MANDARIN SPEAKERS' DIFFICULTIES WITH SPATIAL PREPOSITIONS IN ENGLISH AND THEIR CONCEPTUALIZATION OF SPATIAL RELATIONS

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ปัญหาการใช้คำบุพบทที่แสดงปริภูมิในภาษาอังกฤษและการสร้างมโนทัศน์เกี่ยวกับความสัมพันธ์เชิงปริภูมิของผู้พูดภาษาจีนแมนดาริน

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ฉวงชี จาง: ปัญหาการใช้คำบุพบทที่แสดงปริภูมิในภาษาอังกฤษและการสร้างมโนทัศน์เกี่ยวกับความสัมพันธ์เชิงปริภูมิของผู้พูดภาษาจีนแมนดาริน. (MANDARIN SPEAKERS' DIFFICULTIES WITH SPATIAL PREPOSITIONS IN ENGLISH AND THEIR CONCEPTUALIZATION OF SPATIAL RELATIONS)
อ. ที่ปรึกษาวิทยานิพนธ์หลัก: ศ. กิตติคุณ ดร. อมรา ประสิทธิ์รัฐสินธุ์, 256 หน้า.

งานวิจัยในอดีตกล่าวว่าสิ่งที่ยากสำหรับผู้เรียนภาษาอังกฤษคือการใช้คำบุพบทให้ถูกต้อง ถึงแม้การสอนภาษาอังกฤษจะรวมคำอธิบายพื้นฐานเรื่องการใช้คำบุพบทไว้ แต่ก็ยังมีตัวอย่างจำนวนมากที่ผู้เรียนภาษาอังกฤษเป็นภาษาต่างประเทศเลือกใช้คำบุพบทที่ต่างจากเจ้าของภาษา ช่องว่างนี้น่าจะเกี่ยวข้องกับระบบมโนทัศน์ที่ต่างกันของผู้พูดภาษาที่ต่างกัน งานวิจัยนี้มีจุดประสงค์ 3 ประการ คือ 1) ศึกษาปัญหาของผู้พูดภาษาจีนแมนดารินที่เรียนภาษาอังกฤษในการเลือกใช้คำบุพบทภาษาอังกฤษ 2) ปรับแก้เครือข่ายความหมายของความสัมพันธ์ทางปริภูมิในภาษาอังกฤษที่มีผู้ศึกษาไว้แล้ว และนำเครือข่ายที่ปรับแก้มาเปรียบเทียบกับเครือข่ายความหมายของตัวบ่งชี้จุดตำแหน่งในภาษาจีนแมนดาริน และ 3) อธิบายปัญหาการใช้คำบุพบทที่พบในข้อ 1 ในเชิงปริชาน โดยแสดงความสัมพันธ์ระหว่างปัญหาดังกล่าวกับผลการเปรียบเทียบเครือข่ายความหมายในสองภาษาที่พบในข้อ 2

เพื่อบรรลุวัตถุประสงค์ ผู้วิจัยสร้างแบบทดสอบความสัมพันธ์ทางปริภูมิภาษาอังกฤษเพื่อสำรวจปัญหาของกลุ่มตัวอย่างผู้พูดภาษาจีนแมนดาริน แบบทดสอบประกอบด้วยข้อสอบแบบมีตัวเลือก 60 ข้อ และจำนวนข้อสอบที่ใช้ได้ในการวิเคราะห์มีจำนวน 73 ชุด ผู้วิจัยสร้างเครือข่ายความหมายของตัวบ่งชี้จุดตำแหน่งในภาษาจีนแมนดารินโดยใช้คลังข้อมูลภาษาจีน (Sinica Corpus) การวิเคราะห์ความหมายใช้หลักพหุความหมายที่เสนอโดยไทเลอร์กับอีแวนส์ (Tyler & Evans, 2003) การเปรียบเทียบเครือข่ายความหมายในสองภาษาแสดงให้เห็นทั้งความเหมือนและความต่าง ผู้วิจัยนำปัญหาการใช้คำบุพบทที่วิเคราะห์ได้จากแบบทดสอบมาเชื่อมโยงกับผลการเปรียบเทียบเครือข่ายความหมายโดยใช้หลักการวิเคราะห์เปรียบต่าง

ผลการวิเคราะห์พบว่าผู้พูดภาษาจีนแมนดารินมีปัญหากับการระบุความสัมพันธ์แนวดิ่ง ซึ่งเกี่ยวกับคำว่า *above*, *at*, *below*, *in*, *on*, *over*, และ *under* โดยเฉพาะเมื่อใช้เป็นอุปลักษณ์ ผลการเปรียบเทียบเครือข่ายความหมายในสองภาษาแสดงให้เห็นว่าความต่างมีมากกว่าความเหมือน และการเชื่อมโยงปัญหาการใช้คำบุพบทกับเครือข่ายความหมายทำให้เห็นว่าความเหมือนกันในด้านความหมายทางกายภาพทำให้เกิดความง่ายในการเลือกใช้คำบุพบทในภาษาอังกฤษ ส่วนความต่างกันในด้านความหมายทางหน้าที่ทำให้เกิดความสับสนแก่ผู้พูดภาษาจีนที่เรียนภาษาอังกฤษ

สาขาวิชา ภาษาอังกฤษเป็นภาษานานาชาติ ลายมือชื่อนิสิต .....
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KEYWORDS: COGNITIVE LINGUISTICS/ CONCEPTUALIZATION/ SPATIAL RELATIONS/PROTO-SCENE/SEMANTIC NETWORK

CHUAN-CHI CHANG: MANDARIN SPEAKERS' DIFFICULTIES WITH SPATIAL PREPOSITIONS IN ENGLISH AND THEIR CONCEPTUALIZATION OF SPATIAL RELATIONS. ADVISOR: PROF. EMERITUS AMARA PRASITHRATHSINT, Ph.D., 256 pp.

Previous studies claim that it is difficult for learners of English to master English prepositions. Even though pedagogical descriptions have already included fundamental uses, there are still instances showing that learners choose prepositions differently from native speakers of English. This learning gap should refer to the different systems of conceptualization by the two groups of language users. The objectives of the present study are threefold: 1) to investigate the difficulties which Mandarin Chinese learners of English encounter when choosing the spatial prepositions in English, 2) to modify the existing semantic networks for the spatial relations in English and compare them with the constructed semantic networks for Mandarin Chinese localizers, and 3) to explain the learning difficulties (in No.1) cognitively by relating them to comparisons of the semantic networks for the spatial relations in both languages (in No. 2).

To fulfill the objectives, the Test of Spatial Relations (TSR) which contained sixty multiple-choice test items, were created to examine the difficulties that a sample of Mandarin Chinese learners of English encountered. A total of 73 valid test copies were collected for analyses. The semantic networks for the Mandarin Chinese localizers were created based on Sinica Corpus, and the analyses adopted Principled Polysemy developed by Tyler and Evans (2003). The TSR results confirm and define learning difficulties. The comparisons of the semantic networks in English and Mandarin Chinese suggest similarities and differences. The discussions of the TSR results and the semantic networks lead to cognitive descriptions based on contrastive analysis.

The TSR results suggest that Mandarin Chinese Learners of English especially have difficulties with indicating verticality including *above*, *at*, *below*, *in*, *on*, *over*, and *under*, especially when they are metaphorically used. The comparisons between the semantic networks for the spatial prepositions in English and Mandarin Chinese localizers reveal that there are more differences than similarities. The analysis of the relationships between the test items and the semantic networks shows that the similarities in the spatial-physical senses are more likely to enhance ease of learning while it is more possible that the differences in the spatial-functional senses make MLEs especially confused.

Field of Study: English as an International Language Student's Signature: .....
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CONTENTS

CHAPTER VII CONCLUSION AND DISCUSSION

LIST OF TABLES

LIST OF FIGURES

CHAPTER I
INTRODUCTION

1.1 Rationale

As early as in 1971, the study by Oller and Inal (1971) state that the cloze test of prepositions used in the study significantly correlated with the test takers' English proficiency, especially grammatical competence. Nearly twenty years later, Jabbour-Lagocki (1990) claims that learning English prepositions is a great challenge for learners of English as a second language. Celce-Murcia and Larsen-Freeman (1999) state that even though ESL/EFL students have achieved a high level of proficiency in English for a long time, they still struggle with English prepositions. It is obvious that learners of English encounter difficulties with prepositions. According to the abovementioned statements, it can be assumed that the uses of English prepositions (e.g., *in* as in *he walked in the hallway* and *on* as in *he placed the book on the table*) by Mandarin Chinese learners of English (MLEs) conceivably lead to the fact that this part of speech contains distinctness among different languages. This definitely arouses the intention of the current study which aims at investigating and analyzing MLE's difficulties with English prepositions and the causes of the learning difficulties.

One possible explanation can be related to the fact that English prepositions are categorized as function words, which do not contain any concrete meanings but abstract concepts. Ekiers (2004) states that ESL/EFL learners seem to overlook function words when processing language meanings. MLEs seem to pay more attention to content words than function words while studying the language merely because function words are not proportionally as important as content words in the typical written forms of assessments, e.g., fill in blanks and multiple-choice questions regarding vocabulary. Taylor (1988: 299) states, "It is well known that prepositional usage varies enormously from language to language, to the never-ending frustration of foreign language learners and their teachers." It is undeniable that the current pedagogical grammar has covered the general usage of English prepositions in various contexts. There are still a great number of instances which are not included in or cannot be explained with the pedagogical descriptions. In other

words, the exceptions, which are not explicitly covered in the descriptions, still exist in spoken or written texts produced by MLEs. The learning strategy and the approach have led to noticeable difficulties choosing appropriate English prepositions in a variety of contexts, and the difficulties have raised an awareness that the systems of conceptualization in English and Mandarin Chinese differ in some ways.

The systems of conceptualization in MLEs and native speakers of English (NSEs) ought to be analyzed with a cognitive approach in order to investigate the significant differences when spatial prepositions are used in the two languages. According to conceptual mappings between two domains (Lakoff, 1993), through cognitive process, NSEs apply the concepts in mind and spontaneously map them onto extended metaphorical uses. These concepts cannot be acquired or can partially be learned by MLEs. The gap seems to cause the fact that no matter how proficient in English MLEs are, there are still instances in which they choose different English prepositions from those used by NSEs even though this certain language gap does not significantly influence mutual understandings between speakers and listeners. For example, *the bird is singing in the tree* and *the bird is singing on the tree* would not cause such confusion.

Based on the two examples, a simple search from British National Corpus (BNC) should portray the distinctiveness. First, search *tree* from the database. Second, choose Collations and set the collocation window span from 5 left (-5) to 1 left (-1) for more possibilities which *in* and *on* are located in the construction. In the data base, the minus sign is used to indicate left span while the plus sign is used to indicate right span. Third, set Specific Collocate as *in* and *on*. The above searching criteria yield results in Table 1-1 and Table 1-2. The highlighted parts possibly indicate the results which contain the structures of *in*/*on* with articles/directive adjectives and then *tree*/*face*. The two figures show that *in* collocates with *tree*/*face* more frequently than *on* does. It should be noted that the results include various possible situations. By reading through all the entries, it suggests that in the following situations, NSEs tend to use certain spatial prepositions.

Table 1-1 Frequency of *in* and *on* with *tree*

Within the window -5 to -1, the frequency which *in* and *on* collocate with *tree*		
Distance	No. of occurrences	
	in	*on*
-5	66	34
-4	51	22
-3	101	58
-2	185	87
-1	23	13
Total	426	214

Table 1-2 Frequency of *in* and *on* with *face*

Within the window -5 to -1, the frequency which *in* and *on* collocate with *face*		
Distance	No. of occurrences	
	in	*on*
-5	43	28
-4	44	43
-3	39	98
-2	407	324
-1	13	7
Total	546	500

The above BNC corpus data have shown the collocations. Suppose both MLEs and NSEs are asked to describe the following picture (Figure 1.1) in their own native languages.

Figure 1-1 Bird and tree

NSEs tend to use *the bird is singing in the tree* rather than *the bird is singing on the tree*. In contrast, MLEs would rather use:

(1) 鳥　在　樹　上面　唱歌
Niǎo zài shù *shàngmiàn* chànggē.
bird at tree upside sing[1]
'Birds are singing in the tree.'

When *shàngmiàn* 'upside' in Mandarin Chinese is used to indicate spatial relations, it denotes a concept that is similar to *on* in English. Therefore, when MLEs describe the picture in English, it is highly possible that they would use *the bird is singing on the tree* instead of *the bird is singing in the tree*. Though, whether *in* or *on* is used in this case, the sentence is not likely to cause too much ambiguity to speakers and listeners for mutual understandings. In addition to the above scene, the following picture also demonstrates the difference in the two languages.

Figure 1-2 Baseball

NSEs would be more likely to say *the ball hits in the player's face* rather than *the ball hits on the player's face*. MLEs would be likely to use:

[1] The examples in this study are displayed in Mandarin Chinese, Hanyu Pinyin, and the gloss for each wording.

(2) 球 打 在 球員 的 臉 上面
Qiú dǎ *zài* qiúyuán de liǎn *shàngmiàn*.
ball hit at player particle face upside
'A ball hits in the player's face.'

That is to say, when MLEs are to describe the picture in English, they are more likely to apply *shàngmiàn* 'upside' and utter *the ball hits on the player's face*. The two examples show that native speakers of the two languages conceptualize the same scenes distinctively. In both examples, *in* is used to indicate the spatial relations in English whereas MLEs use *shàngmiàn* 'upside,' the concept of which is relatively closer to *on* in English in this case. To be more accurate, native speakers of the two languages store similar but not identical images in the brain for a broad concept of one certain spatial relation. Those images create a stereotype of the spatial relation. When the images are applied to other spatial relations of the same concept, the differences yield various outcomes.

Unfortunately, the differences are likely to cause learning difficulties to MLEs. When pedagogical grammar has covered the basic concepts of spatial prepositions in English, MLEs still produce some expressions which are different from those of NSEs. There can be various crucial factors which lead to learning difficulties. However, language instructors to MLEs cannot explain the differences systematically when dealing with pedagogical grammar. They seem to guide MLEs to memorize unusual uses in independent contexts. Unusual uses refer to the expressions which are less frequently seen or contain some differences between the two languages. There is no doubt that recitation and memorization support language learning at all levels, but gradually when learners have achieved a certain level of proficiency, they should not play as important a role as they are at the earlier levels of proficiency. In contrast, it is believed that cognitive approaches should matter instead. If MLEs cannot figure out some cognitive features to bridge the two languages, learning of spatial prepositions in English could be slowed or even fossilized.

Earlier research on English prepositions focuses more on syntactic structures. Some researchers analyze spatial prepositions in aspects of syntax-semantics interface. They discuss prepositions from syntactic and semantic aspects individually or in the

mixture of the two perspectives. The discussions are intended to complement each other. Research which discusses prepositions in cognitive terms is relatively limited, especially that concerns MLEs. Therefore, this current study aims at analyzing the conceptual differences between NSEs and MLEs and seeks traceable evidence to generalize the learning difficulties which MLEs encounter when choosing appropriate spatial prepositions in English to agree with certain contexts. When learning difficulties are confirmed and defined, the results should ideally enhance the understandings of spatial relations in both languages for MLEs.

It is challenging and even not feasible to analyze learning difficulties from all the prepositional expressions without any criteria to narrow the scope of the study. It is assumed that MLEs should be especially confused with certain prepositions. The confusion occurs perhaps because of different ways that language users conceptualize the spatial scenes. It is possible that MLEs cognitively map the spatial concepts in Mandarin Chinese to spatial prepositions in English naturally from their conceptualization in the first language. Consequently, learning difficulties could possibly occur in this predictable process. Despite the parts of these concepts in the two languages which exactly match each other, it is also hypothesized that a spatial concept such as *shàngmiàn* ‘upside’ in Mandarin Chinese should rather contain a continuum which denotes more meanings and covers several spatial prepositions in English. This suggests where the difficulties should be traced.

This current study is to confirm learning difficulties and explain the reasons why the learning difficulties occur. The first step is to retrieve quantitative data from a group of MLEs to explore learning difficulties. Second, analyzing similarities and differences between the two languages in a cognitive approach should provide qualitative evidence to explain the learning difficulties. The outcomes of the study should reveal problematic spatial relations when MLEs choose spatial prepositions in English.

1.2 Research questions

1. With which spatial prepositions in English do MLEs have difficulties?
2. What are the similarities and the differences between the semantic networks for the spatial relations in English and Mandarin Chinese?
3. Do the similarities enhance the comprehensibility of the spatial relations in the two languages and the differences suggest the learning difficulties for Mandarin Chinese learners of English?

1.3 Objectives of the study

The objectives of the study are:

1. to investigate the difficulties which Mandarin Chinese learners of English encounter when choosing the spatial prepositions in English;
2. to modify the existing semantic networks for the spatial relations in English and to construct those for Mandarin Chinese, and
3. to explain the difficulties (found in No.1) cognitively by comparing the semantic networks for the spatial relations in both languages.

1.4 Research hypotheses

1. Mandarin Chinese learners of English have difficulties with *in*, *on*, *at*, *above*, *over*, *below*, and *under* especially when they are used metaphorically.
2. The semantic networks for the spatial relations in both languages match and exclude each other in certain senses.
3. The similarities within the semantic networks for the spatial relations in the languages enhance the ease of learning, and the differences suggest the learning difficulties.

1.5 Scope of the study

First of all, MLEs in this study refer to those learners of English in Taiwan who use Mandarin Chinese as the first language in most domains. Those participants who previously received English curriculum in international school systems are excluded because their ways of conceptualization might have been affected by their learning

environments to a distinguishable level which is considered different from those of typical MLEs.

Second, this study emphasizes the spatial prepositions which are listed in the chart of common prepositions (Celce-Murcia & Larsen-Freeman, 1999: 409). The chart suggests a list of frequently-used English prepositions for pedagogical grammar. Based on the chart, criteria are decided and elaborated for selecting an appropriate set of English prepositions for the study when the test is being created. The criteria highlighted the specific group of spatial prepositions in English, the spatial concepts of which are conceptualized at early stages in the human brain from perceptions. From the results, the similarities and differences should help MLEs improve understandings of spatial relations in English.

1.6 Limitations of the study

The population of MLEs is a major limitation in the study. There are different varieties of Mandarin Chinese spoken in the world. The target population and the sample in the study do not represent all MLEs. The findings of the study only suggest the uses of the selected spatial relations and the learning difficulties by and for typical MLEs in Taiwan. However, in spite of the specific population, the findings should still remain general because the analyses are restricted on the basic cognitive truth, which is likely to apply to typical MLEs.

1.7 Definition of terms

1. **Cognition** refers to "the various mental processes used in thinking, remembering, perceiving, recognizing, classifying, etc." (Richard & Schmidt, 2002: 82).

2. **Cognitive feature** refers to the factors which determine a certain sense in a semantic network. For example, *He is in jail* and *He is in medicine* both denote a sense of LOCATION but he is in jail has a sense of STATE and he is in medicine has a sense of ACTIVITY (Tyler & Evans, 2003).

3. **Cognitive mapping** refers to "a process composed of a series of psychological transformations by which an individual acquires, codes, stores, recalls, and decodes information about the relative locations and attributes of phenomena in their everyday spatial environment." (Downs & Stea, 1973: 9).

4. **Cognitive process** refers to "any mental process which learners make use of in language learning, such as inferencing, generalization, deductive learning, monitoring, and memorizing." (Richard & Schmidt, 2002: 84).

5. **Conceptualization** refers to complex conceptualization, which is defined as "the mental representation that results from the interpretation of an utterance." (Tyler & Evans, 2003: 57).

6. **Conceptual metaphor** refers to the concept of "understanding and experiencing one kind of thing in terms of another" (Lakoff & Johnson, 1980: 5). It helps language users to understand abstract concepts from the actual experiences. For example, *Time is money*. Language users understand that time is of value as money. They spend time as how they spend money.

7. **Distractor Influence Index** (DII) refers to the index which is created for the study to investigate how a distracter in a test item influences the participants' performance. It is created based on Item Difficulty Index. There are four levels of influence from less influence to the most stronger influence: Fair Influence (FI), Minor Influence (MiI), Major Influence (MaI), and Absolute Influence (AI). The more participants choose the distracter, the stronger the distracter influences the performance.

8. **Image schema**, in cognitive linguistics, refers to "an image schema is a condensed re-description of perceptual experience for the purpose of mapping spatial structure onto conceptual structure" (Oakley, 2006: 215).

9. **Item Difficulty Index**, in this study, refers to the percentages of the answers chosen by its participants. It simply divides the numbers of the participants who choose the answers by the total number of the participants. The figure is presented in percentage.

Hence, the higher this index value indicates, the lower the difficulty of a test item is, and the greater the difficulty of a test item, the lower the value is in the index.

10. **Learning Difficulty Index** (LDI) is created based on Item Difficulty Index to define learning difficulties in Chapter IV. There are four levels from more difficulty to less difficulty in the index: Absolute Difficulty (AD), Major Difficulty (MaD), Minor Difficulty (MiD), and Fair Difficulty (FD). These four levels are converted from the Item Difficulty Index values. The more participants choose the corrected answer in a test item, the less difficulty the test item is.

11. **Mandarin Chinese Localizer**, in this study, refers to a noun phrase such as *lǐmiàn* 'inside.' It is syntactically treated as either a noun (Li, 1990), a NP clitic (Liu, 1998), or postposition (Wu, 2005). It collocates with prepositions such as *zài* 'at' to indicate spatial relations because a preposition like *zài* 'at' does not indicate a definite location.

12. **Mandarin Chinese learners of English** (MLE) refers to those learners who use Mandarin Chinese in most domains in Taichung, Taiwan. They are English majors in universities, who averagely have received English instructions for approximately six to eight years before entering their universities. In addition, they have not received education through international curricula or lived in any English-speaking country more than one year. This current study tends to investigate a cognitive process of typical MLEs, so the sample of the participants was not limited to a group of learners with a particular level of proficiency. Those two randomly-chosen classes of learners were mainly in their second or fourth year in the University. In general, the participants are considered intermediate learners of English and should represent typical MLEs in this study.

13. **Principled Polysemy** is "a model of lexical representation developed with cognitive lexical semantics. It was developed by Vyvyan Evans and Andrea Tyler in response to perceived shortcomings with the full-specification model of polysemy" (Evans, 2007: 170).

14. **Proto-scene** can be equated with the primary meaning associated with a particular preposition, and thus includes information relating to the trajector and landmark as well as the spatial relation mediating the two (Tyler & Evans, 2003).

15. **Semantic network** refers to a network which represents semantic relations between the concepts. This is often used as a form of knowledge representation. It is a directed or undirected graph consisting of vertices, which represent concepts, and edges. (Shapiro, 1992).

16. **Sinica Corpus** refers to Academia Sinica Balanced Corpus of Modern Chinese, a Mandarin Chinese corpus database in Taiwan. The online version can be obtained at http://www.sinica.edu.tw/SinicaCorpus/. According to the descriptions on the official website, it "is designed for analyzing modern Chinese. Every text in the corpus is segmented and each segmented word is tagged with its part-of-speech. Texts are collected from different areas and classified according to five criteria: genre, style, mode, topic, and source. Therefore, this corpus is a representative sample of modern Chinese language."

17. **Spatial preposition** refers to the preposition which indicates spatial relations. The study focuses on the construction: English preposition+NP and *zai*+ NP+localizer. As to the constructions in Mandarin Chinese, there will be detailed discussions in the latter section.

18. **Spatial relation** refers to the trajectory-landmark configuration. The sentence, a book is on the table shows the relation between a book and the table. A book functions as the trajector and the table the landmark. The relation indicates some features which can be generally describe the relation such as CONTACT and SURFACE.

19. **Trajector** (TR) and **Landmark** (LM) refer to "a profiled relationship construes its participants at different levels of prominence. It is usual for one participant to be made the primary focus, as the entity being located, evaluated, or otherwise described. This is called the trajectory. Additionally, there is often a secondary focal participant, called the landmark." (Langacker, 2008: 113).

20. **Test of Spatial Relations** (TSR) is created especially for this study to investigate the English prepositions with which the MLEs have difficulty with. It consists of sixty multiple-choice test items written in the categories: Monologue, Dialogue, and Picture description. The test especially emphasizes the uses of indicating static verticality in English.

1.8 Significance of the study

The findings of the study should contribute to Mandarin Chinese Learners of English and English language instructors in Taiwan. Ideally, the analyses regarding semantic networks for the spatial concepts in the two languages would stimulate more theoretical discussions on spatial relations. Pedagogical suggestions based on the findings of cognitive features should improve pedagogical descriptions of the spatial relations in English.

CHAPTER II
LITERATURE REVIEW

The literature review regarding the study covers several areas. These areas are 1) Pedagogical grammar regarding spatial relations, 2) Introduction to cognitive linguistics, 3) Cognitive approaches toward spatial relations, 4) Cognitive approached application, and 5) Semantic networks for spatial relations. These major areas of studies are directly associated in the body of the research, and ideally the literature review helps provide constructive frameworks and theoretical backgrounds to the study.

2.1 Pedagogical grammar regarding spatial relations

It is essential to review how pedagogical grammar describes spatial prepositions. The contents regarding spatial prepositions in Longman Dictionary of Contemporary English (2009) and The Grammar Book: An ESL/EFL Teacher's Course (1999) are reviewed and retrieved. This step is to learn how the pedagogical descriptions construct. Take *in* and *on* as examples. These two spatial prepositions are reviewed as examples because expectedly they are the major part of the discussions in this study for the fact that they contain some senses with which Mandarin learners of English (MLEs) are especially confused. The confusion might arise from the possibility that the spatial concepts in Mandarin Chinese, *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' cover several English prepositions, and these two prepositions are to be included.

