Encoding motion and state change in L2 Mandarin

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This paper investigates the crosslinguistic influences on the learning of encoding motion and state change in L2 Mandarin based on the linguistic typology motion and state change (Talmy 1985, 2000; Slobin 2004). We conducted an experiment of elicited descriptions of events of motion and state change with 10 adult native American-English learners of Mandarin. The results show that L2 adult Mandarin learners, similar to their L1 child counterparts (Chen, 2006, 2008), are sensitive to the Mandarin-way of encoding motion and state change. Overgeneralization errors reflect an overuse of the dominant way of lexicalizing motion and state change in the target language. The early learning of the target language pattern may be explained by Clark's (1993, 2004) principles of learning constructional regularities and the inter-typological similarities between Mandarin and English.

1. Introduction

Language acquisition essentially involves the establishment of the systematic conventional form and meaning mappings in the target language.[1] To achieve this goal, learners must discover how to unpack the relevant information – to isolate the components within a combination and identify their contribution to the meaning of the whole, and to discover the regularities in how the forms and their meanings are combined (Bowerman, 1982; Clark, 1993; Pinker, 1989; Tomasello, 1992). In the second language (L2) learning situation, this task becomes more complicated since the L2 learners have already established a full system of form-meaning mappings of their first language (L1). When the two languages differ in how semantic elements are represented and combined, how do learners come to express themselves in their L2?

This paper explores this general question by examining the encoding of events of motion and state change by American-English L2 learners of Mandarin. Encoding is defined as the systematic association of particular components of meaning with particular

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[1] Form refers to the linguistic units of language, including both lexical and grammatical units (i.e., morphological and syntactic). All linguistic forms or expressions are considered to be symbolic units, consisting of the association of a phonological and a semantic representation. Meaning refers to the semantic structure of a symbolic unit, which is in turn equated with conceptualization.

morphemes or constructions (Talmy, 1985, 2000). Motion and state change are two basic types of events that human beings experience daily. A motion event is defined as a situation involving the movement of an entity or the maintenance of an entity at a stationary location (Talmy, 1985, p. 60). By "movement" is meant a "directed" or "translative" motion that results in a change of location. By "location" is meant either a static situation of being in a place or a "contained" motion that results in no overall change of location (e.g., jumping up and down). A state-change event consists of a change in, or – in the limiting case – the unchanging continuation of a certain property associated with a particular object or situation (Talmy, 2000).

2. Encoding motion and state change in English and Mandarin

Talmy (1991, 2000) proposes a two-way semantic typology of the lexicalization of motion on the basis of where languages characteristically express Path and Manner or Cause of motion.[2] In "satellite-framed" languages (e.g., English), Manner of motion is typically encoded in the main verb, and Path in a "satellite" to the verb. English verb particles such as *in, out,* and *across* are typical examples of Path satellites. In "verb-framed" languages (e.g., Spanish), Path is characteristically encoded in the main verb of the clause, an element with a meaning along the lines of 'enter, exit, ascend, descend, insert, extract', and so on, whereas Manner or Cause separate from the main clause. Talmy classifies Mandarin as a satellite-framed language like English on the basis of his analysis of directional verb compounds (DVCs), which are commonly used to describe motion, as shown in (1).

(1) a. *Na   ge   ren   **pao-jin**   le   fangzi.*
       That   CLF   person   run-enter   PFV   house[3]
       'That person ran into the house.'
   b. *Na   ge   ren   ba   zhuolzi   **tui-chu**   le   dong.*
       That   CLF   person   BA   table   push-exit   PFV   cave
       'That person pushed the table out of the cave.'[4]

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[2] We follow Talmy's (2000) theoretical framework of motion and adopt the following terms to refer to:
Figure = the object that undergoes a change of location
Path = trajectory or Deixis of motion
Manner = the way in which the Figure moves
Cause = the event that causes it to move
Ground = a reference with reference to which the path, site, or orientation of the Figure is characterize
[3] CLF = classifier, PFV = perfective aspect marker
[4] The morpheme *ba3* marks the well-known BA construction of Mandarin. This construction is known as the "disposal construction" (Chao, 1968; C. Li & S. A. Thompson, 1981; Wang, 1954), since it focuses on how the object is disposed of, dealt with, manipulated, or handled by the

