth, through appropriate instruction learners can use external materialized mediation to support their language development (e.g. producing an
L2 grammatical structure). Sixth, the current study supports Vygotsky’s argument that appropriately organized instruction can lead and shape development. Indeed, this study has shown that instruction plays a fundamental role in shaping L2 development.

12.2 The Issue of Classifier

In Chinese, classifiers are employed to modify nouns if the nouns are to be counted or specified. For example, to count the number of persons involved in an event, the classifier ge is used with the noun (e.g. liang ge ren, two <classifier> persons). According to Zhang (2001), classifiers are regarded as Stage 3 morphemes.

After examining the performance of our participants, it was found that our learners had developed the ability to use some classifiers (Stage 3 morphemes) correctly while their syntax was still at Stage 2. For example, in the sentence produced by one participant, wo you yi ge didi (I have a brother), ge is a classifier that modifies didi (brother). According to Lenzing (personal communication, March 25, 2014), our learners might not have skipped the ADJ+SVO stage because our learners could produce State 3 classifiers. According to Lenzing, although our learners did not yet have the ability to produce Stage 3 ADJ+SVO structures, they could have acquired the phrasal processing procedures as a prerequisite for learning Stage 4 OSV structure. In other words, processability of Stage 3 morpheme allowed our learners to process OSV without ADJ+SVO.

Lenzing’s comment is interesting. It is true that morphology may emerge before syntax at any given stage (e.g. Pienemann et al., 2005). However, according to PT
morpheme and syntax develop in a stage-by-stage manner, which is supported by a number of previous studies (see a review of studies in Chapter 3). Because development of morphology and syntax follows some specific sequences, morpheme and syntax development belong to two parallel lines of development. Morpheme development at a given stage depends on morpheme development at a lower stage. Likewise, syntax development at a higher stage depends on syntax at a lower stage. Lenzing offers no explanation for why and how a morpheme at a lower stage may bootstrap syntax at a higher stage while syntax at the lower stage is missing. Moreover, I am not aware of any study showing that syntax development at a higher stage depends on morpheme development at a lower stage. In fact, Dyson (2009) noticed that for two of her ESL learners syntactic features emerged before morphological features at the same stage. Bonilla (2012) also reported similar findings for Spanish syntax and morphology. These findings suggest morpheme development does not necessarily bootstrap syntax development. In sum, the fact that our learners were able to process classifiers on the pre-test does not make a strong case against our finding about skipping a PT stage.

12.3 Limitations

12.3.1 Issue related to the tests

The first limitation of the study is associated with the elicited imitation task. Using the EI task to assess grammar knowledge of beginning Chinese learners is time consuming. The task imposed a very high cognitive load on our participants because it
involved both comprehension and production. Learners would easily get bored and tired. The EI task was used at four different points throughout the study—pretest, two immediate post-tests and a delayed post-test. Although the content of the task across the four time points was different, there might be a practice effect (comments from Rod Ellis). Including a control group to take the EI tasks four times would be useful to evaluate whether or not there was indeed a practice effect. However, the practice effect is not controllable and using a controlled group does not reduce the practice effect. Moreover, the pre-test and post-test 1 were the especially relevant for the current study because the EI in the pre-test was used to identify Stage 2 SVO participants and the EI in the post-test 1 would show whether or not learners could skip the ADJ+SVO stage. The EI tasks in both the pre-test and post-test 1 indicated that whenever a grammatical feature was not in the learners’ linguistic system, they were not able to reproduce sentences containing that particular feature. Therefore, the practice effect would not threaten the findings of the study.

12.3.2 Issues with the participants

Another potential issue is related to the proficiency level of the participants. To investigate whether instruction would allow a learner to skip the ADJ+SVO stage (Stage 3), the current study recruited L2 Chinese learners who could only produce SVO sentences (Stage 2). It turned out that participants at this stage had a very small vocabulary size, which limited their language production. To aid our participants to produce what they intended to say, the instructor would have to provide new vocabulary
items, which would have an impact on the flow of the task. As a result, the total number of sentences our participants were able to produce within a task was not large. Nevertheless, there were three speech production tasks in each test, which induced a sufficient number of sentences to meet the PT criterion that a speaker must produce the feature in at least four different required contexts. Besides, due to budget constraints and participants’ time schedule, it was not realistic to include a vocabulary teaching session to teach new vocabulary during the course of the study because the current study had to be conducted within a particular time frame so that the participants would not receive instruction on the ADJ+SVO and OSV structures in their regular Chinese classes. But to overcome the vocabulary problem, it is recommended that vocabulary instruction sessions shall also be included.

