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Factors accounting for acquisition of polysemous *shàng* ‘to go up’-phrases in Chinese as a second language (CSL)

Abstract: This study looks into how factors such as Chinese L1 prototypicality, imageability, concreteness, literalness and frequency account for Chinese L2 acquisition of polysemous *shàng* ‘to go up’-phrases. As the first step, Chinese L1 speakers (N = 92) were instructed to produce five sentences with the verb *shàng* ‘to go up’. The production prototypicality pattern was achieved. This led to the selection of a list of 20 test items. In the second step the list of items were used to measure Chinese L2 learners’ acquisition of them with a translation task (N = 96). Following this another four independent groups of Chinese L1 participants were asked to rank the test items according to their perceptions of teaching sequence in CSL (N = 95) and rate them based on their perceptions of imageability (N = 68), concreteness (N = 52) and literalness (N = 63). The same set of data was also checked in two Chinese corpora for the objective frequency in language use. The analyses indicate that L1 perceptions are reliable in predicting the acquisition sequence of the target *shàng*-phrases in CSL. The sequence correlates significantly with the prototypicality patterns but not with concreteness, imageability or literalness rating patterns. No conclusion, however, can be drawn about how objective frequency in corpora contributes to the acquisition pattern because of discrepancy between the two corpora. The results of the study support the cognitive reality of prototypicality and have implications for prototypicality-based L2 research and teaching practice.

Keywords: second language acquisition, Chinese, polysemy, phrase, prototypicality, frequency

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1 Introduction

Polysemous items abound in languages and they pose a considerable challenge to second language (L2) learners (Laufer 1997, Csabi 2004, Evans and Tyler 2004,

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Morimoto and Loewen 2007, Parent 2009, Schmitt 2010). In the research literature, there is debate over whether L2 acquisition of polysemous items is frequency-based (Ellis 2002) or prototypicality-based (Kellerman 1978). A number of other factors that might play a role in L2 vocabulary learning such as imageability (e.g. de Groot and Poot 1997), concreteness (e.g. Kellerman 1979) and literalness (e.g. Cieślicka 2006) are also identified in the literature. Moreover, some controversial findings are reported concerning how the factors relate to L2 acquisition. The controversy is partly due to the multiplicity of the intertwined variables in SLA, and partly due to a research gap in studies of L2 polysemy acquisition. This paper takes the Chinese polysemous item *shàng* 'to go up' as an example. The abovementioned five variables, namely Chinese L1 prototypicality pattern, Chinese L1 ratings for imageability, concreteness and literalness, and objective frequency in Chinese corpora are investigated in relation to Chinese L2 learners' acquisition sequence of *shàng* 'to go up'-phrases and in relation to one another. The study is undertaken particularly in reference to a series of L2 polysemy studies undertaken by Kellerman (1978, 1979, 1983, 1986) given that his studies are among the few studies documented in the literature on L2 polysemy acquisition, and the present study is very close to Kellerman's studies in approaching data.

1.1 Objectives and research questions

This paper has three main objectives. First of all, it seeks to tease apart some documented factors affecting L2 lexical knowledge and illustrate how they contribute to acquisition of phrases of polysemous items. Some of the factors are found on the MRC Psycholinguistic Database (Wilson 1987), which lists the characteristics that might affect the way vocabulary is acquired, including written frequency, familiarity rating, concreteness rating, imageability rating and lexical categories. Schmitt (2010) contributed more factors, such as collocations, polysemy, literalness, among others. Kellerman (1979) also noticed the significance of prototypicality in affecting L2 polysemy acquisition. However, it is noted that prototypicality is not one individual factor but a linguistic feature that is intertwined with other factors discussed previously such as frequency (e.g. Schmid 2000) and concreteness (Kellerman 1979). If prototypicality truly has a cognitive nature, it should be mirrored in L2 learners as well as in L1 speakers as a relatively stable property. Furthermore, how prototypicality is acquired in SLA is still mostly unknown, and therefore what role it plays in polysemy acquisition needs to be investigated (Shirai 1990).

Secondly, this study attempts to predict SLA polysemy learning outcomes from the perspectives of L1 speakers' perceptions as well as objective frequencies in L1 corpora. The legitimacy and reliability of employing native speakers' intuitions in SLA research is not without debate. Although this is not the focus of the present study, the reliability and stability of L1 speakers' judgement are tested by using the ratings from independent groups of participants over different factors. This study also intends to strike a balance between intuitive ratings by L1 speakers' subjective perception and objective reality in language use as indicated by frequency of the test items in target language corpora.

Thirdly, this study seeks to study polysemy acquisition in Chinese as a second language (CSL) by employing methodology in approaching other languages. The few documented SLA polysemy studies mainly focus on English L2 acquisition in the context of other inherently close languages such as Dutch (e.g. Kellerman 1978, Kellerman 1979, Verspoor and Lowie 2003) and German (e.g. Elston-Güttler and Williams 2008). To date, little is known about the polysemy acquisition status of CSL by English L1 speakers. The recent development in demand for CSL heightens the need to examine Chinese as the target language and bridge the research gap.

In meeting the objectives, the study intends to answer the following research questions:

1. How are Chinese L1 prototypicality patterns and ratings for imageability, concreteness and literalness mapped onto the Chinese L2 acquisition sequence of *shàng* 'to go up'-phrases?
2. How does Chinese L2 acquisition of *shàng*-phrases approximate the frequencies of the items in language use?
3. How do the factors Chinese L1 prototypicality patterns, ratings for imageability, concreteness and literalness, and frequency in corpora relate to one another?