These sentences each contain a DVC, *pao-jin* 'run-enter' in (1a) and *tui-chu* 'push-exit' in (1b). Talmy treats the first verb of these DVCs as the main verb, encoding the Manner ('run') and the Cause ('push') of the motions, respectively. He treats the second verb as a Path satellite – *jin* 'enter' and *chu* 'exit'. Talmy argues that Mandarin Path verbs are satellites because they often do not function as full verbs and they form a small closed set. Slobin (2004) points out that Mandarin and other serial-verb languages differ from satellite-frame languages in that the so-called satellites, unlike English particles or Russian verb prefixes, are full verbs that can be used as predicates directly. Mandarin also does not pattern with verb-framed languages such as Spanish, since there is no distinction between finite and nonfinite forms as there is in typical verb-framed constructions such as 'exit flying'. Slobin therefore proposes a revision of Talmy's binary distinction, adding a third category, "equipollently-framed languages" (Slobin, 2004), in which Path and Manner are expressed by equivalent grammatical forms. Mandarin and other serial-verb languages are examples of this third type of languages.

Regarding the domain of state change, Talmy observes that the way state change is expressed is analogous to the way motion is expressed. For example, the entity that undergoes a state change is often presented as a Figure that (metaphorically) moves to a state specified by a satellite or other verb complement, e.g., *She entered (a state of) ill health, She became ill* (the static counterparts of these are expressions like *She is in ill health*) (Talmy, 2000, p. 238). Talmy suggests that this conceptual analogy motivates a syntactic and lexical analogy: to a great extent, state change is expressed in a language by the same constituent type as Path, and often by homophonous forms. Thus, in accordance with the general typology, the core schema of an event of state change appears in a satellite in satellite-framed languages, and in the main verb in verb-framed languages. The conceptual analogy between motion events and state-change events is borne out in Mandarin. Resultative verb compounds (RVCs), the typical way to encode state-change events, resemble DVCs in structure: the cause component is represented by the first verb of the compound, analogous to the cause/manner verb of a DVC, and the state-change component is represented by the second verb, analogous to the Path verb (the second verb) of a DVC. For example:

(2) a. Nonagentive
    *Ta1 **ka-si***   *zai yi kuai gutou   shang.*
    He   choke-die at one CLF bone   on
    'He choked to death on a bone.'
   b. Agentive

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subject. The morpheme *ba3* originally meant 'dispose, manipulate, hold' in classical Chinese, but it has become grammaticalized and lost this meaning. The status of *ba3* is controversial: it has been argued to be a focus marker (Sun & Givón, 1985), a secondary topic marker (Tsao, 1996), or case assigner (Huang, 1982).

Wo **tui-kai** *le* *chuanhu.*
I push-be.open PFV window
'I opened the window by pushing at it.'

The cause is encoded in the first verb in **ka**-*si* 'choke-die' in (2a) and **tui**-*kai* 'push-be.open' in (2b), and the state change in the second verb, *si* 'die' in (2a) and *kai* 'be.open' in (2b). Both spontaneous and caused state changes can be encoded with an RVC. The combination of a verb denoting a cause and a verb denoting a result state is very productive in Mandarin.

Talmy (2000) suggests that in the domain of state change, English exhibits a mixed system of conflation characteristic of both the satellite-framed pattern and the verb-framed pattern, and both patterns are colloquial. For example, the verb-framed pattern is seen in many monomorphemic state-change verbs that encode state change directly, such as *break* in *He broke the door (by kicking it)*. Talmy treats Mandarin as a "far more a thoroughgoing exemplar of the satellite-framed type" (Talmy, 2000: 241), since state change is consistently encoded in the satellite. What Talmy calls satellites are the complement (i.e., the second) verbs of RVCs, such as *po* 'be.broken' in *ti-po* 'kick-be.broken'. Adopting Slobin's (2004) proposal, we suggest that Mandarin is actually a 'thoroughgoing exemplar' of the Equipollently-framed language in encoding both motion and state change by combining equivalent grammatical forms (i.e., free verbs) into verb compounds.