2.1.1 Longman Dictionary of Contemporary English (2009)

The entries of *in* and *on* are listed based on the different senses. The entries directly derived from the dictionary for *in* are compiled into four tables: 1) *in* as a preposition (Appendix A) *in* as an adverb (Appendix B) *on* as a preposition (Appendix C) *on* as an adjective or an adverb (Appendix D). The dictionary lists almost all the possible senses for its readers, but these senses are not categorized into groups of certain features. Obviously, some senses which share particular features in common can be grouped into one category. For example, both *in silence* and *in horror* might denote STATES, FEELINGS, or STATUS. When the entries are rather listed as they are all independent

senses, learners can just try to memorize the uses as unrelated pieces of information. The information is not systematized in a comprehensible way to learners. If there are no hints to help learners categorize all the senses, memorization in this part of learning can always leave a noticeable difficulty for non-natives or MLEs in the study. In addition, expressions such as *in bed*/*on the bed* or *in time*/*on time* cannot be found from the entries. There are more instances regarding whether *in* or *on* should be used. The answers still remain ambiguous in pedagogical grammar.

2.1.2 The grammar book: An ESL/EFL Teacher's Course (1999)

Dirven (1993: 76) claims that "the extensions of meanings of a preposition from physical space via time into more abstract domains do not occur in any haphazard way but follow a path of gradually increasing abstractions, whereby the link with each prior meaning remains obvious and may account for most, if not all, co-occurrence restrictions between trajector (TR) and landmark (LM)." Celce-Murcia and Larsen-Freeman (1999: 409) compile a chart which displays the various meanings of common prepositions. *In* and *on* are compiled into Table 2-1 below. The chart is rather simple compared to the entries in the dictionary. Take *the bird is singing in/on the tree* as the example. No constructive explanations in the chart can be found for the answer.

Those entries in Table 2-1 are reviewed and listed to display how pedagogical grammar present the English prepositions to ESL/EFL learners. They also show that the current pedagogical descriptions about English prepositions are stated either in listing as many examples as possible or in a rough picture to help learners receive the general ideas.

Table 2-1 Various meanings of *in* and *on*

Preposition	Space	Time	Degree	Other (includes idiomatic usages)
in	enclosure: The man is *in* the room.	*in* a period: WW II ended in 1945. Future appt.: Come *in* 10 minutes		currency: Pay me *in* dollars. Language: Write/say it *in* English
on	contact: *on* the wall along: on the Po; I live on this street	day, date: *on* Sunday *on* Nov. 9th		communication: *on* the radio; *on* TV/the telly concerning: a book *on* magic; a lecture *on* modern art

2.2 Cognitive linguistics

Cognitive linguistics refers to a relatively new school of Linguistics that studies human cognition in general. Croft and Cruse (2004) explain that cognitive linguistics is characterized to three central positions: 1) There is not an autonomous linguistic faculty in the mind, 2) Grammar is understood in terms of conceptualization, and 3) It claims that knowledge of language arises out of language use. Evans and Green (2006: 1) also state, "To study language from this perspective is to study patterns of conceptualization." Patterns of conceptualization come from the study of how human beings perceive and interact with the world. Jackendoff (1992: 55) proposes that human conceptual structures are determined by the principles of the Conceptual Well-Formedness Rules (See Figure 2-1). He explains that "… conceptual structures have to be linked … to the representations for perception and action, so that perceptual experience can be encoded in a form suitable for linguistic expression."

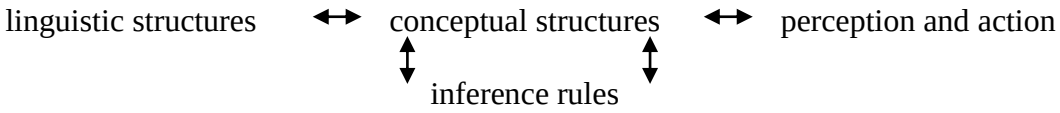


Figure 2-1 Conceptual well-formedness rules

There are four factors (Jackendoff, 1992) which combine to make a word mean what it does: 1) The connection of the concept expressed by the word to perception and action, 2) The interaction with the inference rules, 3) The relationship to the rest of the lexicon, and 4) The interaction of the word with the grammatical patterns of the language.

Fauconnier (1997: 8) also observes that "When language expressions reflect objective events and situations, they do not reflect them directly but rather through elaborate human cognitive constructions and construals." Tyler and Evans (2003) elaborate that the patterns of what human beings perceive in daily experience do not exist independently but are largely the result of our cognitive processing.

Human beings conceptualize whatever perceived in the world through cognitive processing, and the conceptualization is extended to abstract meanings. Jackendoff (1992: 59) rephrases one of Piaget's important hypotheses that "children acquire their repertoire of concepts in a certain order, starting with basic sensorimotor concepts and gradually progressing from them to more abstract domains, eventually arriving at the most abstract concepts of pure logic." Piaget's view to language is advocated by Lakoff (1987 & 1999) who claims, "Abstract concepts are constructed by means of a process of metaphor from a basis of concrete perceptual concepts." From sensorimotor concepts to abstract concepts, it evolves the notion of the embodiment of experience (Tyler & Evans, 2003: 23), which refers to "the notion that human experience of the world is mediated by the kinds of bodies we have." The movement raises the interests of language use in cognitive approaches.

Cognitive linguistics is divided into three areas of study: cognitive semantics, cognitive grammar, and cognitive phonology. This study follows the theories, principles, and frameworks under cognitive semantics, the main tenets of which are: 1) Grammar is conceptualization, 2) Conceptual structure is embodied and motivated by usage, and 3) The ability to use language draws upon general cognitive resources and not a special language module (Croft & Cruse, 2004).

2.3 Cognitive approaches to spatial relations

English prepositions have long been studied. However, most of the research was conducted in syntactic approaches. The results mostly refer to structures of language rather than meanings. It has left a significant gap in the field of language teaching and learning. The gap indicates that the structures of language can be learned quickly by EFL learners, but the usages still remain a noticeable learning difficulty. The difficulty refers

to the cases in which EFL learners choose different English prepositions from native speakers of English to indicate spatial relations. The existing difficulty should be located by some other linguistic approaches to link the meanings and the usages of language. A cognitive approach toward the study of spatial relations should suffice the demands. The results are expected to suggest new techniques which can contribute to EFL education. Before a cognitive approach can be decided for this current study, the general ideas of cognitive studies should be reviewed.

Recently, researchers (e.g., Jackendoff, Langacker, Lakoff, and Talmy) in cognitive linguistics have paid great attention to spatial semantics as a presentation of human cognition. They have proposed theories and approaches toward the studies in the field, and a number of articles (e.g., Svorou, 1994, Talmy, 1983, Levinson, 2003, Tyler & Evans, 2003) were published with frameworks that were created based on the related theoretical principles. Different from strictly following a rigid theory as in other linguistic fields such as syntax, the study of spatial semantics in cognitive linguistics is rather a mixture of theories and approaches. The mixture forms a framework which can facilitate transforming abstract concepts into scientific descriptions and alike from an interdisciplinary perspective.

The perspective aims to investigate human cognition, which is actually a broad trivial definition. From this definition, the concept of the prototype has evolved and been adapted as one of the fundamental assumptions in cognitive linguistics (e.g., Jackendoff, Lavinson, and Tyler & Evans). Rosch (1978) formulates Prototype Theory and defines that a prototype is the best exemplar of a particular category. For example, when we talk about the category *furniture*, *chair* is probably the prototype that is mostly conceived. The notion of prototypicality has been useful in thinking about object categorization, and the relationship between perception and cognition (Evans, 2000).

Besides the prototype, the concepts of embodiment, categorization, and conceptualization also construct the fundamental assumptions of cognitive linguistics. These concepts can be briefly defined as follows. First, Tyler and Evans (2003) explain that human perceptions are ultimately determined by the nature of the body we have,

which is the notion of embodiment of experience. For example, human beings conceptualize *up*, *down*, *left* and *right* through bodily experience. The bodily experience is considered universal, but the representation of language differs.

Second, categorization refers to the cognitive process through which experiences and concepts are recognized, understood, and stored in brain. Categorization, in other words, is the process during which concepts are classified into different categories based on people's experience which is not objective. An image schema is then introduced as "a condensed re-description of perceptual experience for the purpose of mapping spatial structure onto conceptual structure" (Oakley, 2006: 215). Image schemas in cognitive linguistics are treated as the factors which motivate conceptual mappings.

Third, conceptualization can be explained that abstract concepts are constructed by means of a process of metaphor from a basis of concrete perceptual concepts (Lakoff, 1999). It can then be elaborated that the patterns of what human beings perceive in daily experience do not exist independently but are largely the result of our cognitive processing (Tyler & Evans, 2003).

In cognitive linguistics, one of the basic assumptions is that human beings cognitively process the world we live. The process determines prototypes of everything which is perceived, and then human beings store the prototypes as images in the brain which contains limited storage. When language is used to describe one certain object which is never seen, the images function as the base for producing expressions. For example, a two-year-old little boy understands what a cat is. He stores the image of the shape, the color, etc. in his brain. It is possible that when he first sees a tiger, he might consider it a bigger cat. Gradually, prototypes are modified and images revised. It is believed that users of a certain language possess very similar conceptualizations. Based on the above mentioned general assumptions, a variety of cognitive approaches to the study of spatial semantics have been proposed recently as a relatively new area of research interests.

Conceptual metaphor (Lakoff and Johnson, 1980) as the central focus in cognitive linguistics is introduced to the concept of space. It brings up the notion that human beings

conceptualize the world through perception to receive concrete concepts and map what have been conceptualized onto other extended metaphorical uses. Lakoff and Johnson (1980: 5) describe metaphor that "the essence of metaphor is understanding and experiencing one kind of thing in terms of another." In other words, it refers to the process that a person understands one idea in terms of the other. For example, CONTAINER METAPHORS (Lakoff & Johnson, 1980) carries out the explanation toward the concept of space in metaphorical uses. They claim that human beings use ontological metaphors to comprehend the world, which try to elaborate the following two examples.

(1) He is in love

(2) We're out of trouble now

The intangible abstract concepts of *love* and *trouble* are viewed as containers, and so in language, *in* and *out of* are used to indicate the spatial relations. However, the conceptual metaphor theory is not uncontroversial in the study of space. For example, Lakoff (1987) reformulated Brugman's analysis (1981) of *over* with radial categories, and the result shows twenty-four interrelated senses. Evans (2009: 328) defines, "A radial category is structured with respect to a prototype, and the various category members are related to the prototype by convention, rather than being 'generated' by predictable rules." The work, first adopted the concept of polysemy (A detailed description is in a separate paragraph below.) into the study of spatial relations, was criticized lacking concrete theoretical backgrounds, and the researcher's intuition was too much involved.

The term *space* is a broad sense in language. Gradually, the research in the study of space has been restricted to forms of expressions such as spatial prepositions (Landau & Jackendoff, 1993), closed-class forms (Talmy, 1983), and spatial grams (Svorou, 1994). All of these terms refer to the spatial relations mainly constructed by prepositional phrases (e.g., *in a house*). This approach lacks consideration of verbs, nouns, and adverbs which can also indicate spatial relations (e.g., *come* and *go*). Lakoff (1987) defines spatial language as those expressions which indicate spatial relations. This approach tries to include all possible structures which indicate spatial relations. Importantly, studies of spatial relations start to emphasize forms of language instead of the abstract and broad sense at the stage. Terms such as figure and ground (Talmy, 1975) or trajector (TR) and

landmark (LM) (Langacker, 1987) with the same concepts are used to categorize the spatial relations in the study. Trajectory shows the relationship between TR and LM, which is "a profiled relationship construes its participants at different levels of prominence. It is usually for one participant to be made the primary focus, as the entity being located, evaluated, or otherwise described" (Langacker, 2008: 113). Consequently, a spatial relation refers to the TR-LM configuration. For example,

(3) A book is on the table

(4) The flower is in the vase

Example (3) shows the relation between *a book* and *the table*. *A book* functions as the TR and *the table*, the LM. The relation indicates some features which can generally describe the relation such as CONTACT and SURFACE. Sentence (4) shows the relation between *the flower* and *the vase* with the features such as PARTIALLY ENCLOSE. Plus, other than TR and LM, there are still some spatial concepts mentioned and adopted for the analysis in most of related works: frame of reference, region, path, direction, and motion. All of these are used to explain human beings' ontological experience which plays an indispensable role in the study of spatial relations. Levinson (1996: 138) states that "there are exactly three frames grammaticalized or lexicalized in language." Each frame includes at least one reference point. A reference point is a LM. (Langacker, 1987)

The three frames are 1) Intrinsic frame of reference: It indicates that the location of one object (TR) is in relation to another (LM) geometrically. For example, *a bicycle is in the house* best demonstrates the reference point in the frame. 2) Relative frame of reference: The location of one object (TR) is in relation to another (LM) based on the viewpoint. When *the bicycle is to the right of the house* is uttered, three points of reference are mentioned: *the bicycle*, *the house*, and the perceiver. In other words, when the viewpoint changes, the spatial relation turns to be different. 3) Absolute frame of reference: The spatial relation is indicated with cardinal directions e.g., East, South, East, and North. *The bicycle is to the north of the house* shows that the spatial relation is fixed as in intrinsic frame of reference.

There are disputes over the viewpoints, the origin of the co-ordinate system. Other terms such as viewpoint-center frame and object-centered frame are used to discuss the

reference points. When spatial relations constructed by prepositional phrases are discussed, it is assumed that those spatial relations with directions (e.g., *left* and *right*) or cardinal directions (e.g. *North* and *South*) cause cognitive misunderstandings because of confusing viewpoints. They are not considered learning difficulties. It is hypothesized that the learning difficulties that EFL learners encounter should evolve from the uses of static spatial relations e.g., *in, on,* and *at.*

The notion of region has suggested that languages do not relate the TR and LM in a spatial expression directly, but through a region (Svorou, 1994). It refers to "an area adjacent to a LM in which a specific spatial description is valid" (Svorou, 1994: 13). In other words, a LM cannot sufficiently provide enough information to indicate the relation with the TR. The LM should be studied from its primarily functional or primarily perceptual properties in order to define the region (Levinson, 1994). Region is believed to correspond to various types of image schemas such as CONTAINMENT and SUPPORT. For example, *in* indicates a place function: [PLACE]→[IN([THING])] (Jackendoff, 1983).

The concept of path and direction can be discussed together. Path refers to the trajectory, the relationship between a TR and a LM. (Talmy, 1983) This common usage is termed elaborated path. Path can also refer to three components of a motion event, and they are called schematic path (Jackendoff, 1990). The three components are 1) Beginning: For example, *Jenny walked out of the classroom*. *Out of* indicates the path. *The classroom* (or the LM) is the beginning of the path. The action starts from the LM in the sentence. 2) Middle: For example, *Jenny walked through the classroom*. *Through* indicates the path, and the LM, *the classroom* is in the path where the whole action happens. 3) End: For example, Jenny *walked into the classroom*. *Into* indicate the path. The LM, the classroom is the end of the path. The action stops at the LM.

The three examples above show that the LM, *the classroom* functions as the beginning of the path, the path, and the end of the path. It is also claimed that *Jenny is in the classroom* shows zero path. Path requires a region; a region requires a LM. Direction does not necessarily require a region and is defined in the geocentric and viewpoint-

centered frames when there are no LMs and object-centered frame in the case that there are LMs. For example, 1) Viewer-centered frame (e.g., *Jenny is walking that way*): *That way* does not clearly indicate the direction. It is stated from the viewer's point of view. If the viewer is not seen with other non-verbal communication e.g., gestures, the actual direction cannot be understood. 2) Geocentric frame (e.g., *Jenny is walking west*): *West* shows the geocentric direction. No matter where the point of view is, the direction can be received without ambiguity. 3) Object-centered frame (e.g., *Jenny is walking toward the west gate*): The noun phrase, *the west gate* provides enough information for a clear direction. If *west* is replaced by a proper name, e.g., the Hamilton gate, it still functions the same.

Motion is discussed in two ways in spatial semantics. First, object receives actual perceived motion: For example, *the bird is flying toward south*. *The bird* actually receives the motion as it can actually do the action that the verb indicates. Second, object receives imaginary motion: For example, *the path goes through the forest*. *The path* cannot really do the action that the verb indicates. The motion is imagined by the speaker. Talmy (1996) presents the classification of types of fictive motion claiming that motion exists at different levels of palpability, which refer to the level at which an viewer experiences an entity "as fully manifest and palpable, as clear and vivid, with the ostensive characteristics of precise form, texture, coloration, and movement, and with a precise location relative to oneself and to its surroundings, where this precision involves a Euclidean-type geometry and is amenable to metric quantification" (Talmy, 1999: 249). Fictive motion refers to the metaphorical motion of one object through space. However, the classification is criticized for lacking a linguistic device.

Founded on the above general theoretical principles in cognitive linguistics, Tyler and Evans (2001) criticize most of the previous analysis of spatial relations. They propose a new framework which contains the theoretically-constrained Principled Polysemy for the study of spatial relations. Along with Principled Polysemy, the framework also magnifies the concept of the proto-scene, which is adopted from the notion of prototypicality and similar to Prototype Theory mentioned earlier. They also propose a new method for establishing a semantic network.

Polysemy refers to a single linguistic form with multiple meanings, and these meanings are related. To summarize Principled Polysemy that they develop, it accounts for semantic extension which is better discussed through polysemy because of the interaction between spatio-physical experience and situated language use. An abstract proto-scene relays the interaction. In contrast with polysemy, the homonymy approach and the monosemy approach are criticized. Homonymy refers to those words which share the same spelling and the same pronunciation but contain different meanings. Tyler and Evans (2003: 6) argue that "the homonymy approach fails to recognize that distinct meanings may be motivated and, hence, at some level systematically related, we are forced to conclude that it is inadequate" especially in the case of spatial particles. Monosemy means that "forms are paired with a single highly abstract meaning. This abstract meaning can be filled in by contextual knowledge, such that all the distinct meanings associated with a lexeme are derived" (Tyler & Evans, 2003: 6). They further explain that it is not easy to predict all the distinct meanings associated with a particular form. There are some weaknesses of traditional polysemy, so they suggest some criteria to enhance the methodological constrains. It is then termed Principled Polysemy.

Principled Polysemy avoids the polysemy fallacy by setting forth explicit criteria for determining distinct senses versus contextual uses of the proto-scene. The polysemy fallacy termed by Sandra (1998) refers to some models of polysemy which are not methodologically constrained. To avoid the polysemy fallacy, Tyler and Evans (2003) suggest two criteria for determining distinct senses. First, it must contain additional meaning not apparent in any other senses associated with a particular form; that is, a distinct sense must involve non-spatial meaning or a different configuration between the TR and LM than found in the proto-scene. Second, there must be instances of the sense that are context independent, that is, in which the distinct sense could not be inferred from another sense and the context in which it occurs.

The above criteria help to reduce a researcher's intuition and introspection when analyzing distinct senses. They also provide explicit criteria for determining the sanctioning sense (Langacker, 1987): linguistic evidence and empirical evidence. The sanctioning sense refers to the determination of the proto-scene, which is considered

critical in the study of spatial relations. Five criteria of linguistic evidence are explicitly listed (see details in Tyler & Evans, 2003): 1) Earliest attested meaning, 2) Pre-dominance in the semantic network, 3) Use in composite forms, 4) Relations to other spatial particles, and 5) Grammatical predictions (Langacker, 1987).

When a proto-scene of a preposition is determined, and the distinct senses are categorized, a semantic network can be established to display the extended metaphorical meanings of a linguistic form, e.g., a spatial particle projected from the mental representation. Tyler and Evans' framework (2003) is considered a relatively valid and reliable instrument as far as it is concerned to analyze spatial particles in one language. When a specific concept of uses in different languages is analyzed, the semantic map approach should be taken into consideration.

The semantic map approach is adopted especially for cross-linguistic comparative semantics. It is a tool which specializes in typological problems (Croft, 2001). Research using this approach has been published (e.g. Bowerman, 1996, Talmy, 1983, and van der Auwera & Plungian, 1998). This approach emphasizes language-specific and construction-specific features to render cross-linguistic typological variations. The semantic map and the semantic network, which are the two products of the two different approaches, look alike but not identical. The product of the analysis through the semantic map approach is a sophisticated map showing where the contrasted languages overlap in meanings while the product of the analysis through the approach (Tyler & Evans, 2003) shows only the network for one language.

The two approaches share some similar assumptions. For example, both of them are for the studies of polysemy. The map or the network shows the relationships between senses and among clusters. Both of the approaches tend to investigate the spatial representation of meanings and emphasize the relatedness. There is a significant difference between the two approaches. The difference shows that the semantic map approach does not require a prototype as the base to demonstrate mental representation. Almost identical to the prototype, the proto-scene plays a vital role in Principled Polysemy.

As mentioned earlier, a cognitive approach toward this study of spatial relations is rather a mixture of theories and principles which share the same assumptions. Based on the fundamental assumptions in cognitive linguistics, Principled Polysemy is adopted for the current study. Moreover, when the senses are to be determined, Principled Polysemy is adopted for a methodologically-constrained analysis. When English and Mandarin Chinese uses of spatial relations are analyzed cross-linguistically, the semantic map approach is employed. In other words, the approach for the current study follows the semantic map approach with the support from Principled Polysemy. It is a revised approach of the two due to the demands to yield evident information to satisfy research questions.

The current study is to locate the learning difficulties which MLEs encounter when learning spatial prepositions. The first part of the study is to use the Test of Spatial Relations (TSR) to explore how MLEs choose the spatial prepositions. The results are used to compare and contrast with the answer key which is prepared based on the authentic utterances from native speakers of English e.g., entries in dictionaries and corpus data. The test is created to investigate as many spatial relations as possible; however, there are a great number of spatial prepositions in English, and the test does not satisfy this scope due to the page limit, time limit, and whatever factors that influence the effectiveness of the test. Based on the hypotheses for the study, the attention is especially paid to the spatial relations of *over*/*above* and *under*/*below* with the counterparts in Mandarin Chinese, *lǐmiàn* ‘inside,’ *shàngmiàn* ‘upside,’ and *xiàmiàn* ‘downside.’ The static spatial prepositions such as *in*, *on*, and *at* are also covered in the discussions as for the scope of the study stated earlier.

The second part of the study is to analyze the semantic networks for the spatial prepositions in English and their counterparts in Mandarin Chinese. The analyses are conducted based on the results of the TSR. The reasons why the revised approach is demanded are discussed as follows. First of all, the major semantic networks and the analyses for English prepositions can be collected from the existing literature in which the majority of the studies adopt or adapt the Principled Polysemy or alike. To make the semantic networks for the spatial concepts in the two languages comparable, the criteria

for analyses have to stay in concordance. Therefore, the analyses of the semantic networks for the counterparts in Mandarin Chinese have to follow Principled Polysemy.

Second, before the semantic networks can be prepared, the proto-scenes have to be determined. It is one of the most important and critical steps in Principled Polysemy. It is hypothesized that spatial prepositions which indicate static spatial relations cause the learning difficulty because the proto-scenes of these English prepositions are different from those of the counterparts in Mandarin Chinese. In order to conduct the analysis regarding proto-scenes, Principled Polysemy has to be adopted instead of the semantic map approach which does not require prototypicality.

Third, when it is to discuss EFL education regarding spatial prepositions, the proto-scenes cannot be avoided. For example, in a language classroom, when an instructor first introduces spatial prepositions in English, proto-scenes are usually displayed as in textbooks or teaching aids. The displayed scenes are believed to be the most frequently-used or general situations for uses of spatial relations. Those situations are of the images stored in the human brain. Language instructors cannot introduce every possible situation for spatial relations as the uses listed in dictionaries. Schematic descriptions toward the spatial relations provide effective tools in a language classroom. When an EFL instructor can present the differences between the well constructed proto-scenes of the spatial concepts in the two languages, it is expected to yield positive results of instruction. The semantic approach is to analyze meanings in different constructions for typological variations. The final product of the approach may display the relationships among the distinct senses and between languages, but it still does not provide language instructors convenient tools for the instructions toward spatial relations in class. One of the aims in the current study is to investigate a sophisticated solution to improve EFL instructions, so Principled Polysemy is best adopted for this aim.

Finally, Principled Polysemy is often adopted to study spatial relations in one language; especially English as far as it is concerned. The final product only shows the relationships among distinct senses in one language. To fulfill the cross-linguistic contrastive analysis, the semantic map approach has to be adopted. The final product, the

map is expected to display the similarity and difference in a schematized presentation. The cognitive features within the difference can also be located in the presentation.

To sum up, the current study demands the revised approach in order to obtain evident information to answer the research questions. Each of the two approaches satisfies certain parts of the study, so it is important to find the possibility to combine the two approaches in a harmonious way for the fullest extent of the research.

2.4 Cognitive approach-based pedagogical applications

The motivation of my study initially evolves from the quote, "Prepositions are notoriously difficult to learn. "Long after ESL/EFL students have achieved a high level of proficiency in English, they still struggle with the correct uses of prepositions" (Celce-Murcia & Larsen-Freeman, 1999: 401). The quote really reflects some facts in general. The facts lead to the desire of investigating the learning problems, and behind the problems, there are complicated reasons which are supported by theoretical principles. To puzzle out the difficulties, researchers or practitioners have devoted efforts in the related studies.

There are a great number of research projects discussing English prepositions. For example, as early as in the 1970s, the study (Oller, J.W. & Inal, N., 1971) used a cloze test to investigate three groups of students: 1) Group 1: native speakers of English, 2) Group 2: native speakers of Turkish in Turkish, and 3) Group 3: mixed native speakers of various languages in the US. The result shows that Group 1 scored forty-eight in the fifty questions, Group 2 scored thirty-two in the fifty questions, and Group 3 scored thirty-six in the fifty questions. The statistic descriptions display the problems which EFL learners encountered when choosing English prepositions to fill in the blanks. Neither did it further compile the prepositions that caused learning problems nor were any plans suggested to improve the learning problems.