In order to answer these questions, a production task was administered to Chinese L1 speakers to elicit production prototypicality. Based on the results, a list of test items was obtained for the subsequent tasks. Chinese L2 acquisition of the polysemous *shàng* 'to go up'-phrases was measured through a Chinese-English translation test. Chinese L1 ranking for teaching sequence and ratings on imageability, concreteness and literalness, and a frequency study were used as possible predictors of Chinese L2 acquisition. Both qualitative and quantitative methods are used in data analysis. On the one hand this study is descriptive in that it aims to illustrate the determinants of CSL polysemy acquisition and the interactions between them. On the other hand, it is predictive of the L2 learning outcomes of polysemy phrases based on these factors.

1.2 Key concepts

Polysemy in SLA. Polysemy is graded as a central issue of Cognitive Semantics (Ullmann 1951, Nerlich and Clark 2003, Gries and Divjak 2009) but remains an under-investigated area in SLA (Schmitt 1998). Polysemy is a phenomenon of a single lexical form having multiple related senses (Lyons 1977, Taylor 2003a, 2003b). L2 learners often encounter difficulty in acquiring polysemy (Lennon 1996, Tyler and Evans 2004). In L2 vocabulary knowledge, acquisition of polysemy is one important indicator for vocabulary depth knowledge (Qian 1999, Qian 2002, Qian and Schedl 2004, Schmitt 2010). However, compared with the proliferation of literature on polysemy in Cognitive Semantics and vocabulary breadth (size) growth in SLA, there is an overall scarcity of L2 polysemy acquisition research (Schmitt 1998, Meara 2002, Crossley et al. 2010). The approaches and findings in the few documented studies are reviewed below.

Prototypicality in SLA. Prototypicality has been widely used in linguistic analyses but only investigated in a handful of SLA studies. Prototype is a concept that initiated in a series of works on categorisation by Rosch and her colleagues in the 1970s (Rosch 1973, Rosch and Mervis 1975, Rosch and Lloyd 1978). According to the Prototype Theory, within a given category, not all members occupy the same status. More typical members are at the centre of the category, with less typical members at the periphery. Prototype Theory is considered a foundation of Cognitive Linguistics (Langacker 1987, Geeraerts 2006).

However, three concerns over prototypicality still remain: componentiality (Wierzbicka 1985), stability (Geeraerts 2006) and need of evidence in acquisition supporting it (Shirai 1990). Application of the theory in second language acquisition can attempt to tackle these three concerns. Documented approaches to componentiality of prototypicality are production (Rosch 1975), rating (Rosch 1975, Rosch and Mervis 1975), concreteness (Kellerman 1978, Gilquin 2006) and frequency (Kellerman 1979, Geeraerts 1988, Aitchison 1998, Schmid 2000). All these factors will be addressed in the present study. Kellerman (1979) claims that concreteness constitutes an important part of prototypicality despite a poor correlation between them. He also suggested that production by language users is usually based on frequency perceived by language users and it should contribute considerably to prototypicality (Kellerman 1986).

Regarding the stability and consistency of prototypicality, Kellerman (1978, 1979, 1983, 1986) suggests that L1 speakers' intuitions about their native language can be used as the source of polysemy prototypicality and once the prototypicality is established, it remains very consistent. Shirai's findings (1990) support this point. How much different prototypicality patterns elicited

with different approaches from different participants can test whether prototypicality is stable and what approaches are more reliable than others. In the meanwhile, L2 acquisition can provide more evidence for cognitive and linguistic theories on prototypicality. The relation between prototypicality and L2 polysemy acquisition are addressed in a series of studies by Kellerman (1978, 1979, 1983, 1986). However, there is an overall rarity of studies in this specific field and more empirical studies are needed before any further conclusions can be reached.

L1 perception of teaching sequence. As discussed previously, it is assumed that L1 speakers have sound intuitions about their native language. The hypothesis is that their perceptions of L2 teaching sequence are a good source of predictions of L2 acquisition sequence.

To examine how L1 perceive L2 teaching sequence is another perspective to L1 prototypicality, other than L1 production pattern abovementioned. L1 production relies solely on participants' contribution with the researcher completely uninvolved. It is therefore a comparatively more objective and straightforward measure of L1 speakers' impression about the frequencies they usually encounter in language use (Uyeda and Mandler 1980). By contrast, in L1 rankings for teaching sequence, a list of test items is provided by the researcher and participants are instructed to rank them and therefore comparatively speaking this task involves less cognitive efforts and is more indirect. In the meanwhile, the reliability of employing language users' perceptions can be tested. How differently these two patterns are correlated with L2 acquisition sequence and how they relate to each other can provide evidence for the cognitive reality and stability of prototypicality.

Frequency in SLA. Frequency is one important factor in accounting for both L1 prototypicality and SLA acquisition, as is already mentioned above. It is claimed by some corpus linguists that the most frequently used member in a category is the prototype in a category family (Geeraerts 1988, Aitchison 1998, Schmid 2000). Frequency in corpora is recognised in identifying the central member, so much so that Schmid (2000) proposes the 'From-Corpus-to-Cognition Principle' (p. 39). However, evidence shows that elicited data about prototypicality do not always correspond with corpus-based frequency (Shirai 1990, Kennedy 1991, Sinclair 1991, Roland and Jurafsky 2002, Nordquist 2004, Gilquin 2006). Concerning L2 acquisition of polysemous senses, the same disagreement is found: It is suggested in some studies that the more frequently used lexical items are acquired earlier in SLA (e.g. Read 1988, Ellis 2002, Schmitt 2010), while in others prototypical senses are acquired first (e.g. Gass 1988).