3. Motion and state-change events in first and second language acquisition

Talmy's typology of motion has spawned much research in both first and second language acquisition of the lexicalization of motion in the past decades (e.g., Berman & Slobin, 1994; Özçalışkan & Slobin, 2000; Slobin, 1993, 1996a, 1996b, 2000, 2004). These studies reveal that native speaker of typologically different languages show distinct lexicalization patterns in describing motion events. For example, speakers of satellite-framed languages (S-languages) usually provide more description of the Manner of motion by using a main verb of Manner of motion and on Path with particles or prepositional phrases. Speakers of verb-framed languages (V-languages) do not describe the Manner of motion as often as speakers of S-languages. They tend to describe the Path of the motion by using a Path verb, and provide more elaboration on Ground. Children learning S-language or V-language show language-specific way of encoding motion from an early age and approach adult patterns with the increase of age. Mandarin speakers have been found to use a mixed pattern with features of both the satellite-framed and the verb-framed patterns. Like English speakers, Mandarin speakers use a large set of verbs of Manner of motion. But like Spanish speakers, they often describe the physical settings of motion events from which this information can be deduced, and only rarely provide elaborate ground descriptions (L. Chen, 2005). Child Mandarin learners show language-specific lexicalization in encoding motion events early on (J. Chen, 2008). These findings

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support Slobin's (2004) proposal of treating Mandarin and other verb serializing languages as equipollently-framed languages (E-languages).

The language-induced tuning of attention to different aspects of situations that one's language routinely encodes has been labeled "Thinking for speaking" (Slobin, 1996a), and a child learner learn particular ways of thinking for speaking when acquiring a first language. In second language learning, Slobin (1996) suggests there is "first language thinking in second language speaking", i.e., L2 learners are influenced by the typical lexicalization patterns in their L1 when speaking the L2. This view is generally supported by the findings in the second language acquisition studies of motion, which have examined the crosslinguistic influences from both the inter-typological (e.g., L1, S-language English vs. L2, V-language, Spanish) and the intra-typological perspectives (e.g., both L1 and L2 are V-languages: L1-Japanses & L2 Spanish or both L1 and L2 are S-languages: L1-English & L2-Dutch).

Turing to Mandarin, we found no studies that have investigated the interlanguage of Mandarin in encoding motion and state change by native English speakers. One most relevant study by Yu (1996) investigated the narration of motion in L2 English by Mandarin learners and Japanese learners. Yu followed Talmy's typology and treated Mandarin and English as S-languages. He found that Mandarin learners are better than Japanese learners in producing more target motion verbs in three different tasks (elicited story-telling, translation, and picture description). He suggests that this result is due to the similarity between Mandarin and English as both being S-languages. This explanation seems inadequate since the later studies by Slobin and others have shown that Mandarin should be treated separately as an E-language.

4. Mandarin verb compounds: Composition and productivity

In order to understand how L2 learners learn the predicates of motion and state change, we present the compositional, lexical, and semantic properties of DVCs and RVCs (see also J. Chen, 2006, 2008). Mandarin verb compounds are usually composed of two or three root verbs: V1V2(V3). There are no morphological markers to indicate the relationship between the component verbs. The ordering of the component verbs is rigid and iconic, i.e., the verb encoding the change of location (in DVCs) and end result (in RVCs) is always in the second or third position of a compound. There is a tight relationship between the component verbs – no lexical phrases or aspect markers are allowed to occur between them, and aspect markers always follow the last verb.

4.1. Composition of directional verb compounds

VCs are composed of two, or maximally three, lexical verbs, for example, *zou-chu* 'walk-exit', *pao-jin-lai* 'run-enter-come'. Verbs that appear in a DVC can be categorized into two major types according to their distributional properties (Chao, 1968; Kang, 1999; C. N. Li & S. A. Thompson, 1981; Lu, 1977; Zou, 1994): an open set of