Recent research projects regarding English prepositions mostly emphasize syntactic structures in linguistics, e.g., preposition stranding and phrase verbs (e.g., *listen t*o and *get on*). For example, in *who did you go to a movie with*, *with* is left at the end of

the sentence, which is considered incorrect in prescriptive grammar. The results suggest the changes of syntactic structures but do not provide any solutions for the major problems that EFL learners use different prepositions other than native NSEs, which is not directly related to the inappropriate uses of prepositional structures. Some emphasize teaching and learning approaches toward English grammar in pedagogy. These research projects mention that ESL/EFL learners have difficulty with English prepositions in a rather broad sense toward English grammar. When English grammar is discussed as a whole, it covers a wide range of grammatical rules which require different teaching and learning approaches for a better outcome. Plus, relatively limited research in pedagogy exclusively discusses the learning difficulties regarding prepositions and suggests pedagogical implications to improve teaching and learning. Some even spend merely a column in the analyses because prepositions are just a small portion of concepts in English grammar, so this portion has received less attention. Fortunately, in recent years, researchers in cognitive linguistics have started to pay their attention to this area. More perspectives have been brought into the analyses. The results and the analyses in cognitive approaches affect teaching and learning methods, approaches, and techniques. Hopefully, the learning difficulties will be gradually improved.

Apart from content words, English prepositions function to express the grammatical relationships between other parts of speech within sentences. English prepositions carry abstract meanings and indicate spatial relations between two objects. The abstract meanings and the spatial relations have caused learning problems to EFL learners. The problems are stated in many studies, the subjects of which are ESL/EFL learners from different language groups. For example, learning English prepositions is a great challenge for EFL students (Jabbour-Lagocki, 1990). Huang (2001) investigates the errors in writing by university students in Taiwan. Prepositions are found to be one of the top six common errors. In a recent study, Tahaineh (2010) states that "several studies (e.g., Hamdallah, 1988) show that it takes a long time for the learner of English as a second/foreign language to acquire prepositions."

Tahaineh (2010) lists that common preposition errors can be categorized into three groups: 1) Error of substitution: EFL learners use **I am afraid to dogs* instead of *I*

am afraid of dogs. *To* is used instead of *of* in the case. 2) Error of addition: EFL learners use **when you finish from eating* instead of *when you finish eating*. *From* is not required, but EFL learners include this additional preposition. 3) Error of omission: EFL learners use **I listen music* instead of *I listen to music*. *To* is omitted**.** Identically, Han, Tetreault, Lee, and Ha (2010) state that preposition errors can be categorized into omission, commission, and replacement. These three types are exactly of the same concepts as the three groups mentioned above but in different terms. According to the analyses (Tahaineh, 2010 and Han, Tetreault, Lee & Ha, 2010), the errors are caused by L1 interference. Tahaineh (2010: 98) states, "The prepositions proved to be the most common in use and the most difficult ones for the learners in this study are *by*, *in*, *on*, *to*, *with*, *of*, *from*, *for* and *at* respectively." Not only is the cause stated, the English prepositions with which EFL learners have difficulty are clarified.

L1 interference has started to be spotlighted when the learning difficulties regarding English prepositions are discussed. Lott (1983: 256) defines interference as "errors in the learner's use of the foreign language that can be traced back to the mother tongue." Based on the claim, ''the less representative of the prototypical meaning a usage of a given form is, the lower its transferability" (Kellerman, 1987: 65), De Angelis (2005: 382) states that "L1 features are likely to influence L2 forms." Ellis (1997: 51) refers to interference as "the influence that the learner's L1 exerts over the acquisition of an L2". At the beginning, L1 and L2 were treated as two independent languages. Researchers did not look for features to bridge the two languages. Woodball (2002) claims that language switching may be driven by the mental operations of private speech for solving L2 problems with L1 resources. It gives support to the relationship between L1 and L2. The relationship cannot always provide positive assistance in language learning. Celce-Murcia and Larsen-Freeman (1999: 401) suggest that "prepositions do not always match up well from one language to another." To elaborate the difference between two languages, Brala (2000) claims that EFL materials regarding prepositions are mostly inadequate because the examples provided are, generally speaking, inaccurate and misleading. The problems raised within the study are mostly related to the lack of translational equivalence between the examples in the two languages. The research (Brala, 2000) analyzes the meanings of the prepositions, *in*, *on*, and *at* and gives a cognitively

based account of prepositional meanings to lexicographers for English-Croatian dictionaries and the EFL learners.

The analyses merely focus on the primitive meanings and cover some examples of a limited number of extended meanings of the uses of the prepositions. The suggestions to the lexicographers are within the analyses by pointing out the differences. The findings somehow give explanations of the problematic translations. However, as a matter of fact, prepositional meanings in different languages are determined by the ways how language users conceptualize the world. The findings cannot suggest concrete guidelines of compiling bilingual dictionaries. More discussions should be included especially on the extended meanings of the prepositions. Tahaineh (2010: 89) also states, "While interlingual errors due to mother tongue interference are occurred because the Arabic version is equivalent to English ones used in the form of a literal translation." Cross-linguistic analyses are in the trend to locate the learning difficulties in terms of contrastive syntactic structures and then contrastive semantics. For example, English and Mandarin Chinese speakers use different spatial concepts to indicate the spatial relation:

(5) 蝴蝶 在 天 上 飛
Húdié *zài* tiān *shàng* fēi.
butterfly at sky upside fly
'Butterflies fly in the sky.'

MLEs would probably use *on* in this case because the spatial concept is derived from Mandarin Chinese. Syntactic analyses cannot satisfy the problems that the prepositions cause in this case. Furthermore, Boers and Demecheleer (1998) claim that prepositions are difficult because they contain both literal and figurative meanings. It points to a new perspective other than syntactic structures in the studies of English prepositions. It is then considered linking to contrastive spatial semantics. At the stage, cognitive approaches toward the spatial relations have been adopted.

When the approaches for locating the learning difficulties of English prepositions switch, the teaching approaches are changing as well in accordance with new perspectives. There never exist perfect teaching methods or approaches for pedagogy. The methods or approaches applied in a language class should take several factors into

consideration, e.g., the number of students, the age groups of students, the classroom, etc. As to the approaches which best explain the uses of English prepositions to EFL learners, the following discussions are limited to a group of university students in an EFL academic setting.

First of all, there are several teaching methods and approaches often discussed in language education: the Grammar Translation method, Community Language Learning, Communicative Language Teaching, the Audio-lingual method, Total-Physical Response, the Natural approach, the Cognitive theory and the Direct method. From the modern view, the Grammar Translation method is considered outdated academically. The truth is, in the EFL setting, this method with some adjustments is still in effect. At least, it still works in some Asian countries. According to Chang (2011: 13), "grammar teaching in the framework of the Grammar Translation method is better than the Communicative approach." It emphasizes repetition and drills and believes *Practice makes perfect*. This method surely should be effective to teaching English prepositions, but before drills, instructors still have to lecture to provide learners general ideas for understanding the fundamental uses of English prepositions accompanied with their counterparts in L1. The general ideas should be related to the prototypes in cognitive linguistics because the very basic image for the uses of one preposition should be given. For example, a language teacher places a ball in a box and says *the ball is in the box* to instantiate the spatial scene. Rules are listed, and memorization is required. Learners are crammed with prepositional uses without appropriate explanations. After countless practice drills, learners hopefully can remember the uses. All the uses of one preposition are rather treated unrelated exceptions which have to be stored in the brain individually. So does the Audio-lingual method. It also emphasizes repetition, but it trains learners to improve listening skills rather than reading and writing skills.

Community Language Learning and Communicative Language Teaching are similar to an extent. Both of them focus on peer learning which means that learners help among themselves to yield the best learning effectiveness. It returns back to the same step that instructors still have to introduce the prototypes of English prepositions to learners, or how learners can find a point to start. Prototype in cognitive linguistics once again

should be taken into account, or EFL learners cannot naturally acquire the notions of the spatial relations because EFL learners must learn a target language. That is to say, they do not acquire a target language. Learning requires an explicit set of systematic methods and approaches. However, cooperative learning is less beneficial to inactive learners which include those learners who just want to take obligatory English courses for enough required credits toward graduation. Total Physical Response is also mentioned for preposition learning. According to Nugraaningsih's study (2007), the result yields positive outcomes for the fifth graders, but that does not necessarily mean that it can also work effectively to groups of university students. So far, image schemas are strongly advocated because they trigger cognitive process for conceptualization.

Total Physical Response somehow shows a close relation toward the Natural approach, the Direct method, and the Cognitive theory because all of them focus on the notion of learning through responding. The three approaches especially emphasize "learning L2 as you learn L1." Teaching techniques are prepared to make learners naturally conceptualize what they have already had in L1. For university students, it does not seem effective to apply such approaches without any explanations regarding the uses of English prepositions. Time constrain blocks the possibility because for adult learners, it is time consuming to naturally find patterns in a target language and conceptualize the patterns in a natural way. It does not mean that the three approaches do not function at all on adult learners; in contrast, they would work fine if descriptions of English prepositions are provided in a cognitive way and the features between L1 and L2 can be generalized.

In addition to those classic theories and approaches, some inventive techniques are proposed. For example, there are Collocation and Computer-Assisted Language Learning (CALL). Collocation brings the ideas of learning through authentic texts and patterns. This approach moves steps away from the traditional teaching and learning styles. Koosha and Jafarpour (2006: 193) claim that "Both the conventional approaches (such as the Grammar Translation method) and the modern approaches (such as the Communicative approach) to SLA have in different ways underplayed the role of collocations." It is undeniable that collocation helps EFL learners receive language patterns and try to use them as chunks, which is better than memorizing each sense

individually. Learning prepositions as part of fixed phrases in phrasal verbs share the same belief as collocation. Hsieh (2006) states that EFL learners can use corpora or concordance as an alternative tool to effectively recognize phrasal verbs.

CALL starts using a large number of images to introduce English prepositions. Pictures can be a very critical tool because it is related to image schemas in cognitive linguistics. Lindstromberg (1997) offers an account of English prepositions relating metaphorical and prototypical meanings. He also suggests a series of learning hints including the use of icons/pictures, the importance of considering semantically-related prepositions or explaining metaphorical extensions and relating new senses to the ones already known. Pictures, icons, and other learning aids are adopted.

When teaching English prepositions, pictures can hardly be ignored no matter what methods, approaches, and/or techniques are used in language classrooms. Pictures can be presented in various forms (e.g., animated pictures and hand-drawn pictures) which clearly display spatial relations, but it is also important to note that along with pictures, verbal descriptions are also necessary. The descriptions should be the features which relate L1 and L2. Simply speaking, EFL learners cannot naturally conceptualize the scenes that NSEs have because of L1 interference. If no clues or hints are provided to link the two languages, learning cannot reach the full effectiveness.

The following two research studies investigate how the cognitively approached teaching helps learning. The two projects use pictures as the main teaching aids. Hsu (2005) conducted a study to investigate how cognitive approach instruction could be applied to teaching spatial prepositions in English. She compared the cognitive approach to the traditional approach and also analyzed the learning difficulties which the participants encountered.

In the first hour of the experiment, the two groups of students received the same instruction which introduced spatial prepositions with proto-scenes. The fundamental senses of three prepositions were displayed. In the second hour of the experiment, the students in Group 1 received other senses of the three prepositions. They were listed as in a dictionary. Nothing regarding the relationships among senses and the proto-scenes was

explained. The students in Group 2 were given extended uses of the three prepositions. However, the networks were not explained or used in the instruction. When the relationships among clusters and senses are not further elaborated, it misses the essential part of the cognitive approach.

Not surprisingly, the results show that both of the traditional approach and the cognitive approach help the learning of prepositions. The results do not suggest a significant discrepancy. Hsu (2005) claims that abstract senses of prepositions *in, on* and *at* pose more difficulty than concrete senses do. The results of the study (Hsu, 2005) also points out that the participants accept the cognitive approach instruction less than the traditional approach instruction.

The reason why the students accepted the cognitive approach instruction less than the traditional instruction might be, first of all, that high school students were preparing for their entrance exam to universities. They were more familiar with the traditional approach. The teacher prepared a list of uses as teaching materials. The list could make them feel secure or comfortable when they later need to review the materials. Second, when the cognitive approach instruction was implemented, students were not lectured. Instead, they were requested to think actively. The approach was very different from how they were normally taught. Third, the teacher did not really provide enough information about how they could link spatial relations in Mandarin Chinese and English. The pictures, mostly a set of squares, dots, and lines, might look strange to them and might not make any sense to them.

The research conducted by Ho (2007) applied polysemous network instruction and non-network instruction to two groups of non English major university students. The participants were tested three times to investigate how polysemous network instruction worked for learning spatial relations in English. The first test was to confirm if two groups of participants were at the same level of English proficiency. The second test was implemented after the experiment. The third test was given after a certain period of time after the instruction was finished. The results do not show significant differences between the two different kinds of instruction. Nevertheless, the results of the post test still

suggest that polysemous network instruction still provided positive contributions to the learning of spatial participles in English for MLEs.

The participants in the two groups were non English major university students who might not understand the uses of spatial prepositions in English well enough while participating in the study and the instruction only focused on *in* and *on*. Short-term memories could influence the results, and guessing could also be one of the negative factors. It is highly possible that the experiment did not yield significant outcomes because the researcher provided the polysemous network instruction only based on the proto-scenes, which are the cognitive products of NSEs. The researcher did not provide cognitive features which could help the participants link the differences between the two languages. Similar to Hsu's study (2005), this research used only the proto-scenes which do not look interactive or attractive to the participants. They might not arouse learners' attention. It is also noticeable that the researcher did not take advantage of the core benefits of semantic networks, for the relationships among senses were not introduced to the learners.

The two previous studies both implemented two different teaching approaches to two groups of learners. The two approaches stood at the other end of each other. If there were some linking factors, which are believably the cognitive features, to help learners find clues between the two approaches, the results in the previous experiments might yield different outcomes. Investigating the linking factors is one of the objectives in the current study. After the linking factors are determined, they will be introduced to learners. The linking factors should bring L1 and L2 together in certain ways and also show the distance between the two languages. The comparative information could be relatively more interesting to learners especially than geometrical patterns.

To sum up, what this study can help English prepositions be effectively taught in language classrooms should start from the proto-scenes. The well-defined proto-scenes of both spatial relations in English and Mandarin Chinese can help learners understand the reasons why two groups of languages users conceptualize the same scenes differently. When learners know the similarities and the differences between the two languages, they

can remember the significant features of the two languages at a faster pace. When they apply English prepositions to a less-frequently-seen scene, they can quickly brush up related proto-scenes through the significant features they store in the brain. When applied in teaching, proto-scenes can be discussed with real-life images to enhance learners' memorization and make learners build what they learn with the real world.

Second, semantic networks through the semantic map approach demonstrate the distinct senses and their relationships with the proto-scenes. The cognitive features provided to learners, or instructors can guide learners to investigate the features themselves. Based on proto-scenes, extended metaphorical senses form semantic networks. It can be predicted that the unmarked parts show the similarities and the marked parts refer to the differences between the two languages. Learners can relatively easily remember the overlapping parts, and that makes learning of spatial prepositions easier than remembering all the senses in an unsystematic way.

Finally, the results of the current study are likely to apply to almost all of the teaching methods, approaches, and techniques as a full package. For example, when a task-based lesson plan is adopted, instructors can first introduce English prepositions with the package. After the package of instruction is successfully delivered to learners, the tasks can function as good activities. If an instructor prefers that learners should learn in groups as Community Language Learning advocates, the package of instruction can be implemented when learners work together. Students can brainstorm possible spatial relations from proto-scenes and semantic networks. All in all, the highlighted part of this study proposes that EFL learners "learn" the target language through systematic ways, and the ways should be built based on rigid theoretical principles and for possible relatedness. Once the relatedness is located, learning spatial prepositions in English becomes an easier task than how it currently is.

2.5 Semantic networks for spatial prepositions in English

Literature regarding semantic networks for two spatial prepositions, *in* and *on* has been reviewed to understand how a semantic network is created. More prepositions are involved in the analyses of the study.

2.5.1 Semantic network for *in*

Three main concepts of bounded LMs are discussed: CONTAINMENT, PARTIAL INCLUSION, and ENCLOSURE (Tyler & Evans, 2003). They also define that "the proto-scene for *in* constitutes a spatial relation in which a TR is located within a LM which has three salient structural elements—an interior, a boundary, and an exterior." For example, *A ball is in the box.*

Canonical and non-canonical bounded LMs are discussed for the proto-scene. Canonical bounded LMs refer to three-dimensional LMs as in *There are several potholes in the street in front of my house* (Tyler & Evans, 2003: 179). Non-canonical bounded LMs are those conceptualized as being two-dimensional. For example, *The tiny oasis flourished in the desert* (Tyler & Evans, 2003: 184). Hence, in this example, *in* mediates the spatio-functional relation between the TR and the LM. In the study, Tyler and Evans (2003) list six clusters of senses from the proto-scene, which reflect the configurational and functional elements associated with a bounded LM whose functional element is containment.

Tyler and Evans (2003) explain that except the canonical three-dimensional bounded LMs, there are the other three termed non-canonical LMs. Examples (Tyler & Evans, 2003: 184-185) are listed as follows:

(6) The tiny oasis flourished the desert

(7) She lives in New York City

(8) The flag flapped in the wind

(9) The child could not be seen in the crowd

The feature of the four examples is that the LMs do not have a concrete bound, but English speakers still conceptualize the LMs as bounded LMs. They explain Example (9) as "… relate to what Lakoff (1987) termed a multiplex-mass transformation, which relates two distinct construals of the same entity" and "… the LM, the crowd can be construed as occupying a bounded space." Furthermore, Langacker (1987) observes that collective entities, characterized by nominals such as *crowd*, *team*, etc., profile the

interconnections between the individuals that constitute the collective. Figure 2-2 shows the proto-scene for *in* (Tyler & Evans, 2003 and 2004).

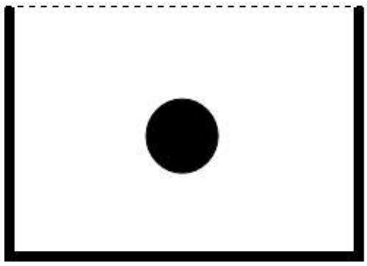


Figure 2-2 Proto-scene for *in*

Beyond the proto-scene, there are five clusters: 1) the Location cluster, 2) the Vantage Point is Interior cluster, 3) the Vantage Point is Exterior cluster, 4) the Segmentation cluster, and 5) the Reflexivity cluster. In the Location cluster, Tyler and Evans (2003: 186) state that in this cluster, "the notion that a bounded LM serves to pick out the salient space which contains the TR is privileged and gives rise to a range of closely related senses." In other words, the TR should be contained in the LM with surety. Under this cluster, they look into four senses: 1) the In Situ sense, 2) the State sense, 3) the Activity sense, and 4) the Means sense.

The most crucial criterion for the In Situ sense is that "the TR remains located for an extended period, for a particular purpose and/or due to a volitional act or event" (Tyler & Evans, 2003: 187). For example, *The workers staged a sit-in* (Tyler & Evans, 2003: 187). No noun phrases (or LMs) follow the spatial particle, *in.* Tyler and Evans (2003: 186) explain, "… the TR remains co-located with the salient space designated by the LM for an extended period provides additional meaning not apparent in the proto-scene."

For the State sense, Lakoff and Johnson (1999) argue that it involves a particular location and the state experienced by the entity, or the particular situation that the TR happens to be experiencing. One feature to determine this sense is that the contained TRs cannot leave the states soon or easily. For example, *in trouble* and *in death* present the

sense. The Activity sense is explained as "… there is a similarly tight and ubiquitous correlation between a particular activity and the bounded LM in which the activity occurs" (Tyler & Evans, 2003: 189).

For the Means sense, Tyler and Evans (2003: 190) state, "Owing to the tight correlation in experience between an activity and the means of accomplishing the activity, *in* has developed a distinct Means sense." Simply speaking, the TR needs a tool to finish the action of the verb, and *in* mediates the LM as the tool. As in the example, *she wrote in ink* (Tyler & Evans, 2003: 190) shows that *in* mediates the TR and the LM, and it indicates that *she* uses *ink* to finish the action, *write*.

In the Vantage Point is Interior cluster, there are three senses: 1) the Perceptual Accessibility sense, 2) the In Favour sense, and 3) the Arrival sense. For this cluster, Tyler and Evans (2003: 191) state, "In spatial scenes involving a bounded LM, one obvious vantage point is interior to the bounded LM." The Perceptual Accessibility sense refers to "A consequence of the experience and vantage point being located within a bounded LM is that TR and interior environment contained by the LM are available to the experiencer by virtue of his or her sense-perceptory apparatus" (Tyler & Evans, 2003: 191). In simple words, a TR can perceive an object in a bounded LM where the TR is also contained. For example (Tyler & Evans, 2003: 191), *I have it in view* and *Susan always tries to stay in touch*. The In Favour sense "derives largely from the tight correlation between gaining access or entry to certain kinds of bounded LMs and the desirability of the event or activity within the confines of the bounded LM," state Tyler and Evans (2003:193). In the Arrival Sense, the spatial scenes show that "the experiencer is located with a bounded LM, a TR at one point located outside the LM undergoes locomotion such that it comes to be located within the LM" (Tyler & Evans, 2003: 194).

In the Vantage Point is Exterior cluster, there is the Disappearance sense. Apart from the Vantage Point is Interior cluster, the experiencer is located exterior to the LM. For The Disappearance sense, Tyler and Evans (2003: 195) state, "The nature of many physical entities with an interior is that they are made of opaque substances and thus the boundary of the LM often obstruct the observer's view of the interior and hence the

contents." For example, *The wind quickly soaked in* (Tyler & Evans, 2003: 195).

The Segmentation cluster refers to "a salient aspect of spatial scenes involving bounded LMs is that they serve to partition the environment, providing a physical means of separation and delimitation (Tyler & Evans, 2003: 196). There are the Shape as Boundary sense (e.g., *Put your chairs in a circle*) and the Blockage sense (e.g., *In the northern territories you can get snowed in for months*) in this cluster. Tyler and Evans (2003: 196) state that "One consequence of being located within a bounded LM is that the boundary can serve to prevent the TR from moving beyond the LM."

The Reflexivity cluster is created based on Lindner's study (1981). She notes that some spatial particles have a reflexive meaning element associated with them. It contains the Reflexive sense (e.g., *The house caved in*). Tyler and Evans (2003: 198) elaborate that "two consequences of the boundary of the LM moving inward are that the LM loses its original shape and the original interior space no longer exists as interior space".

To sum up the above descriptions, Tyler and Evans (2003) create the semantic network for *in* as in Figure 2-3.

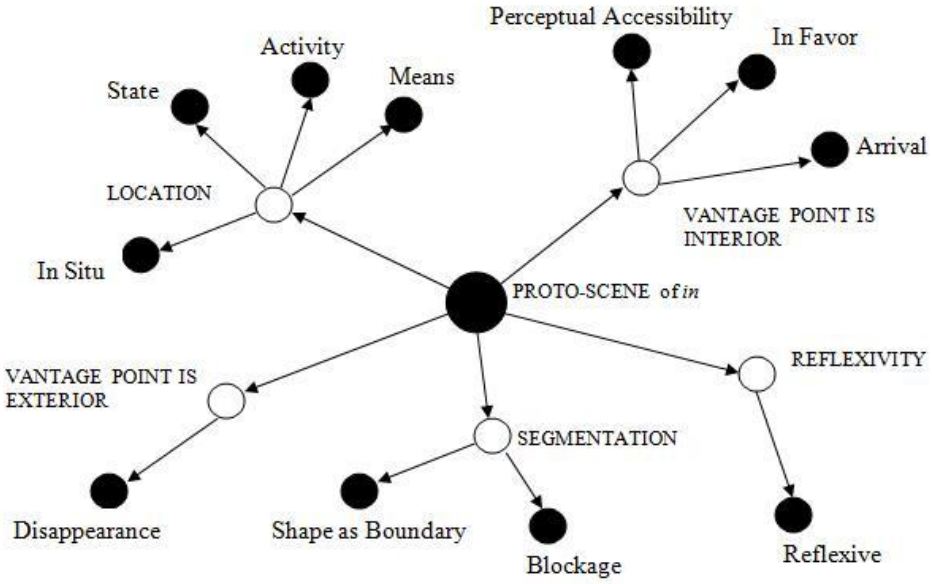


Figure 2-3 Semantic network for *in*

2.5.2 Semantic network for *on*

Due to the limited research on *on*, Ho (2007) compiles the discussions from different studies and develops the semantic network for *on*, following the framework (Tyler & Evans, 2003). The result suggests the proto-scene for *on* and three clusters under which there are one to three different senses.

Ho (2007: 56) states, "The underlying representations of *on* are assumed to be the geometrical contact or contiguity of the surfaces between two entities, and one entity functionally supports the other entity so that the entity's location can control the other in terms of the unidirectional force." For example, *Put the cat on the floor* (Ho, 2007: 57). The TR, *the cat* touches the LM, *the floor*. *On* denotes that the spatial relation between the TR and the LM. This sense is considered the proto-scene of *on*, which can be illustrated in Figure 2-4 (Lindstromberg, 1998).

Figure 2-4 Proto-scene of *on*

Lindstromberg (1998) also proposes the prototypical orientation, which means the contact between the TR and LM can rotate, and it still indicates the same sense. For example, *the light is on the ceiling* and *the light switch is on the wall* (Ho, 2007:58). The TRs, the light in the examples have contact with the LMs, the ceiling and the wall. Even though the scenes do not match the proto-scene, the LMs still support the TRs.