Whatever the argument, frequency is always an important variable for acquisition studies.

Imageability, concreteness and literalness in SLA. Imageability, concreteness and literalness are three important lexical features as well as possible constituents of prototypicality. Imageability and concreteness are claimed to be important predictors of vocabulary learning (Paivio 1969, Carter 1998, Steinel et al. 2007). By definition, imageability is the capacity to invoke an image in the mind (Steinel et al. 2007) that mainly engages the sense of sight, while concreteness is ‘the degree to which a word can be experienced by [all] senses (of human beings)’ (de Groot 2006). Hence concreteness engages more perceptual capacities than imageability. Despite the difference in definition, they are used interchangeably in several SLA studies (e.g. Flege et al. 1998, de Groot and Keijzer 2000, de Groot 2006). However it is also suggested that caution should be applied in taking them as equivalents (Carter 1998, Altarriba et al. 1999). Concerning the roles they play in L2 lexical acquisition, Ellis and Beaton (1993a, 1993b) observe an imageability effect on participants’ performance in translation from L2 to L1. A number of studies report concrete and imageable items are learned earlier and faster and translated better (Ellis and Beaton 1993a, 1993b, Carter 1998, de Groot 2006, Steinel et al. 2007), while other researchers claim that concreteness has no effect on vocabulary (Laufer 1997) or polysemy acquisition (Kellerman 1979). Furthermore, Kellerman (1979) finds that concreteness is poorly correlated with prototypicality, although concreteness constitutes an important part of it. Due to the absence of literature on the effects of imageability and concreteness on CSL polysemy acquisition and prototypicality, these two variables should be studied separately before any further conclusion is reached.

Another possible determinant in affecting L2 polysemy acquisition is literalness (Kellerman 1979, 1983, Laufer 1997, Schmitt 2010). Images are often invoked by literal meanings and therefore it is assumed that literalness is closely related to imageability in general. As another potential predictor of L2 idiom learning, literalness is found to be less influential than imageability in L2 idiom learning (Steinel et al. 2007). It is also claimed that in formulaic languages such as idioms, phrases and collocations, figurative usages are more frequent than literal usages (Conklin and Schmitt 2008). Therefore the relations between frequency and literalness, and how they account for CSL polysemy acquisition needs further investigation.

2 The study

2.1 The test candidate

It is acknowledged that high-frequency words are usually polysemous (Crossley et al. 2010, Fenk-Oczlon and Fenk 2010, Makni 2013). Therefore an ideal candidate for a study on polysemy would be high frequency lexical items displaying a wide range of senses. The primacy of spatial concepts contributes to the high frequency and semantic and syntactic productivity of spatial words. *Shàng*, primarily a locative in Chinese meaning *on*, has developed a variety of different senses, and is chosen to be the polysemous candidate in the current study. The frequencies of *shàng* in different Chinese corpora are illustrated in Table 1.

It is acknowledged that among different lexical categories of a given spelling form, the verb form is entitled to have more senses than other lexical categories. Therefore, *shàng* used as a verb in ‘verb + noun’ phrases was chosen to be the test candidate in the present study, whereby the two factors of syntactic flexibility (Kellerman 1978) and word type (Altarriba et al. 1999) are controlled. Once this was determined, what followed was finalising the test items – ‘*shàng* (polysemous verb) + noun’ phrases – through a production task.

2.2 Participants

Both Chinese L1 speakers and Chinese L2 learners participated in the study. Altogether 275 Chinese L1 participants were recruited in 2012 and 2013 in mainland China, ranging from 21 to 45 years old. They either had university education or

Table 1: Frequencies of *shàng* in different Chinese corpora

CCL corpus		CN corpus		People’s Daily Corpus		Lexiteria	
F	R	F	R	F	R	F	R
0.22%	17	0.60%	10	0.44%	22	0.45%	24

F = frequency; R = rank.

CCL corpus: Chinese corpus created by the Centre for Chinese Linguistics at Peking University
 CN corpus: Chinese corpus created by the Institute of Applied Linguistics of the Ministry of Education

were still studying in universities. Chinese L1 participants are representative of well-educated and relatively young Chinese who have received about 8 to 11 years of English education. Hereby the sample homogeneity of Chinese L1 participants was ensured. Chinese L2 learners of English L1 were recruited both from Brisbane, Australia, and Beijing, China, for two reasons. First, all of the learner participants' L1 was English, and therefore the variable of L1 interference in their CSL learning could be controlled. Second, the learners were from different learning backgrounds with different learning experiences, so that the sample is more representative of the overall population of CSL learners from English L1 language backgrounds. The Chinese L2 learners had university education or were still studying in universities, and most of them were aged from 21 to 32, with a few of office workers in their late 30s and 40s.