verbs indicating Manner (*gun* 'roll') or Cause of motion (such as *reng* 'throw) or Path (such as *diao* 'fall'), and a closed set of directional verbs. Manner- or Cause-of-motion verbs include both intransitive verbs of self-initiated motion (e.g., *zou-jin* 'walk-enter'*, fei-xia* 'fly-descend'), and transitive verbs that inherently imply that the direct object undergoes a change of location (e.g., *chui-xia-lai* 'blow-descend-come', *tui-shang-qu* 'push-ascend-go'. The directional verbs can also be divided into two types: Path verbs that denote the trajectory of a movement (e.g., *shang* 'ascend' (up), *xia* 'descend' (down), etc.), and Deictic verbs (*lai* 'come' and *qu* 'go'). In a DVC with three verbs (V1V2V3), the ordering of the verbs is fixed: verb of manner or cause of motion (V1), followed by a path verb (V2), with a deictic verb at the end (V3). In a two-verb DVC (V1V2), V1 can be a manner or cause of motion verb and V2 can be either a path verb or a deictic verb (e.g., *zou-shang* 'walk-ascend', *zou-lai* 'walk-come'); V1 can also be a path verb and V2 a deictic verb (e.g., *shang-lai* 'descend-come'). Unlike the constituents of English verb-particle combinations, all the elements in a DVC (V1, V2, and V3) can be used as independent main verbs, denoting the manner or cause of a motion, the direction of the motion, and the orientation of the motion with respect to the speaker, respectively.

4.2. Composition of resultative verb compounds

RVCs are composed of two verbs, both of which may be either transitive or intransitive. V1 is an action verb indicating the Cause, and V2 a verb indicating the caused change of state or caused action. V2 indicates what result the action specified by V1 has led to (McDonald, 1995). The result may be a physical state like *kai* 'open', *sui* 'be.in.pieces'; a mental state like *dong* 'understand', *guan* 'be used to'; a quality like *cui* 'be crispy', *hong* 'be red'; or a caused action, such as *xiao* 'laugh' in *dou-**xiao*** 'amuse-laugh' (laugh by amusement), *ku* 'cry' in *ma-**ku*** 'scold-cry' (cry due to scold). Both V1 and V2 are drawn from open sets of verbs. In general, transitives and unergatives denoting activities can act as V1, while V2 is usually a stative verb, an adjective, or an action verb, as in example (2).

4.3. Productivity and semantic constraints on verb compounding

DVCs and RVCs are very productive in Mandarin, and can be created on the spot to describe an event of motion or state change. Take the event of washing clothes, for example. Mandarin speakers can use the conventional RVC *xi-ganjing* 'wash-be.clean' if the clothes turn out clean after the washing, or they can create the new but perfectly acceptable RVC *xi-zang* 'wash-be.dirty' or *xi-po* 'wash-be.torn' if the clothes turn out dirty or torn. In other words, Mandarin allows the combination of 'wash', which implies a result state of becoming clean, with a complement verb that conflicts with this implied result (e.g., 'be.dirty') or that has nothing to do with cleanliness (e.g., 'be.torn'). Combinations like these are not allowed in languages such as English and Japanese (Bowerman, 1988; Uehara, Li, & Thepkanjana, 2001), even though their structure would be fully comparable to those of acceptable constructions such as *wash the clothes clean.*

The productivity of DVCs and RVCs are also reflected in the variety of verbs that can occur in the first (V1) and second (V2) positions of a verb compound. These verbs can come from different semantic classes, including both transitive and intransitive verbs. Furthermore, a same V1 can combine with different V2s, for example, *ti-kai*, 'kick-be.open', *ti-po* 'kick-be.broken', *ti-sui* 'kick-be.in.pieces', *ti-dao* 'kick-fall', and vice versa, a same V2 can combine with different V1s, for example, *si-kai* 'tear-be.open', *jian-kai* 'cut.with.scissors-be.open', *bai-kai* 'snap-be.open'.

Although verb compounding is productive in Mandarin, it is a constrained process that manifest partial productivity (Gu, 1992; Shen, 2003; Zou, 1994). Partial productivity means that a construction can be extended to additional (and even novel) verb forms, but it is not fully productive within any generally defined class of verbs, and novel extensions are acceptable only to the degree that they conform to the semantic (and morpho-phonological) constraints on existing clusters of strings (Goldberg, 1995). This partial productivity also reflects the collective conventional preferences which mirror current perceptions of the meaning-form relations possible and available for use in coinage (Clark, 1993).