Beyond the proto-scene, there are three clusters of senses: 1) the Support cluster,

2) the State cluster, and 3) the Continuation cluster. In the Support cluster, there are three senses: 1) the Physical Support sense, 2) the Means of Conveyance sense, and 3) the Basis sense. Ho (2007: 60) states that "On the virtue of functional consequence, *on* mediates the relation in which LM is providing support function to the TR." Examples (Ho, 2007: 61-63) are provided to explain the three senses in this cluster, respectively:She was on her knees weeding the garden

(11) We are going on foot, not by car

(12) The movie is based on the true story

Example (10) shows that the TR, she is physically supported by the LM, her knees. In this sense, *on* conveys the support sense with body parts. Example (11) explains that "*On foot* more likely means the way of arriving to somewhere rather than the body as a support pivot." (Ho, 2007: 62). Example (12) illustrates that the TR can be firmly believed or proved with the strong foundation, which is the LM. Evans (2006) terms the sense as the rational or epistemic support.

In the State Cluster, there are three senses: 1) the Temporal State sense, 2) the Constrained sense, and 3) the Availability and Visibility sense. Ho (2007: 63) states that "The salient contact associated with *on* suggests the state of being for limited period of time. *On* encodes the state sense more volitional, unlikely to the state sense encoded by *in*." Examples (Ho, 2007:65-67), respectively for the three senses are:

(13) The DVD is on pause

(14) What effect will these changes have on the tourist industry

(15) The program will be broadcast on the Channel 32

Ho (2007: 64) explains Example (13), "The phrase which consists of *on* and the adjective or the noun of action denotes a particular state which does not last for an extended period of time." Example (14) shows that "The influence on the TR appears when the LM constrains the motion of the TR." (Ho, 2007: 65). Example (15) explains, "In contrast with the spatial particle *off, on* mediates the relation between the TR and the LM in the way that the TR is more salient or more available and visible than the LM." (Ho, 2007: 66).

The Continuation cluster contains the Continuation sense. Ho (2007: 67) states,

"There is a way or a path with a start and an end as a narrow surface which a person can be on or off. If the person continues to be on the way, it is reasonable to imply the continuation of the movement toward the certain destination." For example, *Please don't stop, keep on talking* (Ho, 2007: 68). Ho (2007: 68) explains, "The TR which is on the LM still can be accessible but it is undergoing the locomotion along the path on the same LM."

After all the senses are discussed, Ho (2007) prepares the semantic network for *on* in Figure 2-5. This semantic network is approved by Evans through personal communication (Ho, 2007).

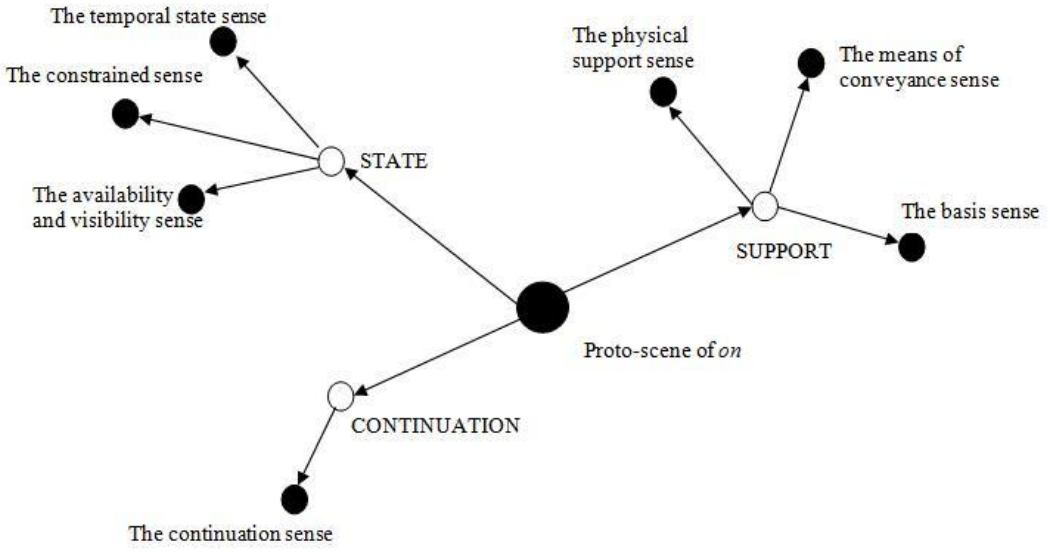


Figure 2-5 Semantic network for *on*

2.5.3 Semantic network for *under*

Tyler and Evans (2003: 121) state that "the proto-scene for *under* denotes a conceptual spatial-functional relation between a TR and a LM, in which the TR is lower than and yet proximal to the LM." Figure 2-6 demonstrates the proto-scene of *under* (Tyler & Evans, 2003). The shaded sphere is the TR, and the bold line is the LM. The TR is in the region between the bold line and the dashed line. The region refers to the proximity, which is the potential contact. For example (Tyler & Evans, 2003:123), *The*

life jacket is kept under the seat. The life jack is the TR which is lower than the LM, the seat. It is not necessarily in contact with the seat, but in a reachable distance.

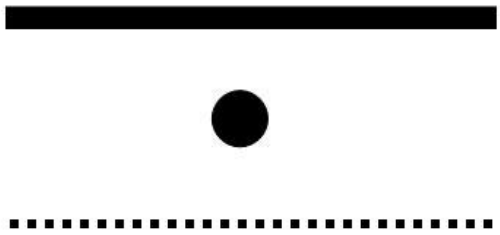


Figure 2-6 Proto-scene of *under*

Beyond the proto-scene, there is the Down cluster which contains the Less sense and the Control sense. In these two senses, the TR is not necessarily physically in a lower position than the LM. The Less sense refers to the sense that "being lower correspondingly implicates having less of something" (Tyler & Evans, 2003: 124). For example (Tyler & Evans, 2003: 124), *Sorry, you cannot drink here if you're under 21*.

The Control sense refers to the sense that the TR is influenced and hence controlled by the LM (Tyler & Evans, 2003). For example (Tyler & Evans, 2003: 125), *George works under his father's close supervision at the family business*. In this example, *George* does not work physically in a lower position than *his father*, but his work or action is scrutinized by *his father*. Beside the Down cluster, there are two additional senses: the Covering sense and the Non-existence sense. These two senses do not belong to any cluster. They are the additional senses from the proto-scene. For example (Tyler & Evans, 2003: 128),

(16) My diary is under all this paperwork

(17) The dead person is buried under six feet of dirt

In Example (16), the TR, my diary is somewhere in a lower position than the LM, all this paperwork. The LM is covering the TR. In this case, the TR can be physically lower than the LM. If the TR is not physically lower than the LM as in *The decorated walls were draped under plastic sheeting* (Tyler & Evans, 2003: 126), the sense still applies. In

Example (17), *under* in this sense implicates death (hence non-existence) (Tyler & Evans, 2003). To sum up the above discussions, the semantic network for *under* can be presented as in Figure 2-7.

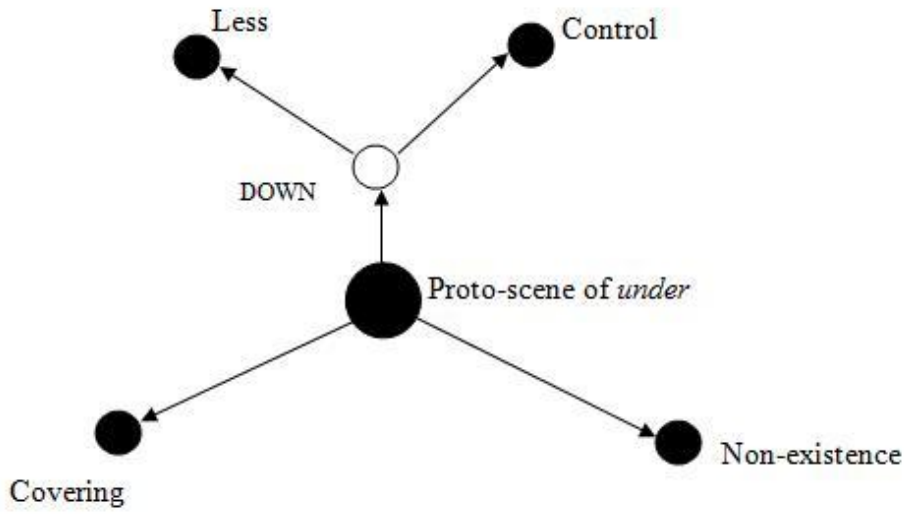


Figure 2-7 Semantic network for *under*

2.6 Contrastive analysis

Initiated by Lado (1957), contrastive linguistics has been used to study the similarities and differences between two languages. In the later studies (Di Pietro, 1971, Hatim, 1997, etc.), the term was gradually changed to contrastive analysis. The analysis is normally used to investigate interlingual transfer, predict errors, and avoid interference in language teaching. For the analysis, Stockwell, Bowen, and Martin (1965) propose Hierarchy of Difficulty which lists six levels of difficulty as follows:

1. Level 0-Transfer: L1 and L2 share some linguistic items in common.
2. Level 1-Coalescence: Two items in L1 are merged into one item in L2.
3. Level 2-Underdifferentiation: An item in L1 does not exist in L2.
4. Level 3-Reinterpretation: An item that exists in L1 is in a new form in L2.
5. Level 4-Overdifferentiation: An item in L2 does not exist in L1.
6. Level 5-Split: An item in L1 refers to two items in L2.

There are three versions of Contrastive Analysis Hypothesis: the strong version, the weak version, and the moderate version (Brown, 2000). The strong version is initiated by Lado (1957: 2) that "Individuals tend to transfer the forms and meanings and the distribution of forms and meanings of their native language and culture to the foreign language and culture." In this version, difficulties are caused mainly because of the differences between the first language and the target language. In other words, more differences cause more difficulties. The differences lead to positive transfer and negative transfer. Positive transfer refers to the situation that the native language and the target language share linguistic features in common in terms of meaning, forms, etc.; therefore, learners can directly link what is in common and produce appropriate linguistic products in the target language. Negative transfer refers to the situation that the two languages do not share some linguistic features in common; consequently, learners cannot successfully link the two languages and fail to produce appropriate linguistics products in the target language.

The weak version is associated with Wardhaugh (1970). In this version, it is claimed that language transfer does not apply to human learning. Besides, a learner's first language does not necessarily interfere with the target language. Learning difficulties are caused by the lack of knowledge regarding the target language. Wardharugh (1970: 126) states that a linguist should "use the best linguistic knowledge available to him in order to account for observed difficulties in second language learning." The perspective of the weak version is opposite to the strong version. The weak version uses the evidence of language interference (errors made by learners) to explain the similarities and the differences between the first language and the target language; the strong version predicts difficulties from the similarities and the differences between the two languages. These two versions are criticized that contrastive analysis cannot predict all the difficulties. It cannot either explain that all the errors made by learners are caused by language interference. Hence, the moderate version is introduced.

Based on the previous two versions, Oller and Ziahosseiny (1970: 184) propose this third version that "The categorization of abstract and concrete patterns according to their perceived similarities and differences is the basis for learning; therefore, wherever

patterns are minimally distinct in form or meaning in one or more systems, confusion may result." In other words, similarities may cause difficulties. However, Fisiak (1981) later states that similarities and differences cause equal difficulties. Contrastive analysis hypothesis including the three versions is disputable, but contrastive analysis cannot be denied because L1 influences the performance of L2.

Based on the weak version of contrastive analysis, error analysis is proposed and believed that it is essential to analyze the actual errors made by learners. Richards and Sampson (1974) list six sources of errors:

1. Interference which refers to errors that are caused by the negative transfer from the first language to the target language.
2. Overgeneralization is the process of using the elements in the first language to what does not apply in the target language.
3. Performance errors are those unsystematic errors caused by learners' emotions or other factors that can hardly be explained in linguistics.
4. Markers of transitional competence are the factors that cannot be avoided in the process of learning a target language.
5. Strategies of communication and assimilation are those errors resulting from the rules that have not been learned.
6. Teacher-induced errors refer to the errors caused by inappropriate pedagogical instructions.

Besides, Richards and Sampson (1974) identify seven factors characterizing second-language learner systems.

1. Language transfer refers to the positive transfer from the first language to the target language.
2. Intralingual interference which refers to the four types of intralingual errors proposed by Richards (1971). The four types are: 1) overgeneralization, 2) ignorance of rule restrictions, 3) incomplete application of rules, and 4) semantic errors such as building false concepts/systems.
3. Sociolinguistic situation can be related to motivation or some other factors in the society that may affect learning of the target language.
4. Modality refers to the learning styles toward the target language.

5. Age refers to the fact that learners at different ages perform differently.
6. Successions of approximative systems refer to the individual circumstances of learning the target language. Each learner's acquisition of the target language is unique.
7. Universal hierarchy of difficulty is concerned with some forms that are inherently difficult to learn regardless individuals.

This current study involves the three major analyses. Chapter IV quantitatively displays how the participants chose English prepositions in the test items. The results of Chapter IV suggest four levels of how the test items caused learning difficulty and four levels of how distracters influenced performance, both of which can refer to the sources of errors for error analysis. Chapter V analyzes the Mandarin Chinese localizers and their assumed counterparts in English. The results of Chapter V suggest the similarities and differences between the two languages, which can refer to the products of contrastive analysis. The third hypothesis of this current study is created based on the strong version of contrastive analysis hypotheses, the analysis is conducted toward whether the hypothesis is accepted or rejected in Chapter VI.

2.7 Conclusion

To conclude, pedagogical descriptions regarding English prepositions still leave ambiguities to Mandarin Chinese learners of English (MLEs) and their instructors according to the dictionaries entries. It has been found that the descriptions lack the use of cognitive features to categorize all the senses which English prepositions denote. Categorization as part of the inevitable norms of cognitive linguistics matters when information is stored in the brain for conceptualization. Cognitive features which generated from discussions in a cognitive approach are the base of categorization because they provide the elements to distinguish differences among senses. They function as labels for language users to evidently group senses into the systematic ways. Without proper cognitive features for categorization, learning English prepositions to MLEs is to memorize a large amount of unorganized data.

Review on second language acquisition regarding English prepositions

generalizes the importance of image-schemas which is the source of prototypicality. Based on prototypicality, Principled Polysemy which is developed by Tyler and Evans (2003) adopts proto-scenes as the core concept. This current study uses Principled Polysemy as the main framework to build semantic networks for spatial concepts in Mandarin Chinese. The comparisons between English prepositions and Mandarin Chinese localizers are conducted based on the semantic map approach to show similarities and differences.

L1 interference is emphasized when the relationships between the learning difficulties and the comparisons of the semantic networks are discussed. The analyses are directed to investigate whether L1 interference matters or how L1 interference matters when MLEs study English prepositions. Chapter II has provided sufficient information to shape the whole framework of this current study.

CHAPTER III
METHODOLOGY

The initiation of this current study partially evolved from the curiosity to identify the cognitive features which could be used to bridge the two languages. The research procedures of this study were prepared as a parallel consideration with the pedagogical setting. Figure 3-1 displays the overall structure of the study.

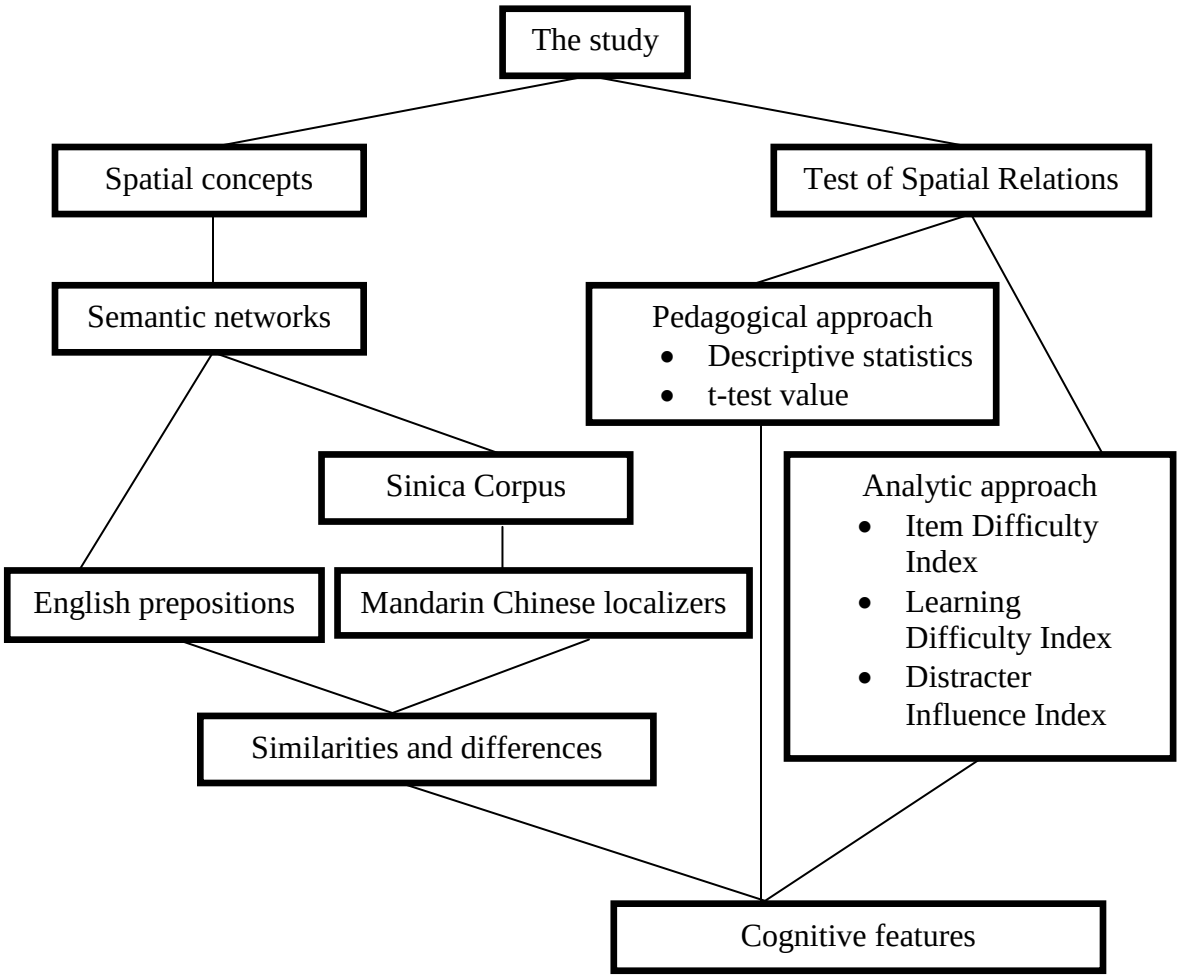


Figure 3-1 Structure of the study

3.1 Population and sample

The target population was set to focus on the English learners in Taiwan who use Mandarin Chinese as their first language in most domains, especially as the major pedagogical language. The learners were termed Mandarin Chinese learners of English (MLEs) in this study. It was planned to recruit 80 university students who majored in English in Taiwan as the participants.

The reason why the group of learners in this category was chosen was mainly associated with the fact that they had studied English under regular curricula approximately six to eight years by the time they participated in the study. Their English proficiency varied, but averagely, they could be considered intermediate English learners. At the level of proficiency, they could understand the fundamental uses of spatial prepositions in English and were aware of the importance of function words. It was assumed that the data collected from this group of learners would contain more effective information than those from more or less competent learners.

3.2 Research instrument

The test of spatial relations (TSR) was used as the research instrument in the study. Sinica Corpus was used as a source of data for creating semantic networks for Mandarin Chinese localizers. The TSR was to obtain the data for analyses to investigate the answer to Research Question No. 1: *With which spatial prepositions in English do MLEs have difficulties?* It was difficult to cover all spatial prepositions in English in the study; therefore, the TSR was created based on Chart of Common Prepositions (Celce-Murcia & Larsen-Freeman, 1999: 409). The chart lists the following 20 prepositions: *at*, *about*, *above*, *against*, *around*, *before*, *below*, *between*, *by*, *for*, *from*, *in*, *of*, *on*, *over*, *through*, *to*, *toward(s)*, *under*, and *with*.

Sinica Corpus was used to build semantic networks for the spatial relations in Mandarin Chinese. This source of data helped obtain authentic uses other than novel uses, so the findings of the analyses could help answer the second research question: *What are*

the similarities and the differences between the semantic networks for the spatial relations in both languages?

3.2.1 Test of Spatial Relations (TSR)

In general, the Test of Spatial Relations was defined as a diagnostic test which "is designed to diagnose specified aspects of a language. Usually, such tests offer a checklist of features for the administrator to use in pinpointing difficulties" (Brown, 2004). It was created with special reference to verticality (vertical axis) to explore the difficulties which the participants encountered when indicating spatial relations in English. Verticality, simply speaking, refers to the up and down directions which human beings perceive through bodily experience. In English, the up and down directions can be denoted by prepositions such as *over*/*above* and *under*/*below*.

3.2.1.1 Creation of TSR

The TSR) was a paper-based test with a short questionnaire (See Appendix E) as the main research instrument for the study. The TSR was to investigate how Mandarin Chinese learners of English decide spatial prepositions in English to indicate certain spatial relations and extended metaphorical meanings. The questions were created to examine with which spatial prepositions in English MLEs have difficulties. The questionnaire was attached to obtain the participants' personal learning experience such as the years they have been studying English, the schools they previously attended, etc. The results of the questionnaire helped sift inappropriate participants who were not the population in the study.

It is believed that the spatial prepositions in English cover a wide range; therefore, the study was conducted with special reference to the three localizers in Mandarin Chinese, *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' with their assumed counterparts in English. As hypothesized, the three localizers cover a continuum of verticality which can be denoted by several English prepositions, and the continuum should cause ambiguity and difficulty. To confirm the continuum, the test was prepared with the following guidelines.

The TSR consisted of 60 multiple-choice test items. Each test item of the TSR was to investigate how the participants chose spatial prepositions in English. The spatial relation between the trajector and the landmark in each test item was to find the evidence to demonstrate the reasons why the participants chose a certain spatial preposition in the context. The overall test result would suggest how MLEs use the selected spatial prepositions in English. For this current study, when more than sixty percent of the participants did not choose the most appropriate answer to a test item, it would be considered a noticeable difficulty.

For each test item, there were four possible options which were semi-randomly chosen from the Chart of Common Prepositions provided by Celce-Murcia and Larsen-Freeman (1999: 409) and arranged in an alphabetical order. "Semi-randomly" referred to the procedure of how the spatial prepositions were decided. The Chart of Common Prepositions lists 20 prepositions, which covers more than the scope of the study. The study emphasized the spatial prepositions that can be especially associated with *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' in Mandarin Chinese.

Therefore, the Chart of Common Prepositions was approximately halved in size with a main criterion. It was to ignore those that apparently do not denote verticality. It means that the prepositions such as *about*, *against*, *around*, etc. were excluded. Some which do not denote verticality such as *through* and *with* were still kept as the distracters in the TSR. In other words, 1) *above*, 2) *at*, 3) *below*, 4) *between*, 5) *from*, 6) *in*, 7) *on*, 8) *over*, 9) *through*, 10) *under*, and 11) *with* were selected. When a test item was created, there were four options. Except the answer, the other three options were chosen from these spatial prepositions. In some contexts, it was obvious that some options were inappropriate, so they were not considered purposively.

All the questions were arranged into three groups: Monologue, Dialogue, and Picture description based on the entries in Longman Dictionary of Contemporary English (2009). These three categories functioned differently in the TSR. The test items in Monologue and Dialogue provided spatial descriptions in words, and those in Picture description provided spatial scenes with pictures. The first two tended to investigate how

the test takers dealt with both spatial-physical and extended metaphorical meanings. The third one, especially, tended to seek the differences when the test takers actually saw the spatial-physical scenes.

Categorizing spatial senses into spatial-physical and spatial-functional senses in cognitive linguistics seems controversial because it is rather a continuum between the two ends. Assertive criteria do not exist to satisfy all the senses. There should always be exceptions or disputes where the two kinds of senses overlap. Tyler and Evans (2003) use very basic spatial senses that are perceived by human beings to decide proto-scenes (e.g., *He is in the room*.). In those spatial relations, trajectors physically interact with landmarks. They place the rest of the spatial relations beyond proto-scenes. In those spatial relations beyond proto-scenes, trajectors do not physically interact with landmarks (e.g., *He is in love*.). Even though TRs do not physically interact with LMs, the extended senses are created tightly depending on those spatial senses in proto-scenes. This study adopted this notion when categorizing spatial senses. However, there are some examples which cannot be determined easily. For example, *He is in jail* and *He is in the jail*. The first one connotes that *he* physically interacts with *jail*, while the latter one only refers to the physical interaction between *he* and *the jail*, and does not necessarily indicate the state of being placed in a space for sentences.

Each group of test types consisted of 20 test items. In other words, twenty test items were created in monologue-type of sentences, twenty test items in dialogue-type of sentences, and 20 test items in either monologue-type or dialogue-type of questions with images. The authentic test was reduplicated in a formal form including a thorough set of descriptions, instructions, and purposes to inform the participants of all regarding the test that they were supposed to understand.