2.3 Test instruments and data collection

Chinese L1 production task. In administering the L1 production task, the first group of Chinese L1 participants (N = 92) were asked to write down 5 sentences freely with *shàng* used as a verb. 460 sentences were collected, with 408 valid ones where *shàng* was used as a verb and followed by a noun. In the other 52 sentences, *shàng* was mainly used after another verb in a 'verb + resultative' construction, which should be subject to another independent study. The usages of *shàng* in the 408 valid sentences were categorised further according to production frequency, variety of senses and idiomaticity. Single cases, namely those only produced once, were not included due to the possible randomness related to participants' individual experience. Outdated expressions, e.g. *shàng gòng* 'offer sacrifice to ancestors', and expressions where the sense of *shàng* is neither structurally or semantically segmental to Chinese L1 speakers, e.g. *shàng dàng* 'to get tricked', are excluded from the list. Diversity of senses was also taken into account in deciding the test items. In *shàng lóu* 'to go upstairs', for instance, *shàng* is used in its most basic, concrete and literal sense as a verb meaning *to move physically from a lower level to a higher level* and both elements *shàng* 'to go up' and *lóu* 'building' can be used independently. In expressions such as *shàng kè* 'to start class', *shàng gǎng* 'to get employed' and *shàng mǎ* 'to start a project', *shàng* is used in its metaphorical and abstract sense meaning *to start*. These items are fixed constructions where the senses of *shàng* are still identifiable.

In the end, a list of 20 *shàng*-phrases was obtained and their frequencies produced constitute the Chinese L1 production prototypicality pattern in the present research. The same list of items was also used for the subsequent tasks. All the test items and their literal and idiomatic translations are listed in the Appendix

with minimal contexts. The minimal contexts were presented in the following sections to the participants to avoid incurring any possible ambiguities since some of them have both literal senses and metaphorical senses.

According to Cognitive Semantics, polysemy is a phenomenon of a single lexical form having multiple related senses (Taylor 2003a, 2003b). Although the pattern of sense relatedness and extension are not empirically tested in the present article, a few clusters of senses are demonstrated in the 20 *shàng*-phrases (see Appendix). The most concrete and basic sense is *to go from a lower level to a higher level* in *shàng lóu* ‘to go upstairs’. The sense *to get onto a supportive bounded platform* in *shàng chuáng* ‘to get onto/into bed’ and *shàng chē* ‘to get onto/into a vehicle’ might extend directly from the most concrete sense. Likewise, all of the senses of *shàng* in *shàng cài* ‘to put dishes on the table/to serve dishes’, *shàng chénglǐ* ‘to go to town from outskirts or the country’ and *shàng chǎng* ‘to get onto sports field’ imply *to get into/onto a bounded area and become the focus of people’s attention*. The first two items also have the conceptual implication of HIGHER STATUS IS UP, which is in line with English in documented literature (e.g. Altenberg and Granger 2002). The first and third items have the implication of PUBLICITY IS UP, which together with *shàng diànshì* (to be on TV), also accords with English in previous literature (e.g. Lindstromberg 2010).

ACTIVE IS UP (Boers 1996, Lakoff and Johnson 1980) seems to be underpinning another cluster of *shàng*-phrases. Usually a person goes to a place and starts to do something, and therefore the sense *to start* might have extended from the sense *to go to*. Examples for this extension can be found in *shàng chénglǐ* ‘to go to town’, *shàng xué* ‘to go to school/to start school’, *shàng bān* ‘to go to work/to start to work’ and *shàng kè* ‘to start class’. *Shàng gǎng* ‘literal sense: to get onto a mound/metaphorical sense: to get employed’, *shàng tái* ‘to get on the stage/to come into power’ and *shàng mǎ* ‘to get onto horseback/(a project)to get started’ all have literal meanings and idiomatic meanings *to start a new state* or *to activate a new state*. *Shàng gǎng* indicates the person concerned starts to be active on the working post. *Shàng tái* literally refers to an opera actor or actress getting onto the stage to perform and therefore becomes the focus of attention. When politicians start to rule a country, they *get onto the stage* like opera actors and actresses. *Shàng mǎ*, literally ‘to get onto the horseback’, metaphorically means ‘(with a lot of efforts, a big project finally) get started’. This metaphor vividly describe after one mounts the horse, he is much higher than average people, becomes the focus of people’s attention and is ready to go at a very high speed.

Another clearly indicated conceptual metaphor is MORE IS UP. In the item *shàng huò* ‘to restock goods’, more goods is physically higher on the shelf and hence *shàng* indicates a larger amount. The Chinese expression *shàng guīmó* matches very well with the English equivalent *to increase scale* since they share

the same underlying conceptual metaphor MORE IS UP (Lakoff and Johnson 1980). The years can also pile up as one grows old and hence the expression *shàng niánjì* (to grow old).

To sum up, it is evident that the sense of *shàng* in the produced test items are systematically motivated and interconnected, although no radial pattern can be obtained from the present research. The conceptual metaphors underpinning them are mostly in accordance with the ones in English. These conceptual metaphors are universals across these two languages.

Chinese L1 ranking for teaching sequence and ratings for imageability, concreteness and literalness. All of the four tasks were administered individually to four independent groups of Chinese L1 participants. None of them had taken part in the previous Chinese L1 production task. The researcher supervised Chinese L1 participants in no more than five people at a time. In the L1 ranking task for L2 teaching sequence, the participants (N = 96) were given the 20 items obtained earlier in the production task and instructed to decide what sequence they would teach them in if they were CSL teachers, as illustrated in the Appendix.

Chinese L1 rating tasks on imageability, concreteness and literalness all employ a 5-point Likert scale from 0 to 4. In imageability rating task, the participants (N = 68) were instructed to rate to what extent each given item could conjure up an image in their mind, where 0 stood for 'no image at all is evoked' while 4 means 'a very clear image comes up'. In concreteness rating task, the participants (N = 52) were asked to rate how abstract/concrete each item was, where 0 means 'very abstract' and 4 means 'very concrete'. In literalness rating task, the participants (N = 63) rated how literal/figurative each item was, where 0 means 'very figurative' and 4 means 'very literal'. The participants were completely free to decide the total number of ranks and the number of items in each rank. In sorting out data, rankings from 1 to 20 were used to label the ratings of each participant.