J. Chen (2008) proposes a number of constraints on the formation of DVCs and RVCs (e.g., the Unique Path constraint, the Congruent Path constraint). We discuss two of the constraints that are relevant for the current study. One general constraint on verb compounding in Mandarin is the strict ordering of the component verbs as discussed above. The other constraint concerns the possible semantic classes of verbs that can appear in the V2 of an RVC. Gu (1992) observes that strings like *xia-tiao* 'frighten-jump', *xia-han* 'frighten-scream' with inherently agentive V2's cannot occur as resultative verb compounds. Certain semantic classes of verbs that involve inherent agentivity are not acceptable as the second component (V2) of conventional RVCs in Mandarin. These include the verbs of the following semantic categories: posture verbs, such as *zuo* 'sit', *dun* 'squat', *zhan* 'stand', *li* 'stand', *tang*, 'lie'; manner of motion verbs, such as *gun* 'roll', *tiao* 'jump', *beng* 'hop'; and verbs of ceasing or closing, such as *ting* 'stop', *guan* 'close', *zhi* 'stop', *bi* 'close' (cf. Chen 2008 for more detailed semantic classes). It sounds odd to use *tui-zuo* 'push-sit' to describe a scene in which a man is pushed by someone and as a result he sits on the ground. Similarly, *an-dun* 'press squat' is not acceptable for a scene in which someone presses on another person, and causes him or her to squat; and *la-zhuan* 'pull-spin' for an event in which someone pulls a spinning table and it spins. J. Chen (2008) proposes that the constraint on these semantic classes of verbs in the V2 position is due to a general sensitivity across languages to the semantic distinction between internal cause and external cause in verb semantics. Verbs specifying internal cause (e.g., *zhan* 'stand', *dun* 'squat') are not allowed to be in the V2 position.

5. The study

This study addresses the following research questions: (1) How do American learners of Mandarin encoding motion and state change? (2) How do crosslinguistic

differences (S-language vs. E-language) influence the learning of encoding motion and state change in L2? More specifically, we are interested in finding out if Manner and Path are both included in the narration of motion and state change; if L2 learners are like the L1 children in learning the productivity of verb compounds from early on; and if L2 learners are sensitive to the semantic constraints on verb compounding.

5.1. Participants

Ten adult American-English learners of Mandarin participated in this study (mean age 23, age range 20 – 27). They have studied Mandarin for about 12 months (mean length of Mandarin learning is 64 weeks) in an intensive Mandarin program at the Defense Language Institute. A group of ten native Mandarin speakers also participated as a control (mean age 31).

5.2. Stimuli

The stimulus set consisted of 42 video clips: 34 target clips, 2 warm-up items, and 6 control items (the control items will be explained shortly). Each target clip depicted an actor performing a causal action that resulted in a location change or a state change, for example, a woman blowing out a burning candle. Eighteen of the events could be routinely described with a verb compound (thus termed *conventional compounds*) and sixteen could not (i.e., the use of the combination of a verb of action and a verb of result will result in ungrammatical compounds). Table 1 lists the conventional and the ungrammatical VCs studied in this experiment, classified according to the semantics of the V2. These V2s, which include posture verbs, verbs of manner of motion, verbs of ceasing, and verbs of closing, are not accepted in the V2 slot by native speakers of Mandarin. Both the conventional VCs and the odd VCs used in this experiment were chosen on the basis of my own intuitions and those of two other native speakers of Mandarin. The VCs tested in the experiment are the target compounds.

5.3. Procedure

The participants were seen individually in a quiet room in their school. They were shown the video clips one by one. For each clip, they were (a) first asked to describe what had happened; and then – if they had not used the target verb compound in their description – they were (b) asked to judge whether the target verb compound was acceptable. For conventional VCs such as *chui-mie* 'blow-extinguish', participants were expected to give a "yes" answer in the judgment task, whereas for odd ones such as *la-zhan* 'pull-stand', they were expected to give a "no" answer. To forestall a "yes" bias on the judgment task, we included 6 relatively easy control events in the stimulus set, half requiring "no" answers and half "yes" answers. For example, for a video clip depicting a man mopping the floor, the participant was expected to say "no" to the experimenter who said the man was sweeping the floor. Only participants who gave correct responses to all the control items were included in the analysis. The participants were audio-taped.