12.4 Future Research

12.4.1 Neural evidence

The current study observes L2 Chinese developmental sequences using timed GJT and speech production tasks. Both GJT and speech production tasks are behavioral measures. As the techniques of neuroscience develop, it will become possible to investigate L2 development using brain-based rather than behavior-based techniques. One important area to investigate PT is associated with the neural substrates that support L2 grammar. PT is based on implicit processing constraints to construct its processability sequences. Therefore, L2 grammar should be supported by the procedural memory
system. However, Paradis (2009) suggests that a great deal of L2 grammar is supported by the declarative memory system. It will be interesting to investigate whether a newly emerged L2 grammar structure (using Pienemann’s criteria: producing a specific grammar feature at four different contexts) is in fact supported by the declarative memory system or by the procedural memory system. If a newly emerged grammar is found to be supported by the declarative memory system, it will show that emergence grammar may not need to be supported by procedural memory but by accelerated declarative memory. Both ERP and fMRI will be useful techniques to investigate how emergence of a grammatical structure (evidence of processability according to PT) is supported by the two different memory systems.

12.4.2 Frequency of grammar

The two heritage speakers in the current study seem to provide counter evidence to Pienemann’s claims because they could process and produce the highly frequent ba-construction while the OSV structure was not in their grammar systems. Nevertheless, the current study did not offer direct evidence to prove that frequency of a grammar structure can override processability constraints. Although it is reasonable to hypothesize, as suggested by N. Ellis (2009) that frequency can have an effect on L2 grammar acquisition, empirical studies that evaluate how frequency of the OSV structure and the ba-construction may be related to the developmental sequence of Chinese grammar would be necessary. One of these kinds of study may be using a longitudinal corpus of child language to examine the relationship between the frequency of input and the
emergence of grammar structure, which may provide explanation of why ba-construction may emerge before the OSV structure due to frequency of input.

12.4.3 Different language background

The current study observed Chinese syntactic development of L1 English speakers. The OSV structure turns out to be a difficult feature for L1 English speakers in terms of comprehension, because these learners might confuse the object with the subject when encountering an OSV sentence. It is not clear how instruction may affect learners with other L1 background, such as Spanish, in which the OSV structure is grammatical. After all, if two languages share similar syntactic features, L1 syntax may be used to support L2 comprehension and production (see also Pienemann’s discussion on L2 transfer of grammar features, 1998). As PT suggests that the PT hierarchy is universal for learners with different language background, studies that recruit learners with different language backgrounds are needed to further investigate the claims of the Teachability Hypothesis.

This study focuses on the pragmatic function of Chinese word order. More studies are needed to evaluate whether instruction can affect developmental sequences of required syntax such as question formation and negation in languages such as English and German or main-clause/subordinate-clause word order in German.
Appendix A

Informed Consent

Title of Project: Evaluating Processability Theory

Principal Investigator: Xian Zhang
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1. Purpose of the Study: The purpose of the study is to examine whether Chinese grammar structure can be taught to beginning-level second language Chinese learners through explicit instruction.

2. Procedures to be followed: You will be asked to take a Chinese grammatical judgment task, elicited imitation task and a cartoon description task. After the tasks, the Chinese instructor will use a pedagogical diagram to teach the Chinese grammar structures to you.

3. Benefits: The benefits to you include learning more about the Chinese language and grammar. The benefits to society include enhancing people’s understanding of the Processability Theory.

4. Duration/Time: You will be asked to participate in six sessions with the researcher at your convenience. The session will last approximately one hour.
5. **Payment for participation:** You will receive $10 per session, up to $60 if you complete the study.

6. **Statement of Confidentiality:** Your participation in this research is confidential. The videotapes will be stored and secured in password-protected digital files. In the event of a publication or presentation resulting from the research, video clips, screen shots, and/or written transcripts may be employed to exemplify how dynamic assessment works. Other forms of data (e.g., written tests) collected during the study will also be stored in electronic (scanned) password-protected files and archived for future research projects, educational, and/or training purposes. Your name and any other personally identifiable information will never be used. Instead, pseudonyms will be used when referring to specific participants. Only the Principle Investigator, Xian Zhang, his Advisor, Dr. James Lantolf, and his Co-Investigator, Dr. Adam van Compernolle will have access to the recordings.

7. **Data Archiving for Future Use:** Normally, video and audio files will be destroyed five years after your participation in this study. However, video and audio files can be valuable resources for research, educational, and training purposes. Please indicate whether or not you agree to allow the researcher to archive video and audio files of your participation in this research for future research, educational, and/or training purposes in the field of second language learning and teaching. In all cases, your data will remain password-protected and confidential.