Frequencies of the test items in Chinese corpora. Taking into account the controversies over corpus frequency, efforts were made to check frequencies of the test items in different Chinese corpora: the Lancaster Corpus of Mandarin Chinese (LCMC), Academia Sinica Balanced Corpus of Modern Chinese (Sinica), the Corpus of Chinese Language (the CCL Corpus) and the Chinese Corpus (the CN Corpus). It was found that only the CCL and the CN corpora are large enough to include almost all the test items. The CCL corpus (for modern Chinese) is the largest Chinese corpus with 307 million Chinese characters, updated in 2009. It was created by the Centre for Chinese Linguistics at Peking University. The CN corpus, with 50 million Chinese characters, covers materials from 1919 to 2002;

materials from 1997 to 2002 account for 50%. It was created by the Institute of Applied Linguistics of Ministry of Education of China.

Chinese L2 translation task. Ranking of L2 participants' performance in the L2 translation task was used as the indicator for acquisition sequence. The CSL learner participants (N = 92) were asked to translate the same set of sentences in the previous tasks from Chinese into English within 15 minutes. The test is presented both in Chinese characters and the Romanised *pinyin* system. No references of any sort were allowed. The researcher supervised the participants in groups of no more than five participants at a time.

3 Data analysis, results and discussion

3.1 Reliability of Chinese L2 translation data and L1 rating data

First of all, Chinese L2 translation data, which indicate L2 acquisition, were examined for internal consistency. As is demonstrated in Table 2, they were found to be highly consistent and reliable. This demonstrates that the instructions were well-received by all the participants without any misunderstanding. Furthermore, it is indicated that Chinese L2 participants agree on their acquisition of the test items, despite the fact that they have had different Chinese learning experiences and are at different Chinese L2 levels. This suggests that Chinese L2 learners acquire *shàng*-phrases systematically rather than randomly. There is a pattern for the L2 acquisition of the target *shàng*-phrases.

For Chinese L1 data, high reliability is found for all sets of Chinese L1 ranking data for L2 teaching sequence and rating data for imageability, concreteness and literalness ($\alpha \geq .88$), as is shown in Table 2. The high agreement among Chinese L1

Table 2: Reliability of Chinese L1 ratings and Chinese L2 translation results

Variable	Number of participants	Cronbach's alpha (α)
CL2 Translation	96	.85
CL1 Teaching sequence	95	.97
CL1 Imageability	68	.96
CL1 Concreteness	52	.94
CL1 Literalness	63	.88

participants concerning the rankings indicates that Chinese L1 participants have a good awareness of their native language and tend to be very consistent.

3.2 Rankings of Chinese L2 acquisition sequence and Chinese L1 production

Comparing rankings of Chinese L2 acquisition sequence with Chinese L1 production prototypicality can illustrate to what extent the two sets of data approximate. Performance on each item in Chinese L2 translation test is needed as the indicator for L2 acquisition sequence. For each item, a Chinese L2 participant was awarded 0 or 1 point according to the accuracy of translation, with 1 point the most accurate. For the Chinese L1 production task, a sequence of Chinese L1 production resulted from ranking the frequencies of the test item produced by Chinese L1 participants. The sequence is also the indicator for Chinese L1 production prototypicality.

Both rankings of Chinese L2 acquisition sequence and Chinese L1 production prototypicality pattern are demonstrated in Table 3. For convenience of comparison, the 20 items were divided into three groups in order of appearance: the first 6, the middle 6 and the last 8. The first observation was that overall almost all of the members in the three clusters in the Chinese L2 acquisition pattern approximate those in the L1 production pattern, with only slight variations in ranking. Secondly, the very first item acquired by Chinese L2 learners *shàng wǎng* ‘to get online’ does not accord with the most prototypical one *shàng lóu* ‘to go upstairs’, where *shàng* means ‘to go up to a higher place’. The priority of *shàng wǎng* ‘to get online’ in acquisition might be that on one hand it is a daily activity for average people and on the other hand there is such a correspondence in form and meaning between English and Chinese. Following the first item in the L2 acquisition sequence are the institutionally frequently used items like *shàng kè* ‘to start class’, *shàng xué* ‘to go to school’ and *shàng bān* ‘to start/go to work’. Frequency seems more influential at the initial stage of L2 acquisition. This may explain the small variations in both rankings.

Thirdly, the middle cluster in both rankings has mostly concrete and literal items, while almost all the members in the third cluster are abstract and figurative. In both clusters, over half of the members in both patterns refer to ‘*getting onto something with a supportive surface*’. The figurative items have the implication of getting into a prestigiously bounded area, initiating some development and/or becoming the focus of people’s attention, such as *shàng cài* ‘to serve dishes’, *shàng gǎng* ‘to get onto a mound/to get employed’, *shàng mǎ* ‘to mount a horse/to start a project’, *shàng tái* ‘to come onto the stage/to come into power’

Table 3: Rankings of *shàng*-phrases in CL2 acquisition sequence and CL1 production prototypicality