Table 1. Verb compounds tested in the study
(Note: Asterisks indicate unacceptable VCs.)

Semantic classes of V2s	VCs tested	
Path	*chui1-diao4*	'blow-fall'
	reng1-chu1	'throw-exit'
	ju3-qi3	'lift-rise'
	fang4-xia4	'put-descend'
Manner of motion	**tui1-hua2*	'push-slide'
	*reng1-fei1	'throw-fly'
	*la1-zhuan4	'pull-spin'
	*tui1-huang4	'push-shake'
	*ti1-gun3	'kick-roll'
	*chui1-gun3	'blow-roll'
	*la1-tan2	'pull-jump'
Breaking	*ji3-po4*	'squeeze-break'
	reng4-sui4	'throw-smash'
	chui1-po4	'blow-break'
	zhe-duan42	'bend-break'
Opening	*ti1-kai1*	'kick-be.open'
	tui1-kai1	'push-be.open'
Closing	**ti1-guan1*	'kick-close'
	*tui1-guan1	'push-close'
	*la1-guan1	'pull-close'
Ceasing	*gai4-mie4*	'cover-extinguish'
	*zhuang4-ting2	'bump-stop'
	chui1-mie4	'blow-extinguish'
	*an4-ting2	'press-stop'
Posture	**la1-zhan4*	'pull-stand'
	*tui1-zuo4	'push-sit'
	*tui1-tang3	'push-lie'
	*an4-dun1	'press-squat'
Other	*ti1-fan1*	'kick-overturn'
	ti1-dao3	'kick-fall'
	tui1-dao3	'push-fall'
	xi3-zang1	'wash-dirty'
	pai1-shi1	'pat-wet'
	tu2-hong2	'paint-red'

5.4. Results

The audio recordings were digitized, and the relevant descriptions of each video clip were transcribed. The judgments given for each clip were also noted down for all the participants. We report the results below, addressing: (1) the overall use of verb compounds in encoding motion and state change; (2) the conscious knowledge of the combinatorial constraints on the formation of verb compounds; (3) the possible effect of

semantic subcategories of V2 on the knowledge of verb compound formation; and (4) error analysis of the learners' interlanguage.

5.4.1. Overall use of verb compounds

The L2 learners, similar to their native counterparts, used dominantly verb compounds to describe most of the events of motion and state change and only a small number of single verbs were used for some clips. Figure 1 summarizes the token frequencies of verb compounds produced by the L2 learner group and the native L1 group, and the breaking-down of the token frequencies of verb compounds by event types (VC events vs. Odd VC events).[5] Strikingly the L2 learners tended to 'overuse' verb compounds – as indicated in Figure 1, L2 learner group produced almost twice as many verb compounds to describe the Odd VC events. Some of these verb compounds are odd VCs that never occurred in adults' descriptions, containing verbs of posture, manner of motion, ceasing, and closing in the V_2 slot.
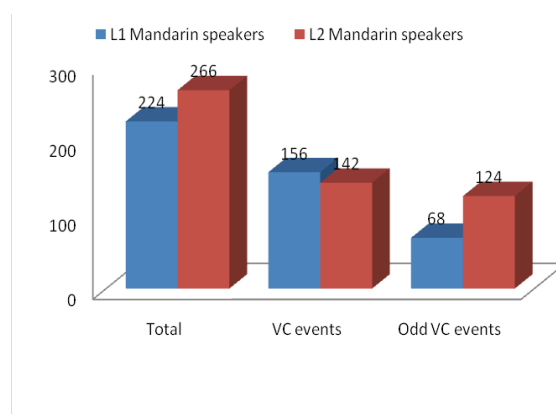

Figure 1. Token frequencies of VCs produced by the L2 learner group and the native speaker group

5.4.2. Knowledge of constraints on verb compounds

The L2 learners, similar to their L1 counterparts, accepted the conventional verb compounds at almost 100% rate (see Figure 2 below). However, in sharp constrast, they accepted almost all the odd verb compounds such as *la-zhan* 'pull-stand', whereas the native speakers generally rejected them.