   _____ I do not give permission for my recordings to be archived for future research projects. I understand the tapes will be destroyed on June 1, 2017.

   _____ I do not give permission for my recordings to be archived for educational and training purposes. I understand the tapes will be destroyed on June 1, 2017.

   _____ I do not give permission for my recordings to be archived for use in presentations and publications. I understand the tapes will be destroyed on June 1, 2017.

   _____ I give permission for my recordings to be archived for use in future research projects in the area of language learning and language teaching.

   _____ I give permission for my recordings to be archived for educational and training purposes.

   _____ I give permission for my recordings to be archived for use in presentations and publications.

8. **Right to Ask Questions:** Please contact the researcher, Xian Zhang (oiz5004@psu.edu; 814-753-2838), or his advisor, James Lantolf (jpl7@psu.edu), with questions, complaints or concerns about this research.

9. **Voluntary Participation:** Your decision to participate in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer or
participate in any activities you do not want to participate in. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.

You must be 18 years of age or older to consent to take part in this research study. If you agree to take part in this research study and the information outlined above, please sign your name and indicate the date below.

You will be given a copy of this consent form for your records.

_____________________________________________    ______________________
Participant Signature                        Date

_____________________________________________    ______________________
Person Obtaining Consent                      Date
Appendix B

Elicited Imitation Tasks

Elicited imitation sample 1 (ADJ+SVO & OSV)

1. 服务员吃了饭，咖啡服务员喝了，服务员喝了可乐.
2. 小陈是学生，每天小陈喝咖啡，小陈今天在家学习
3. 我今天学习中文，中文我每天复习，我说中文.
4. 小张早上在学校复习，晚上小张在家学习，小张是个好学生
5. 李老师有 5 个学生，李老师学生很喜欢，她和学生吃早饭.
6. 张老师每天跳舞，在美国张老师跳舞，张老师在家也跳舞
7. 我 1 点在家吃了中国饭，中国饭我喜欢，我每天吃中国饭
8. 爸爸喜欢茶，今天爸爸没喝茶，他今天不高兴
9. 他星期天去买手机，钱他没有了，他没有买手机
10. 服务员是中国人，在咖啡店服务员和我说中文，我不认识中文
11. 小张认识法文，法国小张去了，他的法文很好
12. 我们今天上课了，晚上我们看了照片，我们下午买了地图
13. 小陈喜欢书，书小陈每天买，小陈有很多书
14. 老师认识中文和英文，在学校老师每天说英文，老师在家里说中文
15. 我复习英文了，中文我也复习了，我要去睡觉了
16. 我们不喜欢酒，昨天我们喝酒了，我们在美国不喝酒
17. 小王来到我家，东西小李买了，我们可以吃饭了
18. 我和哥哥在美国，美国哥哥喜欢可乐，我在美国喜欢喝啤酒
19. 我买了书，地图我在学校买了，我们今天上课
20. 中国手机很便宜，在中国我买了手机，我在美国不买手机了

Elicited imitation task sample 2 (ADJ+SVO & OSV)

1. 他刚才喝了可乐，饭他也吃了，他要睡觉了
2. 我昨天复习了中文，每天我学习中文，我喜欢中文.
3. 我们看书了，英文我们也复习了，我们做了功课
4. 我每天在家吃中国饭，在学校我不吃中国饭，我吃日本饭
5. 老师昨天买了手机，手机老师今天丢了，老师不高兴
6. 我今天 3 点回家，4 点我做饭，我 5 点吃饭
7. 小明喜欢可乐，茶小明也喜欢，小明不喜欢啤酒
8. 小明昨天学习了，今天小明不想学习，小明今天买了手机
9. 我 1 点上课，饭我 2 点吃了，我 3 点复习中文
10. 我在咖啡馆看书，在家我不看书，我在家复习功课
11. 他喝了茶，中国饭他也吃了，他在学校上课了
12. 我喜欢咖啡，茶我也喜欢，我每天喝咖啡和茶
13. 小李昨天学习了，今天小李不学习，小李今天买东西
14. 妈妈喜欢法国饭，法国饭妈妈每天都吃，妈妈吃很多法国饭
15. 哥哥和李老师是朋友，在学校李老师和哥哥说英文，他们在咖啡馆说中文
16. 我们喜欢咖啡，1 点我们喝了咖啡，我们晚上不喝咖啡了
17. 我复习英文了，中文我也复习了，我吃饭了
18. 弟弟买了啤酒，在家我和弟弟喝啤酒，我们在学校不喝啤酒
19. 小王来我家，东西小王买了，我们做饭了
20. 姐姐在中国，美国姐姐喜欢美国饭，姐姐在中国喜欢中国饭