Item	Idiomatic translation	CL2 acquisition*	CL1 Production**
<i>Shàng wǎng</i> (net)	To get online	1	6
<i>Shàng kè</i> (class)	To start class	2	5
<i>Shàng xué</i> (school)	To go to school	3.5	2
<i>Shàng bān</i> (work)	To start/go to work	3.5	3
<i>Shàng lóu</i> (building)	To go upstairs	5	1
<i>Shàng chē</i> (vehicle)	To get aboard	6	4
<i>Shàng jiē</i> (street)	To go out	8.5	7
<i>Shàng chénglǐ</i> (town)	To go to town	8.5	8
<i>Shàng chuáng</i> (bed)	To go to bed	8.5	9
<i>Shàng diànshì</i> (TV)	To be on TV	8.5	11
<i>Shàng chǎng</i> (sports field)	To get onto the sports field	11	12
<i>Shàng cài</i> (dishes)	To serve food	12.5	10
<i>Shàng shì</i> (market)	To come into season	12.5	18.5
<i>Shàng niánjì</i> (age)	To grow old	15	14
<i>Shàng huò</i> (goods)	To restock goods	15	18.5
<i>Shàng gǎng</i> (mound)	To get employed	15	18.5
<i>Shàng yào</i> (ointment)	To apply ointment	17	13
<i>Shàng mǎ</i> (horse)	To start (a project)	18	16
<i>Shàng guīmó</i> (scale)	To increase scale/expand	19	15
<i>Shàng tái</i> (stage)	To come into power	20	18.5

* In the Chinese L2 (CL2) acquisition task, 1 means the item received the highest score in Chinese L2 translation test while 20 means the item received the lowest score.

** In the Chinese L1 (CL1) production task, 1 means the highest number of Chinese L1 participants produced the item while 18.5 means the lowest number of participants produced the item.

and so on. Finally, *shàng niánjì* ‘to grow old’, *shàng guīmó* ‘to increase scale/expand’, *shàng huò* ‘to restock goods’ and *shàng tái* ‘to get onto the stage/to come into power’ in the last cluster belong to another category where the degree develops or the amount increases.

3.3 Correlation analysis results and discussion

A Pearson’s correlation analysis was carried out to investigate the correlations between Chinese L2 acquisition, the dependent variable, and the five predictor

variables, namely Chinese L1 ranking on teaching sequence and ratings on concreteness, literalness and imageability of the test items. First of all, means for the test items in the Chinese L2 translation test were obtained as the indicator for acquisition sequence. Likewise, means for Chinese L1 ratings on teaching sequence, concreteness, literalness and imageability were worked out. Frequencies for the test items in the production task and two corpora were also calculated. It was noted that the item *shàng wǎng* ‘to get online’ was not found in the CN corpus since it was last updated in 2002 when the internet was still not widely used. Considering the probability of skewing the correlations, this item was excluded from the analysis. The correlation values across all variables for the remaining 19 items are presented in Table 4.

Of interest is how Chinese L2 acquisition of *shàng*-phrases is correlated with different groups of predictor variables. For convenience of analysis, the seven predictor variables were categorised into three groups: the prototypicality group, including Chinese L1 production and teaching sequence ranking; the second group involving ratings on individual lexical features, i.e. Chinese L1 ratings on concreteness, imageability and literalness; and the third group of frequencies of the test items in the CN and the CCL corpora.

Table 4: Pearson’s correlation between CL2 acquisition and different CL1 predictors

	CL2 DV		CL1 PV					
	Translation Acq. (N = 96)	Prototypicality		Lexical features			Frequency	
		Prod. (N = 92)	Teach. (N = 95)	Con. (N = 52)	Imag. (N = 68)	Liter. (N = 63)	CN	CCL.
Acq.	–	.76**	–.87**	.33	.29	.39	.70**	.36
Prod.	–	–	–.77**	.47*	.38	.46*	.74**	.28
Teach.	–	–	–	–.61**	–.57*	–.62**	–.64**	–.25
Con.	–	–	–	–	.92**	.93**	.19	.10
Imag.	–	–	–	–	–	.89**	.16	.10
Liter.	–	–	–	–	–	–	.13	.25
CN.	–	–	–	–	–	–	–	.67**
CCL.	–	–	–	–	–	–	–	–

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

DV = dependent variable; PV = predictor variable; Acq. = acquisition; Prod. = production prototypicality; Teach. = teaching sequence; Con. = concreteness; Imag. = imageability rating; Liter. = literalness rating; CN. = frequency in CN corpus; CCL. = frequency in CCL corpus.

With regards to how the first group of Chinese L1 variables relates to Chinese L2 acquisition of *shàng*-phrases, both prototypicality patterns, namely the Chinese L1 production pattern and the teaching sequence pattern, are strongly correlated with CSL learners' acquisition sequence of the items and between themselves ($p = .01$). This means Chinese L2 acquisition score is in accordance with the increasing Chinese L1 production frequency and the decreasing L1 teaching sequence. The results firstly suggest L1 speakers have a good sense of their L1 and are reliable sources of prototypicality patterns. Secondly, prototypicality patterns in this case are quite consistent and stable variables in predicting L2 acquisition of phrases of polysemous items. Kellerman's conclusion (1979) about the contribution of prototypicality in L2 polysemy acquisition is supported here.