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[5] *VC events* are those typically described with verb compounds and *Odd VC events* are those that are not typically described with verb compounds (those marked with an asterisk in Table 1).
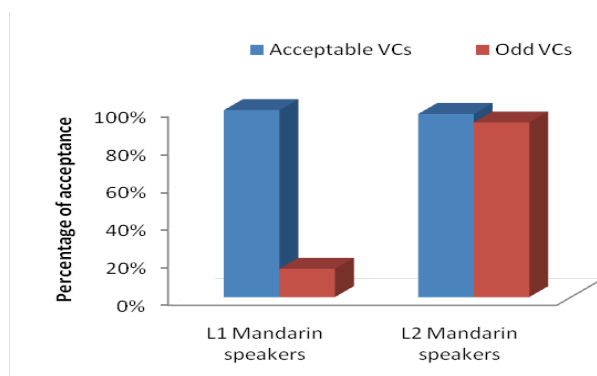
Figure 2. Percentages of the acceptance of the conventional VCs and odd VCs by L2 learner group and the native speaker group

5.4.3. Effects of the semantic subcategories of V2s

Figure 3 shows the percentages of acceptance of the verb compounds with a V2 from three different semantic classes: verbs meaning stop or closure, verbs of Manner of motion, and posture verbs. Surprisingly even though the native speakers overall rejected verb compounds with a V2 from these three categories, they showed different rate of acceptance: verbs of stop or closure > verbs of Manner of motion > verbs of posture. Similar trend is seen in the L2 learner group as well, although the L2 learner group obviously accepted most of the odd verb compounds. It seems that when the V2 is a posture verb, the verb compound is more likely to be rejected by both the native speakers and the L2 learners; but when the V2 is a verb of Manner of motion or a verb meaning stop or closure, the verb compound might be more likely to be accepted as appropriate.
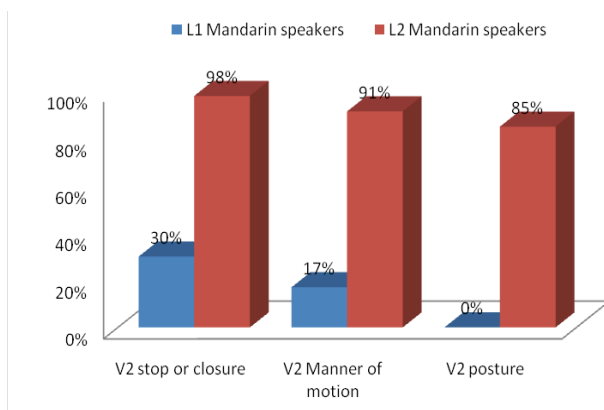

Figure 3. Percentages of the acceptance of verb compounds by different semantic categories of V2 by L2 learner group and the native speaker group

5.4.4. Error analysis

Qualitative analysis was conducted to the innovative uses of verb compounds (or 'erroneous' verb compounds). We found three major types of errors in the data. First, the L2 learners produced verb compounds with a V2 from the semantic classes such as verbs of posture, verbs of stop or closure, verbs of Manner of motion, and verbs of action. Second, they made errors of 'over-combining' verbs, i.e., they created verb compounds with more than 3 verbs. Mandarin allows the concatenation of maximally 3 verbs in a compound. For example, *tui-hua-xia-lai* 'push-slide-descend-come', *chui-diao-xia-lai* 'blow-fall-descend-come', and *zhuang-man-qi-lai* 'pour-fill-rise-come'. This type of errors thus suggests that L2 learners are not yet aware of the combinatorial constraints on the number of possible verbs. The third type of errors involves semantic overgeneralization of the component verbs, which indicates inadequate knowledge of the semantics of the component verbs. For example, the verb *po* 'be.broken' is used to describe the breaking of a stick as in the compounds *zhe-po* 'bend-be.broken' and *tui-po* 'push-be.broken'. Semantically *po* applies only to nonlinear objects and when the affected object is longish such as a stick, a different verb *duan* 'be.broken' has to be used instead. Similar semantic errors are found with V1. For example, *tui* 'push' was used to describe the action of bending a stick.