The answers were prepared based on the entries in Longman Dictionary of Contemporary English (2009). In other words, the discussions regarding the uses of English prepositions in this study generally referred to the uses in American English. The answers were triangulated with the result of a pilot study and experts in the related field. Both NSEs and MLEs would be invited to take part in the pilot study. The pilot study was

necessary because the study valued native speakers' intuition. The intuition might show conceptual differences. For example, in some cases, either *in* or *on* would be chosen by NSEs. A situation like this would reveal that those cases denote some spatial scenes without explicit definitions. When one scene is not clearly defined, the answer key should be reconsidered. Figure 3-2 displays the structure of the TSR. The numbers following the tags refer to the numbers of the test items in the categories. In other words, altogether there were 30 test items for spatial-physical scenes, and there were 30 test items for spatial-functional scenes (extended metaphorical meanings). The numbers following the spatial prepositions refer to the numbers of times that these prepositions appear as the answers in the TSR. The answers proved that the test items were created to emphasize those spatial prepositions that could be associated with the localizers in Mandarin Chinese.

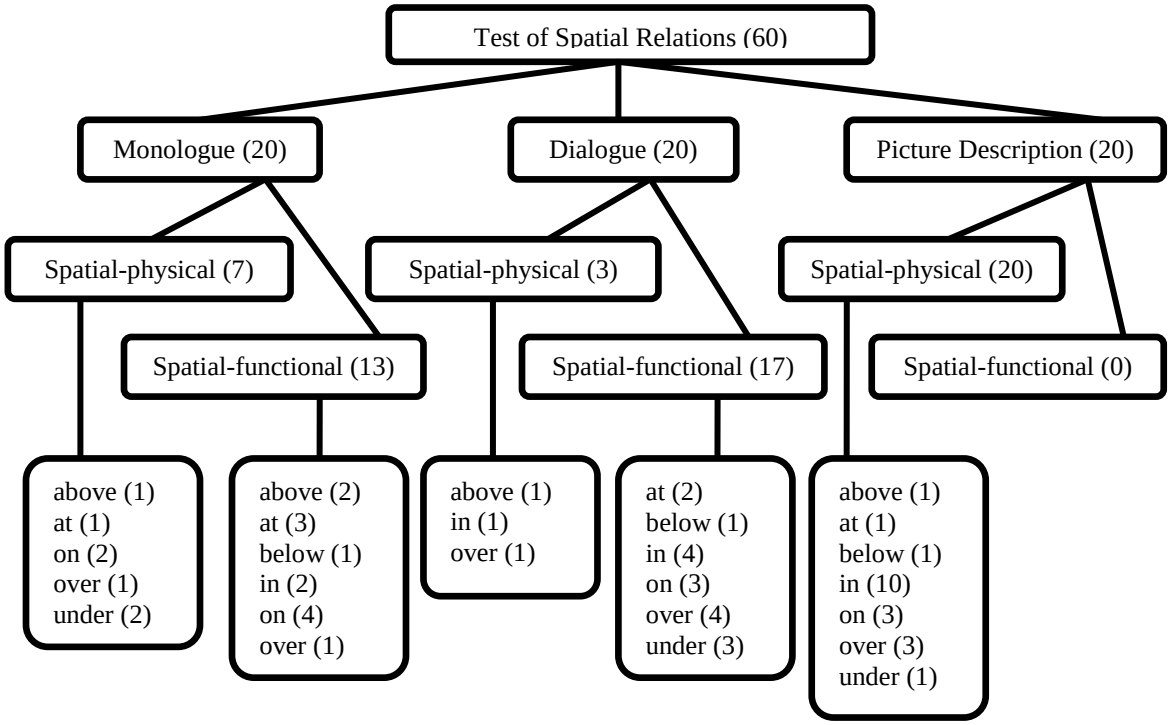


Figure 3-2 Structure of TSR

The TSR was designed with the guidelines for two main reasons. The first reason refers to time limits. The test was administrated within 45 minutes for the participants to

listen to the instructions (15 minutes) and to provide the prompt response to each question (30 minutes). It was time-consuming if the participants were asked to respond by filling any prepositions. It was believed that to make the TSR in multiple-choice questions could avoid this obstacle.

The second reason refers to the selected spatial prepositions. There are a great number of spatial prepositions in English. This study emphasized those spatial prepositions that can refer to the localizers in Mandarin Chinese, *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside.' To accurately examine the selected spatial prepositions, it was appropriate to provide options for the participants to choose. If a participant was asked to respond to a question by filling in any prepositions, the result would be out of focus and lead to unexpected outcomes. Consequently, the test of multiple-choice questions was the most effective form for valid data.

3.2.1.2 Pilot study of TSR

Fifteen copies of the test were dispatched for the pilot study. 10 valid copies of the TSR returned including 2 native speakers of English (NSEs) and 8 MLEs. Both of the NSEs were from the United States of America. One of them held a master's degree Political Science, and the other one was currently pursuing his PhD in Language Instruction in Taiwan. The MLEs included both current graduate school students and graduated students.

Table 3-1 shows the descriptive statistics of the pilot result. It should be noted that the statistic figures were calculated based on the default answers. The default answers were prepared while the TSR was being created and might not be appropriate enough because of ambiguities or some other factors. Both of the NSEs did not choose the answers which perfectly met the answer key. The one who currently works in the language related area pointed out some disputable parts in the test with constructive comments and suggestions. The overall range of the pilot study results was considerably wide from 13 to 52. Among MLEs, the range was still wide from 13 to 45.

Table 3-1 Statistics of pilot study

	NSE1	NSE2	MLE1	MLE2	MLE3	MLE4	MLE5	MLE6	MLE7	MLE8
No. of correctness	52	52	44	42	36	39	34	45	47	13
Mean/Median	40.40/43.00									
Standard Deviation	11.36									
Range	39									

3.2.1.3 Discussion of pilot study for TSR

The main purpose of this pilot study was to evaluate the appropriateness of the test items and the possible problems before the real study was conducted. The descriptive statistic figure of the results was to examine whether the test items were made too simple to meet the objectives of the TSR.

First of all, the MLEs were requested to check the most appropriate option to each test item, and it was stated in the directions at the beginning of the TSR. However, some test takers, checked more than one option or did not check any option to some test items. For example, MLE1 checked *below* and *under* for Q17. MLE6 did not check anything for Q50. (See Appendix F and G) When the TSR was administered for the main study, the guidelines of how to effectively take the TSR should be announced before the test. Besides, the phrase “check only one” marked in bold should be added in the directions of the TSR to avoid the situation that the participants in the main study would choose more than one answer to a test item.

Second, to evaluate the test items, the discussion was divided into three parts, Monologue, Dialogue, and Picture Description as how the test was arranged. The discussion was led by the pilot study result which was statistically calculated. The responses which did not match the answer key were marked in gray.

In Monologue (See Appendix F), the test items included both spatial and metaphorical meanings. NSE1 and NSE2 did not have any different opinions on metaphorical uses but spatial uses. For example, NSE1 checked *below*, *from*, and *under* for Q19. He stated that there were three possible answers, each of which denoted different meanings. This statement was acceptable, so the test item should be revised to

avoid the ambiguity. Besides, NSE1 also suggested using *a* instead of *the* in Q17. It might not influence the test item, but would sound more authentic to NSEs. This suggestion was reasonable and accepted. NSE2 checked *above* and *at* for Q14 and *on* for Q15. *At McDonald's* did not seem reasonable in the context; therefore, it was not necessary to revise the test item. Uses such as *bridges on a river* could rarely be found in the dictionary and the corpus. It was not necessary to revise the test item, either. According to the test result, the test items in Monologue could help locate the difficulties that MLEs encountered. For example, all the MLEs checked the same preposition as the answer to Q3, but for Q8, six out of eight MLEs chose different prepositions from the answer key.

In Dialogue, the test items included both spatial and metaphorical meanings. They provided spatial scenes and/or the metaphorical meanings through conversations. What could not be easily described in Monologue was created in this category. Therefore, most of the test items were created to test how test takers understood the metaphorical uses. According to the result of this category (See Appendix G), it is obvious that both of the NSEs' responses perfectly met the answer key. In other words, there seemed no ambiguity in the test items. NSE1 as well provided a lot of comments on the wording. He suggested changing some words in some test items in order to make the sentences sound more natural and authentic. For example, add *the* between *of* and *food* in Q24 and use *you've been* instead of *you're* in Q33. All the comments were constructive to help revise the careless writing mistakes. The revision of the TSR should follow the comments and suggestions. The result showed the difficulties which MLEs encountered when choosing spatial prepositions for metaphorical uses.

In Picture Description, the test items tended to investigate how differently NSEs and MLEs described spatial relations when they saw the same spatial-physical scenes. Each test item was prepared with a picture which showed a spatial scene. The test result of this category (See Appendix H) showed that NSEs had different opinions on nine out of twenty items. The result raised more challenging tasks. The tasks included looking for more appropriate pictures instead of the current ones or revising the test items to avoid ambiguity. NSE1 suggested some revisions to make the test items sound authentic, such

as using some other picture for Q52. Except the items with writing mistakes, three test items should be especially discussed. First, NSE2 did not mark anything for Q52, but he said it should be *on*, which was not listed. If *couch* was replaced with *chair*, the problem would be solved. Second, the landmark and the trajector in Q59 should be switched. It would then sound more authentic. Third, Q60 tended to test if test takers would use *in* to describe the scene, but the picture was inappropriate. A new picture should be provided because people sit *on* a hammock but lie *in* a hammock according to NSE1's personal opinions, and the opinion was considered and agreed.

With the comments from two NSEs and reconsiderations, the TSR was revised. In general, the revised test items should meet the scope of the study and would be able to find the answers to the first research question. Next, the revised version of the TSR was delivered for validation.

3.2.1.4 Validation of TSR by experts

A simple form of the instrument validation was prepared for validation. (See Appendix I) The form stated the test items and the item objectives. Four experts from either linguistics or language education were invited to validate the TSR. They have devoted to language related studies for a significant period of time and have had enough professional knowledge and experience to provide constructive comments and suggestions.

The experts checked Disagree, Fair, or Agree in the form after they thoroughly studied each test item. The experts examined not only the appropriateness of each test item but the spelling as well as the format. Ideally, all of the four experts agreed with the appropriateness of most of the test items, and some minor changes were suggested. For example, one expert suggested adding *on* as one of the distractions in Q52. This suggestion was considered and accepted.

3.2.2 Corpus of Mandarin Chinese

To prepare semantic networks for spatial relations in Mandarin Chinese, a corpus-based analysis would be conducted for the purpose that the data should be obtained from

the real uses of the language to avoid novel uses. Novel uses refer to the uses for creativity, which make the analysis unnatural. Hence, the entries used for the analysis were derived from Academia Sinica Balanced Corpus of Modern Chinese (Sinica Corpus), a database for modern Mandarin in both spoken and written texts.

According to the Sinica Corpus website, Sinica Corpus "is designed for analyzing modern Chinese. Every text in the corpus is segmented and each segmented word is tagged with its part-of-speech. Texts are collected from different areas and classified according to five criteria: genre, style, mode, topic, and source. Therefore, this corpus is a representative sample of modern Chinese language." (Sinica 3.0, 1997).

The size of the corpus is five million words, which is large enough for this study. The database shows up to 20,000 and 2,000 entries, respectively through the Intranet access and the Internet access. This study used the Internet access to the database, and the search result could be expected to be 2,000 entries as the maximum for each keyword. For creating the semantic networks for spatial relations in Mandarin Chinese, the framework developed by Tyler and Evans (2003) was adopted. The corpus entries from Sinica Corpus were derived by the following criteria.

3.2.2.1 Localizers in Mandarin Chinese

Localizers such as *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' are syntactically treated as either nouns (Li, 1990), NP clitics (Liu, 1998), or postpositions (Wu, 2005) which collocate with prepositions such as *zài* 'at.' A preposition like *zài* 'at' does not determine spatial relations, but the localizers do. With the fact, Greenburg (1995) claims that the prepositional phrases in Mandarin Chinese illustrate circumpositions. A circumposition refers to a structure that consists of a functional adposition, e.g., *zài* 'at' and a lexical adposition, e.g., *shàngmiàn* 'upside.' However, Sun (2008: 199) argues that "the Chinese locative construction includes a semantically underspecified preposition *zài* 'at,' a spatial NP, and an NP enclitic." The arguments still remain ambiguous. This study focuses on the spatial concepts of the localizers. To avoid the mentioned ambiguities, the analysis is limited to the construction,

zài+NP+localizer, which avoids treating lexemes individually from the syntactic point of view.

3.2.2.2 Entries from Sinica Corpus

Part of the study is to create the semantic networks for localizers in Mandarin Chinese in the construction, *zài*+NP+localizer and to discuss how much they differ from the semantic networks for the spatial prepositions in English. For example, *shàngmiàn* 'upside' and *on*. To create the semantic networks, the localizers were searched from the online version of Sinica Corpus. The maximum of each search shows up to two thousand entries according to the description of the corpus. This study adopted simple random sampling and selected the first five hundred entries of each search result for the analyses. Ideally, it is twenty-five percent of two thousand entries. It is believed that the samples were to be representative to the whole search results. If the search result did not show more than five hundred entries, all the entries were selected. The entries were listed and numbered, and the construction, *zài*+NP+localizer was especially marked for reference. *zài* 'at' and localizer were marked in bold, and the NP were underlined. Since the study relied on the NPs between *zài* 'at' and localizers, the NPs were literally translated into English for information. Initially, *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' were to be searched because, as hypothesized, the spatial concepts that these three localizers in Mandarin Chinese denote cover the spatial relations that many of the spatial prepositions in English do.

3.3 Data collection

Data collection contained the procedures for the TSR and Sinica Corpus. There were more steps for the TSR whereas the searches of the corpus data did not depend on any participants. Two instructors were contacted by formal letters of invitation and personal communication such as phone calls and Email messages for the arrangement of the TSR. The test dates and the venues were appointed at the convenience before the actual test.

3.3.1 Implementation of TSR

The process of implementation of the TSR included a series of steps. First of all, the TSR was revised based on the results of the pilot study and the instrument validation in Chapter III. The final draft of the TSR was confirmed and duplicated for the main study. Second, two instructors at Hungkuang University in Taichung, Taiwan were contacted by telephone communication and email messages to reconfirm the process of the TSR. The detailed information such as the administrative time, the collection of the TSR, etc. was explained to maintain validation. After all the steps were adjusted to the most convenient extent and agreed, the test date and the venues were arranged. The TSR was implemented in two regular class meetings at Hungkuang University at the same time on the same date.

On the test date, 100 copies of the TSR were duplicated and distributed to the participants by the instructors in the two classrooms simultaneously. The number of the test copies was decided according to the number of the enrolled students in the two classes. The enrolled students in these two classes were regular students in the English department. The instructors first explained about the purposes of the TSR, the method to effectively respond to the test items, and the administrative time. Second, the participants were guided to fill out the questionnaire altogether by the instructors to lessen ambiguities. This step was implemented because in the pilot study, some participants did not fully understand how to respond to the questionnaire and caused some minor problems, such as leaving some questions blank. After the questionnaire was completed, the participants started to respond to the test items and tried to finish the TSR within one hour. The time was decided because the TSR was meant to elicit above the participants' direct responses to the test items without unnecessary considerations. If they had been given more time to analyze the options in the test items, their responses might not have truly reflected their conceptualization of spatial relations. The participants were asked to stay in the test venues until the administrative time was finished even though they completed the TSR before the scheduled time.

When time was up, all the test copies were collected by the instructors. 81 test copies were answered, and the rest of the test copies were not used. The answered test copies were marked based on the answer key and were subsequently analyzed by the researcher. The test results were presented separately into two parts: the results of the questionnaire on the background of the respondents and their uses of spatial prepositions in English.

3.3.2 Corpus data searches

The three initial localizers, *lǐmiàn* ‘inside,’ *shàngmiàn* ‘upside,’ *xiàmiàn* ‘downside’ were searched in the database. There displayed 849 entries for *lǐmiàn* ‘inside,’ 548 entries for *shàngmiàn* ‘upside,’ and 229 for *xiàmiàn* ‘downside.’ As the above stated criteria, first five hundred entries in the search result of each localizer were selected as the representing sample. When the number of the samples was not larger than five hundred, all the entries were selected. Therefore, there were 500 entries for *lǐmiàn* ‘inside,’ 500 entries for *shàngmiàn* ‘upside,’ and 229 for *xiàmiàn* ‘downside.’ These entries contained the localizers, and then, the construction, *zài*+NP+localizer was checked in each entry. If an entry did not contain the construction completely, it was ignored for the study. In other words, one entry should contain *zài* ‘at,’ NP, and localizer. If one item was missing, the corpus entry was not considered valid. There left 125 entries for *lǐmiàn* ‘inside,’ 106 entries for *shàngmiàn* ‘upside,’ and 30 entries for *xiàmiàn* ‘downside.’ *Zài* ‘at’ and localizer were marked in bold, and NP was underlined with a literal translation. Table 3-2 shows the overview of selecting the appropriate data and the numbers of entries for each localizer. These entries were used to propose semantic networks in Chapter V.

Table 3-2 Procedure of corpus data selection

	No. of search results	No. of sampling	No. of data
lǐmiàn ‘inside’	849 ➡	500 ➡	**125**
shàngmiàn ‘upside’	548 ➡	500 ➡	**106**
xiàmiàn ‘downside’	229 ➡	229 ➡	**30**

3.4 Data analysis

3.4.1 Analyses of TSR

The test results of the TSR were analyzed to answer the first research question: *With which spatial prepositions in English do Mandarin learners of English have difficulties?* This study defined learning difficulties from two perspectives: the pedagogical perspective and the analytical perspective. For the pedagogical perspective, the passing score in Hungkuang University was taken into consideration. According to the generally-adopted passing score for pedagogy, when the number of correctness is less than 36 (equal to 60 percent), it is considered learning difficulties for this study. The overall statistic figures of the test results might explain some facts but would not provide strong evidence in detail to answer the question. In addition, the t-test Paired Two Sample for Means value was computed to confirm whether the participants performed better on spatial-physical senses than spatial-functional senses. For the analytical perspective, the concept of Item Difficulty Index was adopted to create Learning Difficulty Index (LDI) and Distracter Influence Index (DII). Consequently, each test item in the TSR was studied to investigate the spatial prepositions that MLEs chose. LDI categorized the test items in the TSR into four levels of difficulty, and DII clarified how the distracters in each test item influence the participants. There were four levels of distracter influence according to the frequency counts that the participants chose the distracters. The detailed descriptions regarding these measuring tools were presented in Chapter IV.

3.4.2 Analyses of Mandarin Chinese corpus data

The analyses of the corpus data were to answer the second research question: *What are the similarities and the differences between the semantic networks for the spatial relations in both languages?* The very first step to find the answers was to analyze the Mandarin Chinese corpus data and create the semantic networks for the three localizers, *lǐmiàn* ‘inside,’ *shàngmiàn* ‘upside,’ and *xiàmiàn* ‘downside’ initially based on their counterparts in English. The counterparts are *in*, *on*, and *under* respectively as hypothesized. This process was to ensure the results could be parallel and comprehensible in comparison to the semantic networks for the counterparts in English.

To prepare semantic networks for the localizers in Mandarin Chinese, the analyses were conducted based on Principled Polysemy developed by Tyler and Evans (2003). All the valid entries from Sinica Corpus were categorized to build the semantic networks. The initial step of determining a certain cluster or sense was based on the existing semantic networks for the spatial prepositions in English. If there was not an appropriate cluster or sense for one scene, a new cluster and/or a sense would be created. The semantic networks in the two languages were compared to seek the similarities and differences. The significant cognitive features of the spatial sense between the two languages would be discussed.

The comparisons between the TSR results and the corpus results should answer the third research question: *Do the similarities enhance the comprehensibility of the spatial relations in the two languages and the differences suggest the learning difficulties for Mandarin learners of English?* The comparison refers to the process of investigating whether the similarities and the differences between the semantic networks eased learning or caused difficulties.

3.4.3 Considerations to modifying existing semantic networks for English prepositions

There are some considerations which lead to modifying existing semantic networks for English prepositions. First of all, Tyler and Evans (2003) study spatial relations in a broad perspective, which includes English particles in various constructions. For example, *A book is in a box*, *The train arrived in*, and *You're still in*. This study does not deny the validation of the study, but for a better solution in comparison with the semantic networks for Mandarin Chinese localizers, those examples in which English particles are not in prepositional phrases are considered to be removed. This step would assure that the semantic networks for English prepositions are more likely to be in a parallel condition with the semantic networks for Mandarin Chinese localizers, which were created with an emphasis on the construction, *zài*+NP+localizer. Detailed descriptions can be seen in Chapter V.

CHAPTER IV
DIFFICULTIES OF ENGLISH PREPOSITIONS ENCOUNTERED BY MANDARIN CHINESE LEARNERS OF ENGLISH

The purpose of this chapter is to show how Mandarin Chinese learners of English have difficulties with English prepositions. In order to identify the difficulties, the Test of Spatial Relations (TSR) was conducted at a university in Taiwan. The students who majored in English in two regular classes participated in the test simultaneously. The details regarding the creation of the TSR, the target population, and the sampling selection for this study were reviewed in Chapter III. The TSR results were to answer the first research question: *With which spatial prepositions in English do MLEs have difficulties?* The answer was to prove the first hypothesis: *Mandarin Chinese learners of English have difficulties with in, on, at, above, over, below,* and *under especially when they are used metaphorically*.

The statistic figures were analyzed to infer the difficulties from two perspectives, the pedagogical approach and the analytic approach. The pedagogical approach refers to interpreting the TSR results holistically in pedagogy through the descriptive statistics, e.g., means and standard deviation. The analytic approach was to individually scrutinize the test items. The two perspectives complemented each other to yield a better conclusion to answer the research question.

4.1 Questionnaire results

The questionnaire results display the general backgrounds of the participants. This information was to judge the validity of the participants. The validity refers to whether the participants represented typical Mandarin Chinese learners of English. In general, the study ignored those participants who were exposed to the English language far more than the average students who used Mandarin Chinese in most domains were. For example, a participant who used to live in an English-speaking country was considered inappropriate in the study. The test result of such a participant was excluded.

4.1.1 General backgrounds of participants

This section describes the general backgrounds of the participants based on the collected data. The detailed discussions regarding valid and invalid participants are conducted Section 4.3.2. First of all, Table 4-1 shows the number of the participants by gender: 21 male students and 48 female students participating in the TSR. The other two participants did not indicate their gender. Female participants outnumbered male participants because in the English department, Hungkuang University, there were proportionally more enrolled female students than male students. The gender information provides the general backgrounds of the participants for reference only. It was not used as one of the criteria for judging validity of the participants. In other words, the result of the participants' gender did not affect the analyses of the TSR for this study.

Table 4-1 Number of participants by gender

Male	Female	Not specified	Total
21	58	2	81

The results of the participants' responses to whether they used to live in English-speaking countries are listed in Table 4-2. Seventy-nine participants indicated that they never lived in English-speaking countries. Two of them did not respond to this question, and none of the rest indicated that they used to live in English-speaking countries. The result of this question was one of the criteria for judging the validity of the participants because if a participant used to live in an English-speaking country for a certain period of time, the participant's conceptualization of spatial relations would differ from a typical MLE. This study emphasizes the conceptualization of typical MLEs. Plus, this study considered the two participants who did not respond to this question to be valid participants because if they had lived in English-speaking countries, they would be more likely to state the fact.

Table 4-2 Residence history

Yes	No	Not specified	Total
0	79	2	81

The results that the participants responded to whether they had received regular or bilingual/international education can been seen in Table 4-3. Sixty participants indicated that they had received regular education in all of the three options. No participants indicated that they had received bilingual or international education. Twenty-one participants did not completely respond to this set of questions. The result of this question was one of the criteria for judging the validity of the participants because if a participant received bilingual or international education in Taiwan, the participant should have been exposed to English far more than a typical MLE, and the data of this participant are considered invalid. This study assumed that those 21 participants who did not completely answer the questions were valid participants. If they had received the bilingual education, they would have stated the fact.

Table 4-3 Education backgrounds

Regular	**Bilingual**	**Not specified**	**Total**
60	0	21	81

Table 4-4 shows the results concerning the languages that the participants used with their own family members. As shown, 26, 37, and 1 participants, respectively indicated that they used Mandarin Chinese, Taiwanese, and Hakka, respectively, at home. Except English, the rest of the languages listed in Table 4-4 are the languages or dialects which are used as mother tongues by different language groups in Taiwan. This question was designed mainly to learn whether some participants used English at home. The result of this question was one of the criteria for judging the validity of the participants because when one participant used English at home, the participant would be more likely to be a non typical MLE. No participants indicated that English was used as the main language at home. One participant stated that some other language was used, and two did not respond to this question. Fourteen participants chose more than one languages, but all of them included Mandarin Chinese as one of the options. Those two participants who did not respond to the question were considered valid participants because it was assumed that if the participants used English as a language at home, they would be more likely to state the fact in the questionnaire. A participant's home language might be a factor which influences the performance. This study seeks to distinguish the different ways of conceptualization between English and Mandarin Chinese. All of the participants were

Mandarin Chinese speakers and none of them used English as a home language. The data collected from the participants were considered valid. The different ways of conceptualization among other home languages, e.g., Taiwanese and Hakka were excluded in this study.

Table 4-4 Home languages

Mandarin	Taiwanese	Hakka	English	Others	Not specified	Multiple	Total
26	37	1	0	1	2	14	81

It can be seen in Table 4-5 regarding in which year the participants were at the time they participated into the TSR. Respectively, 1, 43, 6, and 30 participants were in the first, second, third, and fourth year. The majority of the participants were in their second and fourth years of the university study. One participant did not respond to indicate the classification. This result was not considered one of the criteria for judging the validity of the participants. Therefore, the participant who did not respond to the question was still considered a valid participant.

Table 4-5 Year of participants at university

1st	2nd	3rd	4th	Not specified	Total
1	43	6	30	1	81

4.1.2 Judging validity of participants

All of the 81 test copies were judged whether they were valid or invalid data. The process of judging the validity of participants consisted of four steps as shown in Figure 4-1.