There is a particularly strong correlation ($p = .01$) across the second group of predictor variables. This suggests that although the three variables, namely concreteness, imageability and literalness, are different in definition, they are very closely related. Due to the weak correlations they have with L2 polysemy acquisition, none can be considered predictors of L2 polysemy acquisition sequence. This result, together with the findings discussed previously, supports Kellerman's claim (1979) that L2 acquisition is not correlated with concreteness. It is also observed that Chinese L1 ratings for literalness are not significantly correlated with the Chinese L1 corpora. The result contradicts the claim made by Conklin and Schmitt (2008) that figurative meanings in formulaic language are more frequent than literal ones. In addition, all the three variables are moderately ($p = .05$) correlated with L1 teaching sequence but not with Chinese L2 acquisition sequence. On the one hand, this result supports the finding in Ellis and Beaton (1993a, 1993b) that imageability is one critical factor that determines a word's teachability. On the other hand, it suggests that although concrete/imageable/literal words are acquired earlier, there are other factors that concurrently affect L2 acquisition.

In the third variable group, although the two corpora are moderately correlated ($p = .05$), a contrastive divergence is found in the way they relate to acquisition and other variables. While a moderate correlation is detected between the CN corpus and L2 knowledge ($p = .05$), the predictive strength of the CCL is almost negligible. The same inconsistency is also found in their relations to the prototypicality patterns. Additionally, in addressing how prototype is mirrored in the corpora, it is observed that the two most frequently used items in each corpus, *shàng xué* 'to go to school' in the CN corpus and *shàng shì* 'to come into season' in the CCL corpus, disagrees with the prototype sense, 'to go up to a higher place'. The assumption cannot be verified that production prototypicality parallels frequencies in language use (Uyeda and Mandler 1980). This cautions against taking the most frequently used number in corpus as the prototype (see Aitchison 1998,

Geeraerts 1988, Schmid 2000). These substantial discrepancies might arise from the unmatched percentages of sampling genres of the two corpora, despite the comprehensiveness both claim. To put it in another way, objective frequency in corpora sees considerable variations depending on resources, and conclusions regarding their application in CSL lexical research should be tentative. A colloquial Chinese corpus might be more capable of reflecting the test items in people's daily language use. Another alternative is, as proposed by Kellerman (1986), to employ subjective frequency perceived by language users to compare with prototypicality.

4 Conclusions and implications

All in all, this study is meaningful to research on Cognitive Semantics and CSL vocabulary acquisition. On the one hand, the Prototype Theory on polysemy is tested with evidence from acquisition studies. On the other hand, a more comprehensive perspective of L2 vocabulary acquisition is obtained and it provides implication for both CSL lexical research and teaching.

With results from both the qualitative and quantitative analyses, some conclusions can be reached concerning polysemy acquisition sequence in CSL and the different predictor variables. First of all, both of the Chinese L1 prototypicality patterns, namely production pattern and teaching sequence pattern, have strong correlations with Chinese L2 acquisition sequence. Therefore prototypicality proves to be a powerful predictor of L2 acquisition of polysemy phrases. This agreement between Chinese L1 and L2 participants provides evidence that prototypicality, mirrored in both L1 speakers and L2 learners, is cognitively true. It also confirms Kellerman's claim that prototype is a well-established and consistent concept, and prototypicality is particularly useful in second language acquisition studies. The findings of the study also support Kellerman's claim that concreteness is poorly correlated with prototypicality. Second, L1 speakers have a good intuitive perception of their L1 and there is a strong agreement between L1 production prototypicality, which is more objective, and the L1 perception of teaching sequence, which is relatively more abstract. Due to the fact that they are strongly interrelated but still different, it is recommended that the prototypicality perspective should always be specified, for instance, to be L1 production, L1 teaching sequence ranking and so on, in future studies to minimise obscurity and confusion over prototypicality. Finally, the predictive power of the three factors, namely concreteness, imageability and literalness, in L2 acquisition is negligible. By contrast, all the three variables approximate moderately L1 perceptions of teaching sequence.

These conclusions about the contributing factors of L2 polysemy acquisition are enlightening for future CSL lexical research. Evidence for prototypicality and its consistency in predicting SLA in this study paves grounds for more research in this field, although prototypicality is all in all still an under-investigated area in SLA. In future studies, more Chinese L2 participants' variables can be considered such as their other linguistic backgrounds and their L2 proficiency levels. And importantly, to give a more comprehensive understanding of polysemy acquisition, L2 learners' knowledge of sense relatedness of the target polysemous item can be compared with L1 speakers' knowledge. Further research on this topic will be needed to complement the findings in the present study. Concerning the role of frequency plays in L2 acquisition, it is suggested that either objective colloquial corpus data or subjective frequency data perceived by L1 users should be considered in future studies.

In CSL lexical teaching, this study provides more justification for introducing the concept of prototypicality to adult L2 learners in classroom teaching. Evidence for how L2 acquisition sequence is affected by L1 prototypicality pattern demonstrates that L2 acquisition of phrases of polysemous items is systematically patterned. L2 awareness of the system can facilitate learning autonomy and teaching efficiency because L2 learners usually react well to explicit knowledge of reasonableness and regularities in the target language (Smith 1981, Kellerman 1983, Watkins 1983, Ellis 1994, Schmitt 2010). More evidence from classroom practice will provide a more complete picture of the role different variables play in CSL polysemy learning.

The researcher is aware the selection of the test items might have some variability depending on different researchers. This variability is counterbalanced to a certain extent by the large number of L1 participants ($N = 92$). In addition, the list of target *shàng*-phrases is only used in the present study as an instrument and example to investigate the acquisition sequence and predictive strengths of prototypicality patterns in Chinese L2 vocabulary acquisition. Therefore it is noted that the prototypicality pattern obtained in this study is a representative but not exhaustive list of *shàng*-phrases that could be in the prototypicality pattern.