6. Discussion and conclusions

Our study focuses on the use of motion and state-change predicates in the interlanguage of English learners of Mandarin. We find that L2 adult learners of Mandarin are sensitive to the Mandarin-way of encoding motion and state change as reflected in their extensive use of DVCs and RVCs. The wide use of DVCs and RVCs suggests both Manner/Cause and Path/state-change information are included for motion and state change. This learning pattern is therefore in line with the features of the E-languages. Errors in creating verb compounds reflect an overgeneralization of the dominant way of lexicalizing motion and state change in Mandarin. L2 learners have difficulty figuring out the partial productivity of verb compounding in Mandarin. The overall learning process is very similar to the L1 child counterparts in learning the productivity of verb compounding early on and the learning of the constraints on verb compounding is probably a long process (cf. J. Chen, 2006, 2008).

Why do L2 English learners of Mandarin tune into the Mandarin-way of encoding motion and state change so quickly? Why isn't there a strong 'first language thinking in second language speaking' effect in the learning of motion and state-change predicates in L2 Mandarin? We propose that this may be due to the linguistic properties of DVCs and RVCs and their frequent uses in natural speech. Such effects can be explained by Clark's (1993, 2004) proposal of three very general principles that affect the process of learning constructional regularities on the basis of the input: Transparency of Meaning, Simplicity of Form, and Productivity in Use. The principle of Transparency of Meaning states that words or constructions that are based on known roots and affixes are learned earlier than

those that depend on forms that are opaque to a learner. For example, the noun compound *pain-killer* is composed of two familiar roots, *pain* and *kill*, along with the relatively early-learned agentive or instrumental suffix *-er*. Recall that in Mandarin, the component verbs of RVCs and DVCs all occur as independent simple verbs as well as in compounds. So the principle of Transparency of Meaning points to a factor that learners of Mandarin could use in analyzing the composition of verb compounds.

The principle of Simplicity of Form states that the simpler a construction is – e.g., the less its root components change in its construction – the easier it is to learn. This means, for example, that English nominals derived from adjectives by adding *-ness*, such as *happiness*, are easier than those derived by adding *-ity*, such as *curiosity*, since *-ity*, but not *-ness*, often causes a stress change in the root adjective. This principle may also contribute to the early productivity of verb compounding. In Mandarin there is no overt morphological marking indicating the relationship between the component verbs in an RVC or a DVC; to create a verb compound, all the learner needs to do is to simply combine two or three bare verbs.

The principle of Productivity in Use states that in forming new words, speakers rely on the most productive option in the language with the appropriate meaning. Productivity reflects the conventional collective preferences of speakers of the language, which in turn draws on speakers' knowledge of structurally possible and available options in that language. The patterns to which learner receive the most exposure are those that are the most frequent in adult speech. In Mandarin, DVCs and RVCs are the most frequent constructions for encoding motion and state-change events, as shown by the high token frequency in native speakers' descriptions. So transparency of meaning, simplicity of form, and high productivity in adult speech all seem to contribute to early productivity in the use of VCs by L2 learners of Mandarin.

We suggest that another possible contributing factor is the inter-typological structural similarities between English motion or state-change predicates (verb particle constructions) and Mandarin verb compounds. English particles differ from compliment verbs of compounds, but once the learner discovers the systematic mapping of using a verb in Mandarin to represent the meaning expressed by particles in English, they are in a position of creating DVCs and RVCs that they have never heard in the input to describe any new events of motion and state change. This leads to the overproduction of verb compounds as seen in our data. The influence of the intertypological similarities supports Slobin's (2004) suggestion that languages are better to be treated as on a cline of Manner salience (or Path salience) in motion typology, rather than a dichotomized or trichotomized distinctions. Mandarin is probably closer to English than Japanese on this cline and that may explain the better performance of Mandarin learners of English than Japanese learners of English reported in Yu (1996) study. It remains a question how L2 learners cut back on productivity if they have gone too far. Our data indicates that both L1 and L2 Mandarin speakers seem to be sensitive to some extent to the semantic constraints on the V2. They show varied degree of acceptance to verb compounds with

the second verb from the semantic classes such as posture or Manner of motion. Future research needs to look into why certain constraints are learned earlier than others.

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