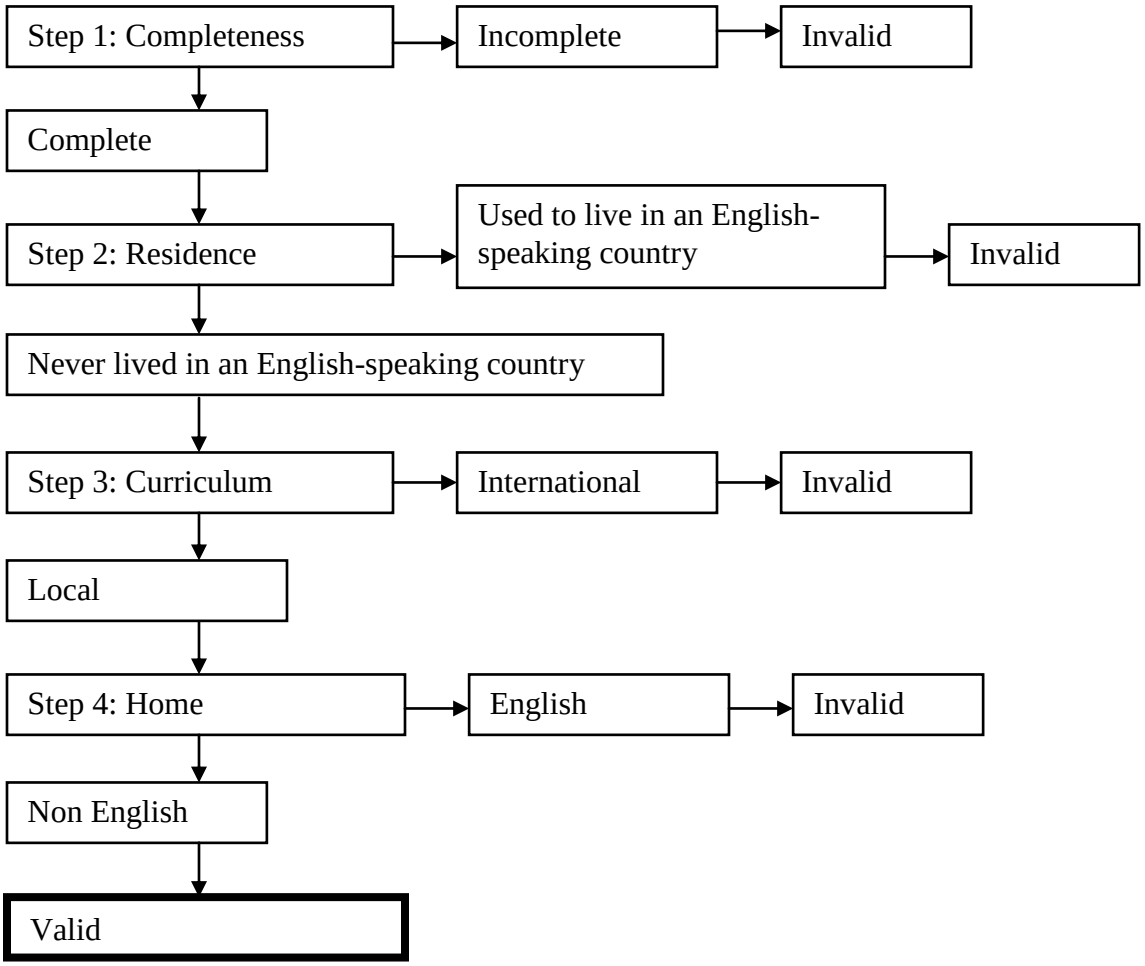


Figure 4-1 Process of judging validity of participants

The completeness was taken into consideration for the very first step of the process. If one test copy was not completed, it was considered invalid. There were ten test copies which were not completely finished. Two of the ten participants did not respond to only one test item; therefore, these two test copies were still considered valid. Eight of the ten participants did not finish the whole part of Picture description; therefore, these eight test copies were considered invalid. After the first step, there were 73 test copies left.

Second, if a participant used to live in an English-speaking country for certain years, the test copy taken by the participant was considered invalid. This step referred to question number four and five of the questionnaire. There were no participants who used

to live in English-speaking countries. Two of the participants did not indicate whether they used to live in English-speaking countries. It was assumed that if they had lived in English-speaking countries, they would have responded to the question. Therefore, these two test copies taken by these two participants were considered valid. After the second step, there were 73 test copies left.

Third, if one participant received bilingual or international education in the primary school or high school before entering the university, the test copy taken by the participant was considered invalid. Receiving bilingual or international education would have made the participants non typical MLEs. This step referred to question number three in the questionnaire. The left seventy-three test copies were taken by the participants who received regular curriculum before entering the university. After the third step, there were seventy-three test copies left.

Fourth, the sixth question in the questionnaire was to confirm if the participants used English as the main language at home. This study only ignored those learners who used English as the main language at home. The rest of the languages in the list were frequently-used in Taiwan as home languages. Some MLEs might use one home language that was different from Mandarin Chinese at home such as Taiwanese, but Mandarin Chinese was the official language for pedagogy. If one participant used English as the main language at home, the participant was more likely to be a non typical MLE. Therefore, the test copy taken by the participant was considered invalid. According to the result, no participants claimed that they used English at home. At this step, all the tests were considered valid.

After all the steps of judging the validity of the participants, there were 73 test copies left. These 73 test copies were used as the valid data for the analyses in the study. The valid data were analyzed to investigate the difficulties that the participants encountered.

4.2 Interpreting TSR results in pedagogical approach

This section presents the statistic results of TSR in general to discuss whether the participants had difficulties with the TSR as a whole. The difficulties were defined and interpreted by a set criterion. The statistic results of how the participants performed on SP senses and SF senses are also presented to explore whether metaphorical extended uses caused more difficulties than spatial-physical configurations to MLEs.

4.2.1 Interpretation of TSR results

After all the valid 73 test copies were marked according to the answer key (See Appendix I), the results were compiled into descriptive statistics based on the raw scores (See Appendix J) not transformed standard scores. The test result of each test copy shows the number of correctly answered items. It is more convenient to use the raw scores because this study did not compare the test results to any other forms of testing. One correctly answered test item was worth one point in a score to directly show the frequency counts.

To review the TSR results in a pedagogical approach, the study adopts the passing score regulated in the University Regulations of Hungkuang University (Hungkuang University, 2012) to define the learning difficulty. The University Regulations states that students must reach at least 60 percent of the course score in order to obtain the course credits. If a participant's test result did not reach 60 percent, it was considered that the participant had a learning difficulty with the TSR. In other words, the number of correctly answered test items should reach 36 in order to have a passing score in pedagogy. Therefore, if a participant had less than 36 correctly answered test items, it was considered that the participant had difficulties with the TSR.

4.2.2 Statistic descriptions of TSR results

According to the raw scores (See Appendix J), merely 3 participants reached 36 correctly answered test items. In other words, the rest of the participants were considered having difficulties with the TSR. Figure 4-2 shows that four percent of the participants were not considered having difficulties with the TSR while 94 percent of the participants

were considered having difficulties. The figure apparently explains that the overwhelming majority of the participants had difficulties with the TSR.

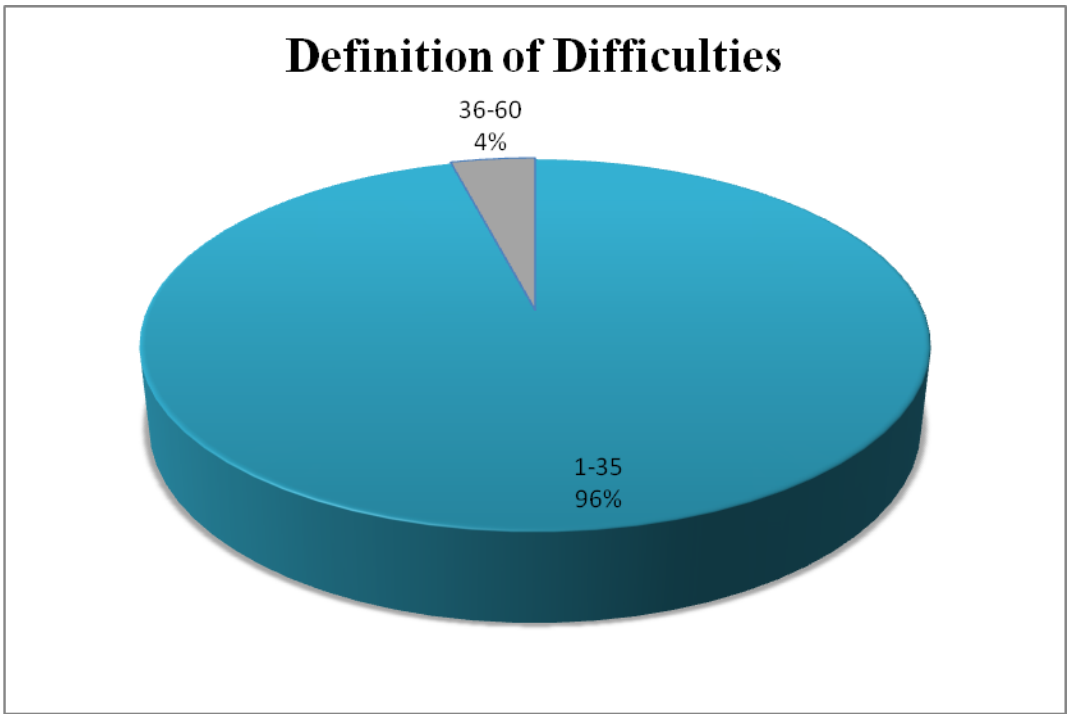


Figure 4-2 Percentage of participants having difficulties with English prepositions

The descriptive statistics of the TSR results are listed in Table 4-6. There were a total of 73 valid test copies for analyses. The sum of all the raw scores was divided by the number of the participants, 73 for the average of the TSR results. The average number of correctly answered test items is 22.42, which means the participants answered 22.42 test items correctly in average. Besides, the TSR consisted of thirty test items which contained the SP scenes and the other thirty test items which contained the SF scenes. The average number of correctly answered test items that contained SP senses and SF scenes are 11.88 and 10.55, respectively. The figures show that the participants performed slightly better on the SP senses than the SF senses in the pedagogical view.

Table 4-6 TSR results in descriptive statistics

TSR AVG.	SP AVG.	SF AVG.	N	Median	SD	MAX	MIN	Range
22.42	11.88	10.55	73	23	5.89	42	9	33

The range is considered wide from 9 to 42, which explains that some participants were far more familiar with the usage of English prepositions than the others. The understanding of English prepositions among the participants varied in a wide range. Table 4-7 shows the distribution of the raw scores. The majority of the participants had the numbers of correctly answered test items in the category of 11 to 20 and 21 to 30. As a diagnostic test, the TSR examined the difficulties. Obviously, the results show that the participants hardly answered half of the test items correctly. The TSR results suggest that the participants were confused with most of the uses of the English prepositions in the TSR. These English prepositions in the test items are to be thoroughly discussed in a later section.

Table 4-7 Distribution of raw scores

Scores	1-10	11-20	21-30	31-40	41-50	51-60	Total
Number of participants	1	24	43	4	1	0	73

4.2.3 Participants' performances on SP and SF senses in TSR

To statistically judge whether the participants outperformed SF senses, the TSR results were sorted into two groups: SP and SF senses. Each group contained thirty test items (See Appendix N). The table lists each participant's numbers of correctly answered test items on SP and SF senses. To examine the significance of difference, the study applied t-test: Paired Two Sample for Means on SPSS. To be short, t-test Paired Two Sample for Means computes the means of two variables for each participant. The P-value shows the probability of rejecting the null hypothesis. For this study, the hypotheses were:

1. Null hypothesis (H0): There was no difference between SP and SF results.
2. Alternative hypothesis (Ha): There was a difference between SP and SF results.

The risk level was set at 0.05, which is widely considered in humanity and social science research. The data analyses program on SPSS displays the t-test results in Table 4-8.

Table 4-8 t-test results

	SP	SF
Mean	11.87671	10.54795
Variance	10.33181	13.08447
Observations	73	73
t Stat	3.262053	
P(T<=t) one-tail	0.000846	

The one-tail P-value of the TSR results is 0.00, which is less than the risk level, 0.05; therefore, the null hypothesis is rejected. This hypothesis is supported. There is a significant difference between the SP and SF results. In other words, the participants scored better on SP senses than on SF senses. They had more difficulties with the metaphorical uses of the English prepositions in the TSR.

4.3 TSR results in analytic approach

The analysis of the TSR results in an analytic approach consisted of two precedures. The first step was to define learning difficulties based on Item Difficulty Index, and the second step was to conduct Distractor Analysis.

4.3.1 Defining learning difficulty based on Item Difficulty Index

Item Difficulty Index refers to the percentages of the answers in a test chosen by its participants. It simply divides the numbers of the participants who choose the answers by the total number of the participants. The figure is presented in percentage. The item difficulty values for this study were prepared based on the tables in Appendix K, L, and M. In these appendixes, the highlighted columns refer to the answers in the TSR. For example, the item difficulty value of test item number one is (25/73)*100=34. All the test items were computed in the same formula, and the item difficulty values are compiled into Table 4-9.

Table 4-9 Item difficulty values of TSR test items

Monologue		Dialogue		Picture description	
Test item	Item diff.	Test item	Item diff.	Test item	Item diff.
1	34%	21	86%	41	78%
2	53%	22	27%	42	21%
3	45%	23	14%	43	60%
4	63%	24	26%	44	21%
5	26%	25	19%	45	11%
6	10%	26	34%	46	59%
7	7%	27	40%	47	78%
8	27%	28	12%	48	32%
9	41%	29	12%	49	41%
10	66%	30	52%	50	44%
11	85%	31	47%	51	45%
12	36%	32	18%	52	5%
13	23%	33	52%	53	24%
14	45%	34	74%	54	67%
15	34%	35	26%	55	36%
16	23%	36	56%	56	21%
17	32%	37	23%	57	60%
18	21%	38	30%	58	48%
19	21%	39	58%	59	19%
20	56%	40	12%	60	7%

Item Difficulty Index is usually adopted to investigate whether a test item is too easy or too difficult. Test creators can revise test items based on the index. The index is presented from 0 to 100. The greater the value, the easier the test item is. Test creators normally revise those test items which are too easy or too difficult in order to meet an appropriate item difficulty value. This study does not investigate how the TSR test items were created but how well the participants responded to the test items. Consequently, Item Difficulty Index is adopted not to discuss the TSR test items but to define learning difficulties exclusively for this study.

This study assumes that if the item difficulty value of a test item does not reach 100, there exists learning difficulties. According to the TSR results, each test item contained learning difficulties because all the item difficulty values do not reach 100. Therefore, all the learning difficulties found in the TSR should be defined in terms of their levels of difficulty. The levels of difficulty are defined based on the item difficulty values. According to Lord (1952), ideal item difficulty levels for four-response multiple-

choice items in terms of discrimination potential are 74 percent. It means that if an item difficulty value is more than 74 percent, it is considered a rather easy test item; otherwise, it is considered a rather difficult test item. This TSR contained 60 four-response multiple choice test items. It is a thorough idea to adopt this notion to create Learning Difficulty Index. First, take a value which is more than 74 percent into consideration, and then evenly partition learning difficulties into four levels, each of which contains 25 percent. The levels are listed in Table 4-10.

Table 4-10 Learning Difficulty Index (LDI)

Learning Difficulty Index			
0%-24% Absolute Difficulty (AD)	25%-49% Major Difficulty (MaD)	50%-74% Minor Difficulty (MiD)	75%-99% Fair Difficulty (FD)

Learning Difficulty Index (LDI) contains four levels, and the four levels are termed: Absolute Difficulty (0%-24%), Major Difficulty (25%-49%), Minor Difficulty (50%-74%), and Fair Difficulty (75%-99%). The item difficulty value of a test item determines its level of learning difficulty. For example, Table 4-9 shows that the item difficulty of test item number one is 34 percent; therefore, it is considered a Major Difficulty. The item difficulty values of the TSR are all converted into Table 4-11. The abbreviations in the table are LDI: Learning Difficulty Index, AD: Absolute Difficulty, MaD: Major Difficulty, MiD: Minor Difficulty, and FD: Fair Difficulty.

Table 4-11 Test items' levels of learning difficulty

Monologue		Dialogue		Picture Description	
Test Item	LDI	Test Item	LDI	Test Item	LDI

1	MaD	21	FD	41	FD
2	MiD	22	MaD	42	AD
3	MaD	23	AD	43	MiD
4	MiD	24	MaD	44	AD
5	MaD	25	AD	45	AD
6	AD	26	MaD	46	MiD
7	AD	27	MaD	47	FD
8	MaD	28	AD	48	MaD
9	MaD	29	AD	49	MaD
10	MiD	30	MiD	50	MaD
11	FD	31	MaD	51	MaD
12	MaD	32	AD	52	AD
13	AD	33	MiD	53	AD
14	MaD	34	MiD	54	MiD
15	MaD	35	MaD	55	MaD
16	AD	36	MiD	56	AD
17	MaD	37	AD	57	MiD
18	AD	38	MaD	58	MaD
19	AD	39	MiD	59	AD
20	MiD	40	AD	60	AD

In the TSR results, 21 test items contained ADs, 22 test items contained MaDs, thirteen test items contained MDs, and four test items contain FDs (See Table 4-12). The distribution of the four levels can be seen in Figure 4-3. It is obvious that ADs and MaDs in the TSR occupy the majority of the chart. It implies that the TSR contained relatively higher LD (AD and MaD) more than lower LD (MiD and FD).

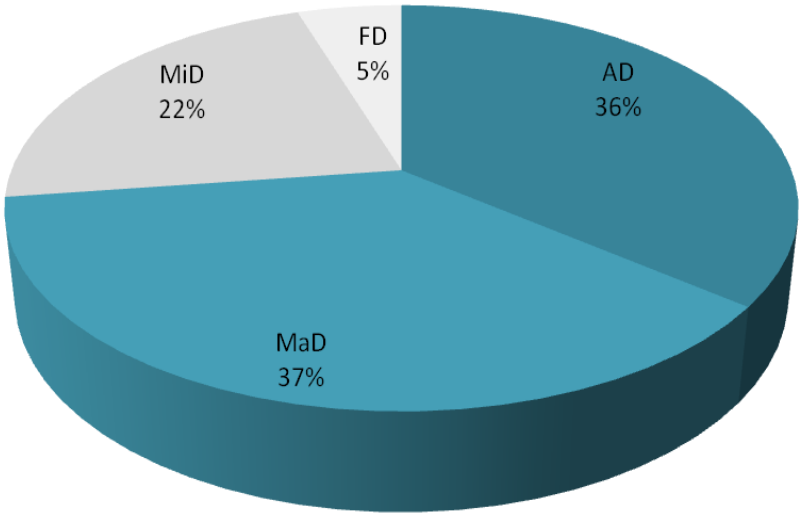


Figure 4-3 Distribution of four LDI levels

The test items in the TSR are sorted into Table 4-12 based on the LDI. The table shows there are 21 ADs, 22 MaDs, 13 MiDs, and 4 FDs. AD and MaD refer to the test items that are relatively more difficult than those MiD and FD do. There are 43 test items that are ADs and MaDs; there are 17 test items that are MiDs and FDs. From a pedagogical point of view, this table shows the majority of the test items are difficult to the participants. The LDI is also adopted for the discussions in Chapter VI.

Table 4-12 Summary of learning difficulty in TSR

Test item	Learning Difficulty Index			
	AD	MaD	MiD	FD
Monologue	6	9	4	1
Dialogue	7	7	5	1
Picture description	8	6	4	2
Total	21	22	13	4

4.3.2 Distractor analysis

Besides learning difficulty, it is also important to study the distractors in each TSR test item. The participants' performance on each distractor should suggest how they conceptualized the spatial scenes. Each distractor in the TSR should have influenced the performance of the participants on the TSR. To investigate how each distractor

functioned to influence the performance, the study adopts the notion of ideal difficulty levels, which is also the base of Learning Difficulty Index in the study, to create Distractor Influence Index. The index as well partitions the influence into four levels (See Table 4-13). The four levels are termed: Fair Influence (0%-24%), Minor Influence (25%-49%), Major Influence (50%-74%), and Absolute Influence (75%-99%).

Table 4-13 Distractor Influence Index (DII)

Distractor Influence Index			
0%-24% Fair Influence (FI)	25%-49% Minor Influence (MiI)	50%-74% Major Influence (MaI)	75%-99% Absolute Influence (AI)

For example, in Appendix K, Option 1 in Q1 was chosen by 2 participants, which is nearly 3 percent (2/73*100=3%). Therefore, it is considered a Fair Influence. Option 2 was chosen by 44 participants, which is 60 percent. Therefore, it is considered a Major Influence. Option 4 was chosen by 2 participants, which is nearly 3 percent. Therefore, it is considered a Least Influence. All the distractors in the TSR are converted into Distractor Influence Index and discussed in the later sections. The process of conversion is based on the data in Appendix K, L, and M. The abbreviations used for the distractor analyses are DII: Distractor Influence Index, FI: Fair Influence, MiI: Minor Influence, MaI: Major Influence, and AI: Absolute Influence. The discussions emphasize the facts regarding how the distractors influenced the participants' performance on the TSR. The discussions regarding the relationships between the cognitive features of English and Mandarin Chinese are not focused in this chapter.

4.3.2.1 Distractor influence of test items: *above*

This section lists the test items which contained *above* as the answer (See Table 4-14). There are five test items in this group. These test items are:

- Q13: *It is pretty cold outside. I guess the temperature is just <u>above</u> freezing*.
- Q14: *It is easy to find the bank in the building. It is <u>above</u> McDonald's*.
- Q20: *The toy is made for kids <u>above</u> the age of 3. Don't give it to your baby girl.*
- Q26: *Daniel: My note's ready. Where do you think I should put the recipient's name? Susan: Write it just <u>above</u> the subject of your note*.

- Q43: *The picture is hanging <u>above</u> the sofa*.

It can be seen that Q14, Q26, and Q43 contained SP senses, and Q13 and Q20 contained SF senses. In this group, there are 1 AD, 2 MaDs, and 2 MiDs. Q14 is a MaD, and *at* functioned as a MiI while *from* and *on* functioned as FIs. In other words, *at McDonald's* was preferred over *from McDonald's* and *on McDonal's*. Same in Q26, which is an MaD, *at the subject of your note* was chosen by more participants than *from the subject of your note* and *through the subject of your note*. Q43 and Q20 are similar in terms of LDI and DII. Both of them are MiDs, and all the distractors are FIs. It is possible that the participants were confused with the test items which could be ambitious to them, so not a preposition is significantly preferred. Q13 is a AD, and *on freezing* and *over freezing* were confused with *above freezing*.

Table 4-14 Distractor influence of test items: *above*

Answer: *above*					
Type	**Test item**	**LDI**	**DII**		
SP	Q14	MaD	*at* (MiI)	*from* (FI)	*on* (FI)
	Q26	MaD	*at* (MiI)	*from* (FI)	*through* (FI)
	Q43	MiD	*at* (FI)	*over* (FI)	*with* (FI)
SF	Q13	AD	*from* (FI)	*on* (MiI)	*over* (MiI)
	Q20	MiD	*from* (FI)	*in* (FI)	*through* (FI)

4.3.2.2 Distractor influence of test items: *at*

The test items which contained *at* as the answer are listed in Table 4-15. There are seven test items in this group. These test items are:

- Q08: *My father's garden is full of flowers and plants. I think it is <u>at</u> its best in June*.
- Q10: *Susan studied very hard in high school. She then became a student <u>at</u> Harvard in the 1980s*.
- Q11: *Jessica is patient. She is good <u>at</u> making things out of junk*.
- Q12: *Let's leave for mountain climbing <u>at</u> dawn. We should wake up very early*.
- Q25: *Mary: We're going to have a math test tomorrow morning. Bryan: I am never <u>at</u> ease when taking a test*.
- Q30: *Naomi: How did you feel when your father told you the destination for the family trip this year? Angie: My sister and I, <u>at</u> the same time, screamed out loud*.

- Q55: *Snoopy is sitting <u>at</u> the desk.*

Q10 and Q55 contained SP senses, and Q8, Q11, Q12, Q25, and Q30 contained SF senses. In this group, there are 1 AD, 3 MaDs, 2 MiDs, and 1 FD. Q11 is a FD, which means the majority of the participants chose *at making things out of junk* as the answer. Its distractors are all FIs, which implies that they rarely influenced the performance. Q25 is an AD, *at ease* seems a use that is not familiar to the participants while *on ease* and *with ease* were preferred over *under ease*. The two MiDs are Q10 and Q30. The difference between these two items is that the distractors in Q10 are all FIs. They did not outperform among each other, but *in the same time* was chosen by a significant number of participants. At least, it was chosen by the participants more than *on the same time* and *under the same time* were. The three MaDs are Q55, Q8, and Q12. *On* was preferred in Q55 and Q8 while *in* was preferred in Q12.