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Appendix

Chinese L1 ranking for L2 teaching sequence

Dear all,

I am a researcher in the University of Queensland studying learning and teaching Chinese. If you are given a chance to teach Chinese as a second language, in what sequence are you going to teach *the following items in italics*? An example is given in the following with Chinese polysemous item *hóng* ‘red’. You can rank them either individually or categorise a few under the same rank. Group 1 means what you are going to teach first. **There are no right or wrong answers**. Your time is greatly appreciated.

- a. *Wǒ xǐhuān hóng huā.*
I like *hóng* flower
‘I like red flowers.’
- b. *Tā xiànzài shì hóng rén.*
he now COP* *hóng* person
‘He is very popular (with the bosses) these days.’
- c. *Nǐ hē hóng chá ma?*
you drink *hóng* tea QM*
‘Would you like (some) black tea?’
- d. *Hóng dēng tíng, lǜ dēng xíng.*
hóng light stop green light go
‘(We have to) stop at the red light and can go at the green light.’
- e. *Tāmen yīgè chàng hóng liǎn, yīgè chàng bái liǎn.*
They one play *hóng* face, the other play white face.
‘(They two) one plays the good cop while the other plays the bad cop.’

- f. *Niánzhōng wǒmen fēn hóng lì.*
 year end we share *hóng* profits
 'At the end of the year we will share the profits.'

* COP: copular verb

QM: question marker

Here are some possible answers:

You may teach them in this order ... Group 1 <u>a</u> . Group 2 <u>d</u> . Group 3 <u>c</u> . Group 4 <u>b</u> . Group 5 <u>f</u> . Group 6 <u>e</u> .	Or this order ... Group 1 <u>a</u> . Group 2 <u>d, c</u> . Group 3 <u>b</u> . Group 4 <u>f, e</u> . Group 5 __ Group 6 __	You may teach them in this order ... Group 1 <u>a, d, b</u> . Group 2 <u>c</u> . Group 3 <u>e</u> . Group 4 <u>f</u> . Group 5 __ Group 6 __	And there are many other possible combinations.
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Now please judge in what order you would teach the following items in italics and put the corresponding letters on the blanks.

- (1) *Zhèxiē gōngrén kěyǐ shàng gǎng le.*
 these workers may *shàng* mound PER
 'These workers are ready to get employed now.'
- (2) *Gāi shàng yào le.*
 should *shàng* ointment PER
 'It's time to apply ointment.'
- (3) *Tā shàng diànshì le.*
 he *shàng* TV PER
 'He was on TV.'
- (4) *Tā bā diǎn shàng xué.*
 he eight o'clock *shàng* school
 'He goes to school at eight.'
- (5) *Wǒmen xiànzài shàng kè.*
 we now *shàng* class
 'Let us *start* our class now.'

- (6) *Háizǐmen yào shàng lóu.*
 children AUX. shàng floor
 ‘The children want to go upstairs.’
- (7) *Tā shàng niánjì le.*
 He shàng age PER
 ‘He is quite old.’
- (8) *Yùndòngyuán yào shàng chǎng le.*
 Athletes AUX. shàng sports field PER
 ‘The athletes are getting onto the sports field.’
- (9) *Wǒmen děi shàng chénglǐ cáinéng mǎi dào zhèběn shū.*
 We must shàng town can manage to buy this
 book
 ‘Only by going to town can we buy this book.’
- (10) *Nǐ gāi shàng chē le.*
 you should shàng car PER
 ‘It is time to get aboard now.’
- (11) *Shāngchǎng yào shàng guīmó.*
 shopping mall AUX. shàng scale
 ‘The shopping mall should increase its scale.’
- (12) *Tā jīnnián jiǔyuèfèn shàng tái.*
 he this year September shàng stage
 ‘He will *come into power* this September.’
- (13) *Gǎnjǐn shàng cài ba!*
 Quick shàng dish SEP
 ‘Please serve the dishes as soon as possible.’
- (14) *Jīnnián hěnduō chāoshì yào shàng mǎ.*
 this year many supermarkets AUX shàng horse
 ‘Many supermarkets will start business this year.’
- (15) *Tā gāng shàng chuáng.*
 he just shàng bed
 ‘He just went to bed.’
- (16) *Xīguā yào shàng shì le.*
 watermelon AUX. shàng market PER
 ‘Watermelon will be in season soon.’

- (17) *Tā tiāntiān shàng wǎng.*
 he day day shàng Internet
 'He gets online every day.'
- (18) *Tā zuò huǒchē shàng bān.*
 he take train shàng work
 'He goes to work by train.'
- (19) *Wǒmen yīhuìr shàng jiē ba.*
 we in a while shàng street SEP
 'Let's get onto streets (go out) in a while.'
- (20) *Diànlǐ gāi shàng huò le.*
 store need to shàng goods PER
 'The store needs to restock its goods.'

*PER: perfective marker

AUX: auxiliary word

SFP: sentence final particle

COP: copular verb

QM: question marker

- | |
|----------------|
| Group 1 _____ |
| Group 2 _____ |
| Group 3 _____ |
| Group 4 _____ |
| Group 5 _____ |
| Group 6 _____ |
| Group 7 _____ |
| Group 8 _____ |
| Group 9 _____ |
| Group 10 _____ |
| Group 11 _____ |
| Group 12 _____ |
| Group 13 _____ |
| Group 14 _____ |
| Group 15 _____ |
| Group 16 _____ |
| Group 17 _____ |
| Group 18 _____ |
| Group 19 _____ |
| Group 20 _____ |

Bionote

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