Elicited imitation sample 3 (OSV and ba-construction)

1. 服务员很口渴，服务员把水喝光了，服务员还喝了可乐
2. 我去年开始学中文，中文我每天都学习说，我懂一点点中文
3. 李老师有 5 个学生，李老师学生非常喜欢，李老师和学生经常一起吃饭
4. 我早上洗了衣服，下午我还把地扫了，所以我晚上看电影了
5. 他星期天去买手机，可是她把钱丢了，他没买到手机
6. 小张认识法文，法国小张去过，他的法文很好
7. 小陈喜欢书，书小陈每天都会买一两本，所以小陈家里有很多书
8. 我复习功课了，我把作业做完了，我现在准备睡觉了
9. 小王要来我家做客，饭菜小王会提前买，我们什么都不用准备了
10. 我带了上课的书，地图我在学校也买了，我们可以去上课了
11. 小李养了 5 头猪，今年猪把食物都吃光了，小李家没东西可以吃了
12. 小明喜欢可乐，茶小明也喜欢，但是小明非常不喜欢啤酒
13. 你先去洗澡，然后你把衣服放洗衣机洗干净，你就可以好好休息了
14. 小白昨天买了手机，手机小白今天就丢了，小白很不开心
15. 太阳出来了，阳光把云朵照得通红，这是景观很美丽
16. 我买了很多东西，我把钱用完了，我不能再买东西了
17. 我 3 点半吃过东西，药我 4 点吃了，然后我还喝了很多水
18. 你先往杯子倒入咖啡，然后把热水倒入杯中，等 1 分钟就可以喝了
19. 我复习英文了，中文我也复习了，我睡觉了
20. 小老鼠爬上桌子上，小老鼠把面条吃进了肚子，小老鼠吃得很饱。
Appendix C

Q & A Task

1. 能介绍一下你自己吗?
2. 你圣诞做什么了?
3. Tell me sth about your country?
4. Tell me sth about your family?
5. Tell me sth about what you usually do?
6. Tell me about your habit?
7. 你一般都在家做什么?
8. 你洗衣服吗?
9. 你在家吃什么?
10. 你吃饭多久?
11. 你在家一般喝什么?
12. 你看电影(film)吗?
13. 你一般睡多少时间，在哪里睡觉?
14. 你在家做作业吗？你喜欢作业吗?
15. 你煮(cook)饭吗？在哪里煮饭呢?
16. 你玩游戏吗?
17. 你打电话吗?
18. 你去过什么国家?
19. 你会说什么语言?
20. 你喜欢什么语言?
21. 你购物(shopping)吗?
22. 你去哪里买东西?
23. 买什么呢?
24. 你买衣服|手机,吗?
25. 买什么衣服？比如什么颜色的衣服
26. 你一般在哪里买衣服?
27. 你什么时候买衣服呢?
28. 你去超市(supermarket)吗?
29. 你什么时候去超市?
30. 美国的同学和这里的同学有什么不同!
31. 你在美国吃什么?
32. 你在美国的时候喜欢什么?
33. 你在美国到过什么地方?
34. 你喜欢中文吗?
35. 你学中文多久了
36. 你喜欢同学吗?
37. 你在哪里学习中文？你在课室学习中文吗？
38. 你什么时候学习中文吗？白天？晚上？
39. 你在家学习中文吗？
40. 你学习什么中文？
41. 你学习中文多久了？
42. 你的中文老师是？
43. 美国的同学和这里的同学有什么不同！
44. 你在美国吃什么？
45. 你在美国的时候喜欢什么？
46. 你在美国到过什么地方？
47. 你去过什么国家？
48. 能说说你的家庭吗？
49. 你有哥哥姐姐弟弟妹妹吗？
50. 你父母喜欢什么？
51. 他们喜欢什么？
52. 你有好朋友吗
53. 可以说说你的朋友嘛？
54. 你的好朋友喜欢什么？
55. 你和你朋友一般做什么？
56. 你喜欢那个 pop star？
57. 你喜欢那个电影或者电视剧？
58. 能说一下那个电影的情节吗？
59. 你一般在哪里看电影或电视剧？
60. 能说一下 Tom 和 Jerry 吗？回忆一下你看过的片段？
61. 你一般回家第一件事会做什么？能多描述一下吗？
62. 你去酒吧吗？你都喝什么？
63. 能说一下你的好朋友吗？
64. 你的好朋友喜欢什么？
65. 你和你朋友一般做什么？
References


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