Table 4-15 Distractor influence of test items: *at*

Answer: *at*					
Type	**Test item**	**LDI**	**DII**		
SP	Q10	MiD	*on* (FI)	*under* (FI)	*with* (FI)
	Q55	MaD	*in* (FI)	*on* (MiI)	*under* (FI)
SF	Q08	MaD	*in* (FI)	*on* (MiI)	*under* (FI)
	Q11	FD	*above* (FI)	*over* (FI)	*with* (FI)
	Q12	MaD	*in* (MiI)	*on* (FI)	*with* (FI)
	Q25	AD	*on* (MiI)	*under* (FI)	*with* (MiI)
	Q30	MiD	*in* (MiI)	*on* (FI)	*under* (FI)

4.3.2.3 Distractor influence of test items: *below*

There are merely three test items which contained *below* as the answer (See Table 4-16). These test items are:

- Q17: *John is having difficulty in a math class. His math score is <u>below</u> average.*
- Q29: *Ted: Why have you decided to raise a fund for those people in the pictures? Mark: Because most of them are living <u>below</u> the poverty line.*
- Q59: *The meat is <u>below</u> the cheese.*

In this group, Q59 contained a SP sense, and Q17 and Q29 contained SF senses. There are 2 ADs and 1 MaD. Q17 is a MaD while *under average* was confused with *below*

average. The 2 ADs are Q59 and Q29. In Q59, *under the cheese* was preferred over *below the cheese*. In Q29, *in the poverty line* was chosen instead of *below the poverty line*.

Table 4-16 Distractor influence of test items: *below*

Answer: *below*					
Type	**Test item**	**LDI**	**DII**		
SP	Q59	AD	*in* (FI)	*on* (FI)	*under* (MaI)
SF	Q17	MaD	*at* (FI)	*between* (FI)	*under* (MaI)
	Q29	AD	*in* (MaI)	*under* (FI)	*with* (FI)

4.3.2.4 Distractor influence of test items: *in*

In this group of *in* as the answer, there are seventeen test items (See Table 4-17). These test items are:

- Q02: *I went to an interview yesterday. All the interviewees were nervous and waiting for the result in silence.*
- Q03: *Boys and girls, before we start the class today, let's put all the chairs in a circle.*
- Q21: *Jenny: Have you seen Robert recently, Fred? It has been a long while since we last met. Fred: Robert? He met a girl several weeks ago and has been busy seeing her frequently. I think he's so much in love now.*
- Q31: *Jason: Gary, I don't see your son at the party. Gary: He's in the Spiderman's costume playing over there with the boys.*
- Q32: *Jack: Have you heard that they're going to release iPhone 5 soon this year? Brendon: Yes, I read the news in the newspaper two days ago.*
- Q34: *Paula: It's really nice to meet you again. I think I'd better get going. Janice: All right, let's stay in touch.*
- Q37: *Citizen: Here's the required document for the service, Sir. Official: I am afraid that you should fill out your form again in ink. It's stated in the instructions.*
- Q42: *The dog is lying in the grass.*
- Q44: *There are hill tribes in the mountains.*
- Q45: *The woman slaps the man in the face.*
- Q46: *The airplane is flying in the sky.*
- Q49: *People are sitting in the shade.*

- Q50: *The bird is singing <u>in</u> the tree*.
- Q52: *The dog is sitting <u>in</u> the chair*.
- Q56: *The socket is installed <u>in</u> the wall*.
- Q57: *There is a hole <u>in</u> the tree*.
- Q60: *The man is lying <u>in</u> the hammock*.

Q31, Q42, Q44, Q45, Q46, Q49, Q50, Q52, Q56, Q57, and Q60 contained SP senses. Q2, Q3, Q21, Q32, Q34, and Q37 contained SF senses. There are 8 ADs, 4 MaDs, 4 MiDs, and 1 FD. First of all, the FD is Q21 in which *in love* was chosen correctly by most of the participants. Q46, Q57, Q2, and Q34 are MiDs. The distractors in these test items are basically FIs, but *through the sky* in Q46 is a MiI. The four MaDs are all different. In Q31, all the distractors are FIs. In Q49, *at the shade* and *on the shade* were preferred. In Q50, *on the tree* was chosen by more participants. In Q3, *through the circle* was chosen instead of *in the circle*. In the eight ADs, *on* was chosen instead of *in*, except in Q37 in which *with ink* was preferred.

Table 4-17 Distractor influence of test items: *in*

Answer: *in*					
Type	**Test item**	**LDI**	**DII**		
SP	Q31	MaD	*at* (FI)	*on* (FI)	*under* (FI)
	Q42	AD	*at* (FI)	*on* (MaI)	*with* (FI)
	Q44	AD	*at* (FI)	*on* (MiI)	*between* (FI)
	Q45	AD	*at* (FI)	*on* (MaI)	*over* (FI)
	Q46	MiD	*at* (FI)	*on* (FI)	*through* (MiI)
	Q49	MaD	*at* (MiI)	*on* (MiI)	*with* (FI)
	Q50	MaD	*at* (FI)	*on* (MiI)	*over* (FI)
	Q52	AD	*at* (FI)	*above* (FI)	*on* (AI)
	Q56	AD	*from* (FI)	*at* (FI)	*on* (MaI)
	Q57	MiD	*at* (FI)	*on* (FI)	*with* (FI)
	Q60	AD	*from* (FI)	*at* (FI)	*on* (MaI)
SF	Q2	MiD	*between* (FI)	*on* (FI)	*under* (FI)
	Q3	MaD	*on* (FI)	*through* (MaI)	*under* (FI)
	Q21	FD	*at* (FI)	*on* (FI)	*under* (FI)
	Q32	AD	*below* (FI)	*at* (FI)	*on* (MaI)
	Q34	MiD	*on* (FI)	*under* (FI)	*with* (FI)
	Q37	AD	*from* (FI)	*on* (FI)	*with* (MaI)

4.3.2.5 Distractor influence of test items: *on*

This group of test items consists of *on* as the answer (See Table 4-18). These twelve test items are:

- Q01: *Today in class we are going to learn how to backup your files. It is important you regularly backup your files which are saved on your computer*.
- Q04: *After you finish reading the books in the library, please leave them on the table over there*.
- Q05: *Sarah's wedding ring is missing. She is now on her hands and knees searching for it*.
- Q06: *Peter is planning a trip to India. Do you have any books on India for him to read*?
- Q07: *A lot of kids in this community are on drugs at the age of 12. The local government is trying to solve the problem.*
- Q09: *The grocery store is not far away from here. It is just there on Maple Street*.
- Q33: *Mother: You've been on the phone for ages. Hang it up, please. Daughter*: *Jenny just broke up with her boyfriend. She needs someone now*.
- Q35: *Harry: You've been working so hard. I haven't seen you for a long time. Larry: I live on my own, so I have to work hard to make enough money to live*.
- Q36: *Miles: The protestors set the theater on fire last night. Did you watch the news? Nelly: Yes, I did. It's sad to see it burned.Q41: There is a bruise on his face.*
- Q47: *Two ducks are walking on the grass*.
- Q53: *The players are on the court*.

Q4, Q9, Q41, Q47, and Q53 contained SP senses. Q1, Q5, Q6, Q7, Q33, Q35, and Q36 contained SF senses. There are 3 ADs, 4 MaDs, 3 MiDs, and 2 FDs in this group. Q53, Q6, and Q7 are ADs. In Q53, *in the court* and *on the court* were confused with on the court. In Q6, *in India* and *with India* functioned as MiIs. In Q7, *below drugs* and *in drugs* were confusing to the participants. The four MaDs are Q9, Q1, Q5, and Q35. In Q9, *at Maple* Street was preferred. In Q1, *in your computer* strongly influenced the performance. In Q5, *under her hands* and *with her hands* were chosen by a significant number of the participants. In Q35, *in my own* and *with my own* were preferred. *With* was outstanding in

both Q5 and Q35. In the 3 MiDs, all the distractors were FIs except *over the phone* in Q33. Q41 and Q47 are FDs. The distractors in these two test items were all FIs.

Table 4-18 Distractor influence of test items: *on*

Answer: *on*					
Type	**Test item**	**LDI**	**DII**		
SP	Q4	MiD	*between* (FI)	*at* (FI)	*with* (FI)
	Q9	MaD	*at* (MiI)	*in* (FI)	*above* (FI)
	Q41	FD	*in* (FI)	*at* (FI)	*with* (FI)
	Q47	FD	*in* (FI)	*at* (FI)	*with* (FI)
	Q53	AD	*in* (MiI)	*at* (MiI)	*with* (FI)
SF	Q1	MaD	*in* (MaI)	*at* (FI)	*over* (FI)
	Q5	MaD	*at* (FI)	*under* (MiI)	*with* (MiI)
	Q6	AD	*in* (MiI)	*at* (FI)	*with* (MiI)
	Q7	AD	*below* (MiI)	*in* (MiI)	*at* (FI)
	Q33	MiD	*in* (FI)	*over* (MiI)	*under* (FI)
	Q35	MaD	*in* (MiI)	*under* (FI)	*with* (MiI)
	Q36	MiD	*in* (FI)	*below* (FI)	*under* (FI)

4.3.2.6 Distractor influence of test items: *over*

There are ten test items which contained *over* as the answer. These test items are:

- Q15: *Come visit Bangkok sometime. There are many beautiful bridges <u>over</u> the Chaophraya River*.
- Q16: *Holiday seasons are coming. Can we talk about a family trip <u>over</u> dinner tonight?*
- Q24: *Sue: What's the main reason for choosing one restaurant <u>over</u> another, Peter? Peter: It's the taste of the food*.
- Q27: *Emily: What were you doing here at the balcony? David: We're watching a helicopter flying low <u>over</u> the pond*.
- Q28: *George: What's the matter with Diana? Britney: She has never gotten <u>over</u> the shock of her mother's death*.
- Q38: *Stockholder A: The company is not in good condition. Stockholder B: I agree. <u>Over</u> the past five years, it has halved in size*.
- Q39: *Nathan: I can see pictures of this country song singer everywhere. Grace: His popularity has spread <u>over</u> the northeastern part of Thailand*.

- Q48: *The girl is holding the sign over her head.*
- Q51: *The chandelier is hanging over the sofa*.
- Q58: *The bridge is over the river*.

Q15, Q27, Q48, Q51, and Q58 contained SP senses. Q16, Q24, Q28, Q38, and Q39 contained SF senses. There are 2 ADs, 7 MaDs, and 1 MiD. The 2 ADs are Q16 and Q28. In both test items, *in* significantly influence the performance. All the test items which contained SP senses in this group are MaDs. In this case, *on* seems to influence the performance stronger than other prepositions. It is worth noting that in Q48, *above her head* was confused with *over her head*. Q24 and Q38 are MaDs, too. In Q24, *above another* was confused with *over another*. In Q38, the use of *over the past five years* seems unfamiliar with the participants because most of them chose *in the past five years* instead. Q39 is a MiD. The distractors in this test items are all FIs.

Table 4-19 Distractor influence of test items: *over*

Answer: *over*					
Type	**Test item**	**LDI**	**DII**		
SP	Q15	MaD	*from* (FI)	*on* (MiI)	*between* (FI)
	Q27	MaD	*between* (FI)	*on* (MiI)	*at* (FI)
	Q48	MaD	*above* (MiI)	*on* (MiI)	*at* (FI)
	Q51	MaD	*on* (MiI)	*from* (FI)	*under* (FI)
	Q58	MaD	*in* (FI)	*on* (MiI)	*at* (FI)
SF	Q16	AD	*from* (FI)	*in* (MaI)	*below* (FI)
	Q24	MaD	*below* (FI)	*under* (FI)	*above* (MiI)
	Q28	AD	*in* (MiI)	*on* (FI)	*at* (FI)
	Q38	MaD	*in* (MiI)	*on* (FI)	*at* (FI)
	Q39	MiD	*on* (FI)	*above* (FI)	*with* (FI)

4.3.2.7 Distractor influence of test items: *under*

There are six test items which contained *under* as the answer. These ten test items are:

- Q18: *It is snowing now. Before you go out, wear a jacket under your coat, son*.
- Q19: *In the picture, we were on a cruise for dinner in Bangkok. It stayed still under the Rama 9 Bridge so the guide could explain the history of the architecture*.
- Q22: *Mother: In this hospital, how do you manage the record of each newborn baby? Nurse: Each baby's record is filed under the mother's last name*.

- Q23: *Boss: How is the profit in this quarter? Secretary: Under the new manager's leadership, the revenue doubled in less than 3 months*.
- Q40: *Reporter: How's the investigation on the murder so far? Police: Three people who worked in this place are under suspicion*.
- Q54: *The sheep is standing under the tree*.

Q18, Q19, and Q54 contained SP senses. Q22, Q23, and Q40 contained SF senses. There are 4 ADs, 1 MaD, and 1 MiD. The four ADs are Q18, Q19, Q23, and Q40. In Q18, *in your coat* and *on your coat* were chosen by the majority of the participants, especially *on your coat*. In Q19, *from the Rama 9 Bridge* and *with the Rama 9 Bridge* were preferred *over below the Rama 9 Bridge*. In Q23, the use of *under the new manager's leadership* seems a strange concept to the participants. A noticeable number of the participants chose *through the new manager's leadership* instead. In Q40, *in suspicion* is a MaI, which means it is chosen by the majority of the participants. Q22 is a MaD. *In the mother's last name* was chosen by relatively more participants. Q54 is a MiD. In this test item, all the distractors functioned as FIs.

Table 4-20 Distractor influence of test items: *under*

Answer: *under*					
Type	**Test item**	**LDI**	**DII**		
SP	Q18	AD	*in* (MiI)	*on* (MaI)	*at* (FI)
	Q19	AD	*from* (MiI)	*below* (FI)	*with* (MiI)
	Q54	MiD	*from* (FI)	*on* (FI)	*below* (FI)
SF	Q22	MaD	*below* (FI)	*in* (MiI)	*at* (FI)
	Q23	AD	*on* (FI)	*through* (MiI)	*below* (FI)
	Q40	AD	*below* (FI)	*in* (MaI)	*at* (FI)

4.4 Conclusion

The TSR was created to investigate how MLEs indicated spatial scenes in English and the difficulties they encountered. The test items were prepared with special reference to verticality which includes a series of English prepositions such as *above*, *over*, *below*, and *under*. According to the TSR results analyzed in the pedagogical approach, MLEs had learning difficulties with the test items in the TSR. The computed P-value of t-test proves that the participants significantly had more learning difficulties with the SF scenes than the SP scenes. After analyzing the test items in the analytic approach, the TSR

results have proved that MLEs had difficulties with appropriately indicating verticality in English because according to Learning Difficulty Index, the majority of the test items are either Absolute Difficulty (AD) or Major Difficulty (MaD). The analyses of the distractors in the TSR based on Distractor Influence Index suggest all the distractors' levels of influence. The levels of influence provide evidence to trace the cognitive features among the spatial uses in English and Mandarin Chinese, which are discussed in Chapter VI.

CHAPTER V
SEMANTIC NETWORKS FOR SPATIAL RELATIONS IN ENGLISH AND MANDARIN CHINESE

This section aims to answer the second research question: *What are the similarities and the differences between the semantic networks for the spatial relations in English and Mandarin Chinese?* The answers sought to prove this hypothesis: *The semantic networks for the spatial relations in both languages match and exclude each other in certain senses*.

In Mandarin Chinese, spatial relations are indicated in various ways. This study emphasizes the construction: *zài*+NP+localizer. *Zài* 'at' functions as a preposition, but it does not indicate specific spatial relations. Instead, the localizer in the construction provides the specific spatial relation. (See Section 3.2.2.1, Chapter III for detailed descriptions). The analyses of the semantic networks for the Mandarin Chinese localizers in this chapter focus on *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' *xiàmiàn* 'downside.' The analyses are conducted following the semantic networks for their English counterparts: *in*, *on*, and *under*, proposed by Tyler & Evans (2003). The detailed descriptions regarding these technical terms (e.g., cluster, sense, etc.) used in the semantic networks can be seen in Section 2.5, Chapter II.

5.1 Mandarin Chinese corpus data

As stated in Chapter III (Section 3.2.2 and 3.3.2), the semantic networks for Mandarin Chinese localizers, *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' were created with the same principles for English prepositions, such *in*, *on*, and *under*. The English prepositions are, as hypothesized, the counterparts of the three Mandarin Chinese localizers. The three localizers were searched in the online version of Sinica Corpus, and there displayed up to 2,000 entries. The search results showed all the entries in the database, which were listed randomly and not based on the frequency of occurrence. For a corpus-based study, the size of sampling is dependent on its use. The study obtained the top 25 percent of the listed entries (or top 500 entries) for analyses. This study assumed that the top 25 percent of the search results should represent all the

uses. This assumed sampling was examined by confirming the authentic numbers of entries from the searches. In other words, the localizers were searched, and the entries were obtained. The authentic search results of the three localizers contained not more than one thousand entries (See Table 3-2 in Chapter III for detailed figures). Therefore, the sampling method for this study covers the dominant majority of the entries in the search results. It should cover sufficient prepositional uses in Mandarin Chinese.

The analyses of the semantic networks for the localizers lead to further discussions regarding the revisions of the existing semantic networks for the English prepositions which are mainly created by Tyler and Evans (2003) as well as the comparisons between the three localizers and the involved English prepositions that are not the initial counterparts of the localizers for this study. It is assumed that the senses which a Mandarin Chinese localizer denotes might cover several English prepositions. For example, *shàngmiàn* 'upside' should cover *on*, *above*, and *over*. In short, the Mandarin Chinese localizers were compared to all the involved English prepositions. This chapter tends to investigate the similarities and differences between English and Mandarin Chinese. MLEs have already conceptualized spatial relations in Mandarin Chinese. When they learn how to indicate the spatial relations with English prepositions, they, as hypothesized, transfer what they have conceptualized to match the most appropriate English prepositions. The perspective of the analyses is oriented to explore how the first language influences learning of the target language. Hence, the comparisons between these two languages are based on the Mandarin Chinese localizers toward English prepositions.

5.2 Semantic network for *lǐmiàn* 'inside'

After the procedure of corpus data selection (See Table 3-2), there are one hundred and twenty-five entries containing *lǐmiàn* 'inside.' Those entries (See Appendix O) were scrutinized and categorized into appropriate clusters and senses based on the same principles for the existing semantic network for *in* (Tyler & Evans, 2003) which can be seen in Chapter II. For the semantic network for *lǐmiàn* 'inside,' the first step was to distinguish whether the trajectors (TRs) physically interact with the landmarks (LMs).

According to Langacker (2008) from the cognitive linguistic perspective, a TR and a LM refer to the two focal participants in a profiled relationship (Detailed definitions can be seen in Chapter I). For example, *A tree is in the backyard*. In this example, *a tree* is the TR and *the backyard* is the LM. According to Principled Polysemy (Tyler & Evans, 2003), when TRs physically interact with the LMs, they are considered the proto-scene; otherwise, they are considered the scenes beyond the proto-scene. Detailed descriptions regarding Principled Polysemy can be seen in Chapter II.

5.2.1 The proto-scene of *lǐmiàn* 'inside'

According to Tyler and Evans (2003), a proto-scene is the primary meaning of a preposition (See Definitions of Terms in Chapter I). The notion of the proto-sense of *in* includes ENCLOSE or PARTIAL INCLUSION. There are forty-six entries which are found to meet the notion. The TRs physically interact with the LMs in the corpus data. For example,

(1) 在　信　裡面　附寄了　一張　五百元　禮券 (Entry 1)[2]
Zài xìn *lǐmiàn* fùjìle yīzhāng wǔbǎiyuán lǐquàn.
at letter inside enclose a five-hundred-dollar voucher
'A five-hundred-dollar voucher is enclosed in the letter.'

(2) 蒙　在　獅頭　裡面 (Entry 38)
Méng *zài* shītóu *lǐmiàn*.
cover at lion-head inside
'(Someone) is covered in a lion-head.'

In Example (1), the TR refers to *lǐquàn* (voucher), and the LM is *xìn* (letter). The TR is physically enclosed in the LM. The entry meets ENCLOSE. In Example (2), the TR, which is omitted in the text, refers to a person, and the LM is *shītóu* (lion head). *Shītóu* (lion head) refers to a costume for a traditional performance. *Shītóu* (lion head) is not likely to enclose the whole body of a person but covers part of the body. It encloses especially the upper part of the body. The scene meets PARTIAL INCLUSION. The two examples instantiate the canonical bounded LMs. A canonical bounded LM refers to a LM which is conceptualized as a three-dimensional containment involving three salient

[2] The examples from Sinica Corpus in this chapter were tagged with entry numbers which can refer to the positions of the examples in the appendices.

structural elements: boundary, interior, and exterior. (See canonical bounded LMs and non-canonical bounded LM in Chapter II for detailed definitions).

There are some entries which are found appropriate to explain the non-canonical bounded LMs such as *crowd*. In short, a non-canonical bounded LM refers to the boundary of the LM that is not saliently seen but actually exists in conceptualization. For example,

(3) 個人　完全　埋沒　在　群眾　裡面 (Entry 39)
Gèrén wánquán máimò *zài* qúnzhòng *lǐmiàn*.
person completely bury at crowd inside
'A person is buried in the crowd.'

(4) 我　處　在　那個　團體　裡面 (Entry 45)
Wǒ chǔ *zài* nàgè tuántǐ *lǐmiàn*.
I stay at that group inside
'I stay in the group.'

In Example (3), The TR, *gèrén* (person) and the LM, *qúnzhòng* (crowd) construe the same entity. Same as in Example (4), the TR, *wǒ* (I) is part of the LM, *tuántǐ* (group). According to the findings, the proto-scene of *lǐmiàn* 'inside' (Figure 5-1) is identical to the proto-scene of *in*. The notions of the proto-scenes of *lǐmiàn* 'inside' and *in* both include ENCLOSURE and PARTIAL INCLUSION.

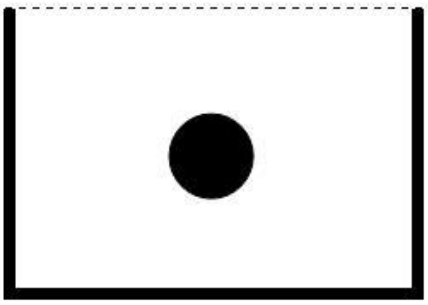


Figure 5-1 Proto-scene of *lǐmiàn* 'inside'

5.2.2 Beyond the proto-scene of *lǐmiàn* 'inside'

Apart from the proto-scene, some entries are found appropriate for the Location cluster and the Constrain cluster. In the Location cluster, some entries are found to meet the State sense. Simply speaking, all the metaphorical extended senses are first categorized into clusters, which are collections of rather broader concepts. Each cluster includes at least a sense. The senses in the same cluster share the same concept with slight differences. The differences yield cognitive features. These clusters and senses can be seen in Chapter II. For example,

(5) 人 活 在 灰色 甚至 黑色 裡面 (Entry 48)
Rén huó *zài* huīsè shènzhì hēisè *lǐmiàn*.
person live at gray even black inside
'A person lives in gray or even black.'

(6) 孩子 在 溫室 裡面 成長 (Entry 55)
Háizǐ *zài* wēnshì *lǐmiàn* chéngzhǎng.
kid at greenhouse inside grow
'Kids grow in a greenhouse.'

In Example (5), the TR is *rén* (person) and the LM is *huīsè* (gray) and *hēisè* (black). *Huīsè* and *hēisè* literally means two colors, but the metaphorical meaning of the two colors refers to the mental state that the TR is experiencing depression or pessimism. In Example (6), the LM, *wēnshì* literally means a greenhouse where plants are grown in a stable temperature but metaphorically refers to an environment in which a person is well protected without too many obstacles. The TR, *háizǐ* (kid) is in the state of what *wēnshì* (greenhouse) metaphorically means.

There are a number of entries which meet the notion of the Activity sense. For example,

(7) 專家們 在 研究所 裡面 建立 (Entry 59)
Zhuānjiāmen *zài* yánjiūsuǒ *lǐmiàn* jiànlì.
experts at graduate-school inside build
'Experts build (something) in the graduate school.'

(8) 在 你 的 人生 裡面 只 佔 一 小 部分 (Entry 86)
Zài nǐ de rénshēng lǐmiàn zhǐ zhàn yī xiǎo bùfēn.
at you particle life inside just occupy a small part
‘(Something) occupies a small part in your life.’

In Example (7), *zhuānjiāmen* (experts) is the TR, and *yánjiūsuǒ* (graduate school) is the LM. According to the context, the LM does not refer to a concrete building where the graduate school is located. It rather refers to a community where the faculty, the students, and the staff participate into planned activities for specific purposes. Nothing concrete is built but principles, regulations, and mutual understandings which are more likely to be abstract concepts. In Example (8), the TR is omitted in the text. It refers to some item which is not specified. The LM is *rénshēng* (life) which is composed of experiences, activities, etc. In these two entries, the TRs participate in what the LMs is composed.

In the Location cluster, there are two additional senses which are created in the semantic network for *lǐmiàn* ‘inside’ because they are not included in the semantic network for *in*. The two senses are the Temporal sense and the Visibility sense. Obviously, Tyler and Evans (2003) exclude temporal reference when they analyze spatial particles. However, when an English particle is studied for polysemy, the analyses should include all the polysemous meanings it denotes. For example, *in the year of 2012* should also be considered a metaphorical sense in which *in* mediates a TR and a LM. Plus, when *in a box* or *in love* are included as two polysemous senses in the analyses, *in the year of 2012* should not be excluded or ignored. Some entries are found to meet the Temporal sense. For example,

(9) 在 一九八三年 裡面 (Entry 93)
zài yījiǔbāsānnián *lǐmiàn*
at 1983 inside
‘in 1983’

(10) 在 青春期 裡面 (Entry 97)
zài qīngchūnqī *lǐmiàn*
at puberty inside
‘during puberty’

In Example (9), the TR refers to the percentage of adult literacy, and the LM is *yījiǔbāsānnián* (1983). The entry describes how the adult literacy in a certain period of

time was. The period of time is considered a bounded LM. The start and the end of the period make the margins. Example (10) also denotes the same sense that the puberty is usually defined as a period of time, e.g., from the age of twelve to eighteen. The TRs in this sense is metaphorically located in the bounded LMs.

The Visibility sense usually refers to electronic devices such as television. For example,

(11) 在　電視　裡面 (Entry 105)
zài diànshì *lǐmiàn*
at television inside
'on TV'

(12) 在　螢光幕　裡面 (Entry 106)
zài yíngguāngmù *lǐmiàn*
at screen inside
'on a screen'

In Example (11) and (12), the TRs refer to the TV programs such as news reports and TV series. The LM in Example (11) refers to a television set, and the LM in Example (12) refers to a television screen. Simply, both of the LMs refer to the broadcasting. Mandarin Chinese speakers view the broadcasting the same as a television set, which is a three-dimensional container. TV programs are in the container. In other words, whatever in a TV program the audience can watch or see (e.g., cast and scene) is enclosed in the container, even though it is actually not. This use is distinct from the use in English. In English, LMs in such the sense are viewed as the broadcasting system and considered two-dimensional paths, e.g., *on TV* or *on the radio*.

The above analyses concern the entries which meet the Location cluster. The rest of the entries are studied to confirm whether there is evidence showing that *lǐmiàn* 'inside' denotes some other clusters and/or senses that can be found in the semantic network for *in* (Tyler & Evans, 2003). The result has turned out to be negative. In the study (Tyler & Evans, 2003), the examples provided for the rest of the clusters (e.g., the Segmentation cluster and the Reflexivity cluster) and senses (e.g., the Shape as Boundary sense and the Reflexive sense) instantiate that the particles are apparently not used as prepositions. For example, *come on* and *the wall fell in*. It cannot be denied that the

particles still indicate spatial references. However, this current study focuses on the construction, *zài*+NP+localizer. In other words, the spatial structure in the entries is a prepositional phrase; therefore, there are no entries which meet such the uses as the evident examples.

The rest of the entries are scrutinized and categorized into a newly-created cluster, the Constrain cluster in the semantic network for *lǐmiàn* 'inside.' This cluster indicates that the TR is constrained in a specific field which is viewed as a bounded LM. The action of a TR is implemented within the boundary of a LM. In this cluster, one sense is found from the entries, the Theme sense. In this sense, the TR is metaphorically constrained by the LM, which usually refers to a theme or a topic. The LM is usually to ensure the specificity. For example,

(13) 在 我 心 裡面 我 覺得說 (Entry 108)
zài wǒ xīn *lǐmiàn* wǒ juédéshuō
at my mind inside I think
'in my mind, I think'

(14) 包括 在 飯錢 裡面 (Entry 118)
Bāokuò *zài* fàn qián *lǐmiàn*.
include at rice money inside
'(Something) is included in the budget for food.'

In Example (13), the TR is *wǒ* (I). When *wǒ* (I) implements the action, *juédéshuō* (think), it is constrained in the boundary of *wǒ xīn* (my mind), the LM. The entry refers to the situation that the TR tends to confirm the specificity that the TR represents the TR's self. In Example (14), the TR refers to a certain amount of money, and the LM is *fàn qián* (rice money). *Fàn qián* literally means rice money and metaphorically refers to the budget for food. The two LMs in the entries are considered themes in which the TRs are constrained.

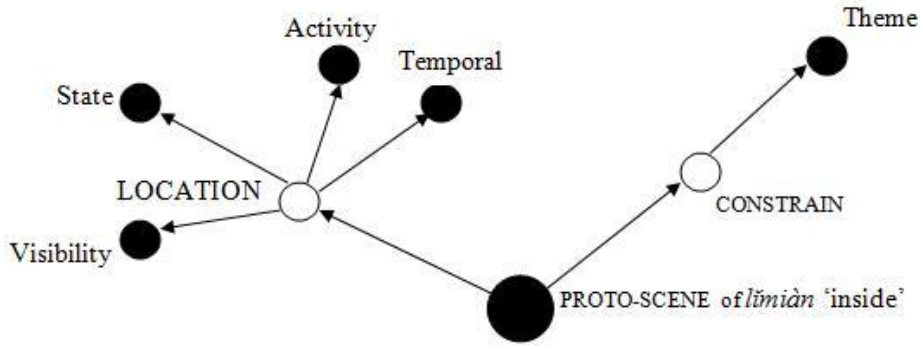


Figure 5-2 Semantic network for *lǐmiàn* 'inside'

To sum up the analyses, Figure 5-2 demonstrates the semantic network for *lǐmiàn* 'inside.' In the semantic network for *lǐmiàn* 'inside', there are the Location cluster and the Constrain cluster. In the Location cluster, there are the State sense, the Activity sense, the Temporal sense, and the Visibility sense. In the Constrain cluster, there is found the Theme sense. It proves that the semantic network for *lǐmiàn* 'inside' contains fewer clusters and senses than the semantic network for *in* (Tyler & Evans, 2003).

5.2.3 Comparisons between *in* and *lǐmiàn* 'inside'

The detailed description of the semantic network for *in* (Tyler & Evans, 2003) can be seen in Section 2.5.1, Chapter II. To summarize, the proto-scene of *in* is associated with three elements: an interior, a boundary, and an exterior with notions of CONTAINMENT and INCLUSION. For example, *A ball is in the box*. *Box* is considered a canonical bounded LM. A non-canonical bounded LM simply refers to the boundary of the LM is not salient. For example, *She lives in New York*. Beyond the proto-scene, there are five clusters: the Location cluster, the Vantage Point is Interior cluster, the Vantage Point is Exterior cluster, the Segmentation cluster, and the Reflexivity cluster (Examples can be seen in Table 5-1 below). Tyler & Evans (2003) study *in* as a spatial particle, and the discussions include *in* in various constructions, e.g., prepositional phrases and verb complements. Consequently, the examples provided by Tyler & Evans (2003) for these clusters include the scenes, in which *in* is not used metaphorically. In most cases, the examples refer to non-static spatial scenes especially when *in* is used as a verb

complement. When it is used as a verb complement, it is more likely to indicate a traverse (a moving path). A traverse in a prepositional phrase is tightly related to *into*. For example, *The train finally arrived in*. This study emphasizes the construction, *zài*+NP+*lǐmiàn*, which is a prepositional phrase. It mostly denotes static spatial senses. This feature causes most of the differences between the semantic network for *in* and the semantic network for *lǐmiàn* 'inside.'

The semantic networks for *in*, which is marked in black (Tyler & Evans, 2003) and *lǐmiàn* 'inside,' which is marked in gray were combined in Figure 5-3 to show the similarities and the differences. The proto-scene of *lǐmiàn* 'inside' is basically identical to the proto-scene of *in*. In other words, *in* and *lǐmiàn* 'inside' share the same proto-scene. One case worth noting is that in some spatial-scenes, MLEs do not view the LMs as bounded LMs. It is more likely to be two-dimensional paths. In the case, *on* could be chosen instead of *in* by MLEs.

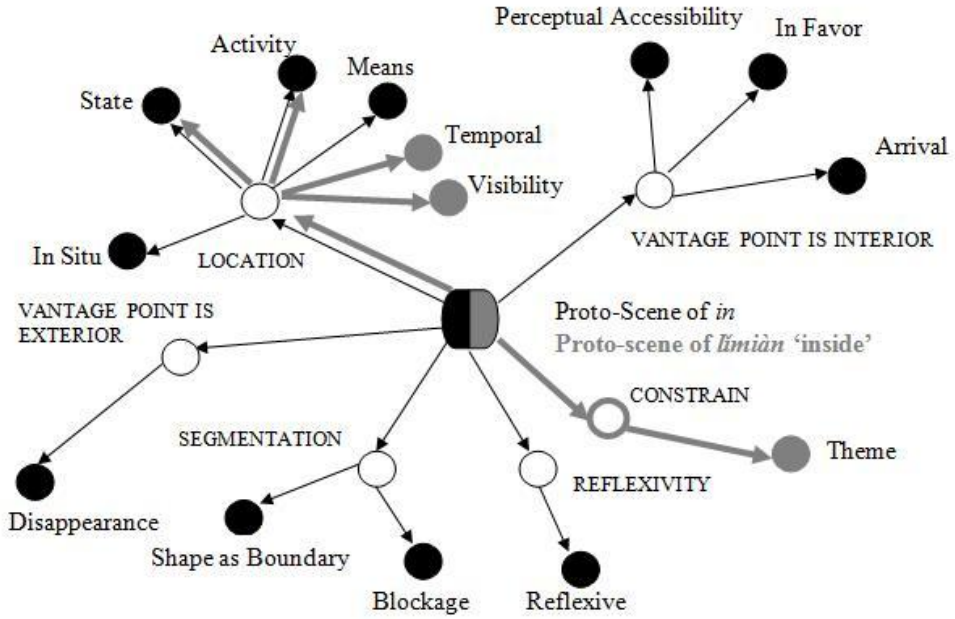


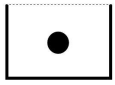
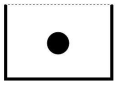
Figure 5-3 Combination of *in* and *lǐmiàn* 'inside'

Besides the proto-scenes, *in* and *lǐmiàn* 'inside' only share the Location cluster. In the Location cluster, they share the State sense and the Activity sense. For the differences, *in* denotes a great number of senses that *lǐmiàn* 'inside' does not denote, but *lǐmiàn* 'inside'

exclusively include the Temporal sense and the Visibility sense in the Location cluster and the Theme sense in the Constrain cluster. To summarize the comparisons between *in* and *lǐmiàn* ‘inside’, the results were compiled into Table 5-1. In the table, the proto-scenes, the clusters, and the senses which build the semantic networks for *in* and *lǐmiàn* ‘inside’ are listed. A check mark symbolizes the fact that a sense exists; a cross mark symbolizes the fact that a sense does not exist.

The examples regarding the semantic network for *in*, *on*, and *under* provided in Table 5-1, 5-2, and 5-3 are derived from the studies (Tyler & Evans, 2003 and Ho, 2007). The examples regarding the semantic network for *lǐmiàn* ‘inside,’ *shàngmiàn* ‘upside,’ and *xiàmiàn* ‘downside’ provided in the tables are derived from Sinica Corpus.

Table 5-1 Overview of similarities and differences between *in* and *lǐmiàn* ‘inside’

	in	***lǐmiàn* ‘inside’**
Proto-scene *A box is in the box*		
LOCATION		
The In Situ sense *The workers staged a sit-in*	✓	×
The State sense *She is in prison*	✓	✓
The Activity sense *She is in medicine*	✓	✓
The Means sense *She wrote in ink*	✓	×
The Temporal sense *zài* qīngchūnqī *lǐmiàn* ‘during puberty’	×	✓
The Visibility sense *zài* diànshì *lǐmiàn* ‘on TV’	×	✓
VANTAGE POINT IS INTERIOR		
The Perceptual Accessibility sense *I have him in sight*	✓	×
The In Favor sense *He’s in (with the boss)*	✓	×
The Arrival sense *The train is finally in*	✓	×
REFLEXIVITY		
The Reflexive sense *The house caved in*	✓	×
SEGMENTATION		
The Shape as Boundary sense *Put your chairs in a circle*	✓	×
The Blockage sense *In the northern territories you can get snowed in for months*	✓	×
VANTANGE POINT IS EXTERIOR		
The Disappearance sense *The wine quickly soaked in*	✓	×
CONSTRAIN		
The Theme sense bāokuò *zài* fàn qián lǐmiàn ‘(something) is included in the budget for food’	×	✓

5.3 Semantic network for *shàngmiàn* 'upside'

After the procedure of corpus data selection (See Section 3.3.2 in Chapter III), those one hundred and six entries were considered for analyses (See Appendix P). While these entries were being categorized into the clusters and senses which *on* denotes, there are some difficulties, for some meanings are peculiar to Mandarin Chinese. When a sense is peculiar to Mandarin Chinese, an independent sense should be created in the semantic network for *shàngmiàn* 'upside.' The uniqueness might leave ambiguities and disputes. Despite the uniqueness, the entries were eventually classified based on the framework (Tyler & Evans, 2003) and the semantic network for *on* (Ho, 2007), which can be reviewed in Chapter II.

5.3.1 The proto-scene of *shàngmiàn* 'upside'

There are twenty-six entries which significantly meet the notion of the proto-scene of *on*, which indicates the spatial-physical configurations. In other words, the twenty-six entries show the spatial relations between the TRs and the LMs. It means that the twenty-six entries denote the spatial relations which are identical to the notion of CONTACT and SUPPORT, which constructs the proto-scene of *on*. These two semantic features occur on SURFACE. For example,

(15) 装　在　竹子　上面 (Entry 3)
Zhuāng *zài* zhúzǐ *shàngmiàn*.
attach at bamboo upside
'Attach (something) on a bamboo.'

According to the context in Example (15), buttons (not directly mentioned) are installed on the bamboo. The bamboo is not seen as a three-dimensional object. Instead, the surface of it, which is a two-dimensional path, is involved in the spatial scene. In other words, the bamboo (LM) provides a platform, and the buttons (TR) are physically attached to it. The scene demonstrates SUPPORT and CONTACT. Therefore, the TR-LM configuration in Entry 3 meets the proto-scene of *on*, and the configuration is not disputable. The following two examples were categorized in the proto-scene with some additional explanations.

(16) 在 葫蘆 上面 彩繪 (Entry 7)
Zài húlú *shàngmiàn* cǎihuì.
at calabash upside paint
'Paint on a calabash.'

(17) 在 成績單 上面 簽名 (Entry 13)
Zài chéngjìdān *shàngmiàn* qiānmíng.
at transcript upside sign
'Sign in the transcript.'

Húlú (calabash) as in Example (16) is a kind of tropical plants, and the fruit of which can be a container when it is dried and consequently can stay firm. Someone completes the action of the verb, which refers to "paint." The final product of the verb physically appears and lasts on the surface of the fruit. It seems that the TR refers to the person who completes the action in the surface structure of the entry. The person is not actually on the *húlú* (calabash). However, the unsaid product of the action should be construed as the true TR which is involved in the TR-LM configuration. The explanation leads to determining the entry to be categorized in the proto-scene of *on*. Example (17) provides another example that agrees with the logic which makes these two entries different from the entries in the Activity on LM sense. This sense is further discussed in a following section.

Besides the above entries which meet the proto-scene of *on*, Example (18) and Example (19) reveal the spatial scenes which cannot be considered the proto-scene of *on.* They are also spatial-physical scenes and should be included in the proto-scene of *shàngmiàn* 'upside.' The TRs in the two entries are physically in a higher position of the LMs, which meets the notion of UPSIDE.

(18) 她 就 在 我 家 上面 (Entry 26)
Tā jiù *zài* wǒ jiā *shàngmiàn*.
she right/just at my home upside
'She is on the floor above my home.'

(19) 在 一 堆 沙 的 上面 蓋 個 遮棚 (Entry 30)
Zài yī duī shā de *shàngmiàn* gài gè zhēpéng.
at a pile sand particle upside build CL shed
'Build a shed over a pile of sand.'

In Example (18), the TR refers to *tā* (she), which is in a spatial relation with *wǒ jiā* (my home), the LM. *Jiā* (home) should refer to a physical place where people live, not the abstract concept of home. Supposed the scene happens in an apartment building. One lives on the second floor, and the other lives on an upper floor. In the situation, the context in Example (18) turns available and slightly meets CONTACT and SUPPORT. However, this sense is more likely to be closer to the proto-scene of *above*. The TR is distal in a higher position. In the spatial relation that (19) demonstrates, the TR refers to *zhēpéng* (shed), and the LM refers *yīduīshā* (a pile of sand). *zhēpéng* (shed) should be in a higher position but not make any physical contact with *yīduīshā* (a pile of sand), and alone the logic, *yīduīshā* (a pile of sand) does not physically support *zhēpéng* (shed). To summarize, IN A HIGHER POSITION leads to what *over* and *above* denote. These two spatial prepositions in English are similar, but Evans and Tyler (2011) clarify that the TR is within potential reach of the LM for *over*'s proto-scene, and *above* emphasizes the unbridgeable distance. The proto-scene of *shàngmiàn* 'upside' can be defined as in Figure 5-4.

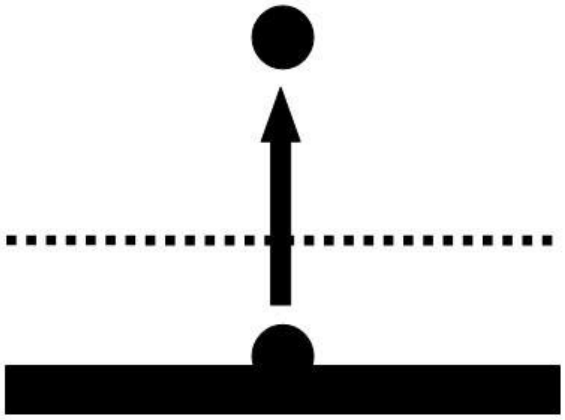


Figure 5-4 Proto-scene of *shàngmiàn* 'upside'

In Figure 5-4, the bold line represents the LM, and the dark sphere the TR. The dashed line symbolizes the distance for the reachable distance as it is introduced to distinguish *above* and *over*. Compared to Figure 2-4 which shows the proto-scene of *on*, Figure 5-4 instantiates the continuum from the contact with the LM to a higher position of the LM. A higher position can be indicated by *above* and *over* in English. The dashed line is the

factor to distinguish these two prepositions (Tyler & Evans, 2003). The result has found it evident that the proto-scene of *shàngmiàn* ‘upside’ covers more than just the proto-scene of *on*. The coverage, except *on*, can also refer to *over* and *above*.

Now that the proto-scene of *shàngmiàn* ‘upside’ is confirmed, the following example demonstrates a spatial scene which is conceptualized differently by English speakers and Mandarin Chinese speakers.

(20) 睡　在　弔床　上面 (Entry 18)
Shuì *zài* diàochuáng *shàngmiàn*.
sleep at hammock upside
‘Sleep in a hammock.’

In Example (20), *diàochuáng* (hammock) is a compound noun associated with a general concept of *chuáng* (bed). When *chuáng* (bed) is involved in a spatial relation, mostly CONTACT, SUPPORT, and UPSIDE apply. It is not likely to be seen as a container by Mandarin Chinese speakers in most cases. In contrast, “hammock” or “bed” is rather considered a container by English speakers when it refers to a period of sleeping because someone lies and is held by a hammock. However, someone can sit *on* a hammock or a bed when the period of sleeping is not denoted. This spatial scene proves a different way of conceptualization in the two languages.

5.3.2 Beyond the proto-scene of *shàngmiàn* ‘upside’

Beyond the proto-scene, there are two entries which are evident for the Means of Conveyance sense in the Support cluster. For example,

(21) 坐　在　巴士　上面 (Entry 33)
Zuò *zài* bāshì *shàngmiàn*.
sit at bus upside
‘Sit on a bus.’

The spatial scene in Example (21) is consistent to the proto-scene of *on*. The uses in Mandarin Chinese and English are almost identical, but Mandarin Chinese speakers tend to use *shàngmiàn* ‘upside’ for such the sense no matter what kind of moving vehicle it is. A car or a bus would not make any difference. English speakers would be more likely to choose different spatial prepositions to collocate with different vehicles. For example, it

is not likely to use *on* with a moving car. This use is distinct from the expressions in Mandarin Chinese. However, in some other cases, a stationary bus can be considered a container in both languages. For example, suppose two persons agree to meet at a bus station to go on a road trip. Both of them have arrived but have not seen each other. They are talking on the phone to figure out their own locations. One might describe the location as *I am in the bus*. Consequently, it is assumed that when a LM is a kind of vehicle which is not in motion, both Mandarin Chinese speakers and English speakers can view it as a container. When it is a kind of vehicle for conveyance, Mandarin Chinese speakers especially tend to use *shàngmiàn* 'upside' to indicate all the spatial relations in this sense, but in English, a preposition is determined by the vehicle.

Entries 34 to 71 (See Appendix P) are categorized into the State cluster and the Theme/Topic sense which does not exist in the semantic network for *on*. All the entries are more likely to occur in written texts or formal speeches because they are rather produced in formal contexts. It is assumed that these entries should be categorized into a certain sense in the cluster, which is normal and peculiar in Mandarin Chinese, not in English. The sense can be termed, the Theme/Topic sense. All the entries show that the TRs commit or utter something on certain topics or themes, which function as LMs. The LMs refer to some restricted areas. For example,

(22) 在 經濟 開發 上面 受到 先進國家 的 援助 (Entry 49)
Zài jīngjì kāifā *shàngmiàn* shòudào xiānjìn guójiā de yuánzhù.
at economic exploitation upside receive developed countries particle assistance
'Receive assistants on economic exploitation from other countries.'

(23) 將是 未來 在 經濟 發展 上面 共同 的 一 項 認識 (Entry 53)
Jiāngshì wèilái *zài* jīngjì fāzhǎn *shàngmiàn* gòngtóng de yī xiàng rènshí.
will-be future at economic development upside mutual particle an CL agreement
'It will be a mutual agreement on economic development.'

Example (22) and Example (23) are translated from Mandarin Chinese into English with the most appropriate expressions in prepositional phrases, so the translated lines can be in the parallel constructions to the English expressions. The translated lines might not be the best editions because the ways of expressions in the two languages are distinct. It should

be noted that in the entries, the LMs function as a specific theme, topic, or issue. This sense does not exactly meet any existing senses in the semantic network for *on* (Tyler & Evans, 2003), but is close to the Constrained sense. Therefore, it was categorized in a newly created sense. In this sense, there is a significant syntactic feature of the sense. The feature demonstrates that *zài*+NP+*shàngmiàn* in the entries functions as an independent prepositional phrase. It tends to modify the whole clauses, not the verbs from a syntactic point of view. This feature makes the sense distinct from the Constrained sense.

There are evident entries for the Constrained sense in the State cluster:

(24) 錢 花 在 這 上面 (Entry 82)
Qián huā *zài* zhè *shàngmiàn*.
money spend at this upside
'Spend money on this.'

(25) 注重 在 分數 上面 (Entry 83)
zhùzhòng *zài* fēnshù *shàngmiàn*
emphasize at scores upside
'emphasize scores'

(26) 我 花 很多 的 心血 在 我 孩子 上面 (Entry 85)
Wǒ huā hěnduō de xīnxuè *zài* wǒ háizǐ *shàngmiàn*.
I spend a-lot-of particle efforts at my kids upside
'I spend a lot of efforts on my kids.'

Example (24) shows the TR, *qián* (money) is constrained to the LM, *zhè* (this) through the verb, *zhùzhòng* (emphasize). Example (25) indicates that the TR, *wǒ* (I) merely pays extra attention to the LM, *fēnshù* (scores). *Xīnxuè* (efforts) in Example (26) should be seen as the true TR which is constrained in the LM, *wǒ háizǐ* (my kids). The constraint is made by the verb, *huā* (spend). The three entries exemplify the concept of constraints to the LMs. Plus, from a syntactic point of view, *zài*+NP+*shàngmiàn* in this sense seems to modify the verbs not the whole clauses.

There is also a small group of entries that are evident for the Availability and Visibility sense in the State cluster. For example,

(27) 在 媒體 上面 說 (Entry 99)
zài méitǐ *shàngmiàn* shuō
at media upside tell
'express on the media'

(28) 在 電視機 上面 能夠 看到 (Entry 100)
Zài diànshìjī *shàngmiàn* nénggòu kàndào.
at TV upside can see
'It can be seen on TV.'

(29) 在 伺服器 上面 提供 檔案 (Entry 102)
Zài cìfúqì *shàngmiàn* tígōng dàng'àn.
at server upside provide file
'provide files on servers'

It is assumed that in this sense, the entries meet the concept of AVAILABILITY and VISIBILITY. In Example (27), someone uses *méitǐ* (media) as a channel to complete the action of *shuō* (tell). The product of the action is available and/or visible to the audience. Example (28) shows that the audience can see something (omitted in the example) on the screen of a TV. Both true TRs are available or visible on the LMs. The LMs rather function as a channel/platform. These two features can also explain Example (29). *Dàngàn* (file), the TR is available on the platform, *cìfúqì* (server). It reveals one unexpected fact. *Cìfúqì* (server) is a computer-related device. When computer-related devices are involved in a spatial relation as a LM, they are, in most cases, seen as a container. In other words, *shàngmiàn* 'upside' do not apply. For example, English speakers say *save the file on your computer*, but Mandarin Chinese speakers tend to utter:

(30) 檔案 存 在 電腦 裡面
Dàng'àn cún *zài* diànnǎo *lǐmiàn*.
file save at computer inside
'Save files on computers.'

The last group of entries is categorized in a newly created sense in the State sense. It is termed, the Activity on Landmark sense. For example,

(31) 在 牌桌 上面 贏錢 (Entry 105)
Zài páizhuō *shàngmiàn* yíngqián.
at table-for-board-games upside win-money
'Win money at a table for gambling.'

(32) 坐 在 飯桌 上面 吃飯 (Entry 106)
Zuò *zài* fànzhuō *shàngmiàn* chīfàn.
sit at dinning-table upside eat
'Eat at the dining table.'

Example (31) refers to the activity of board games which takes place on a table. *Yíngqián* (win) is rather seen as an abstract concept. There is no final product as a true TR that exists on the surface or anywhere in a higher position than *páizhuō* (table for board games), the LM. This is disputable because *yíngqián* (win) can also be seen as *yíng* (win) *qián* (money). Then, *qián* (money) is the TR that can be physically on a table. It meets the proto-scene of *shàngmiàn* 'upside' completely. It is not necessary to treat *yíng* (win) and *qián* (money) individually as two lexical items in this case. It could be more logical to treat it as a concept because *qián* (money) does not necessarily appear in a game. Also, *qián* (money) can refer to some other valuable items based on the agreements of the players in a game. Example (32) literally means that someone sits on a dining table. The person is not physically on the surface of a dining table. *Chīfàn* (eat) actually refers to the activity of having a meal which occurs with the table. To sum up the above analyses, Figure 4 suggests the semantic network for *shàngmiàn* 'upside' for this study.

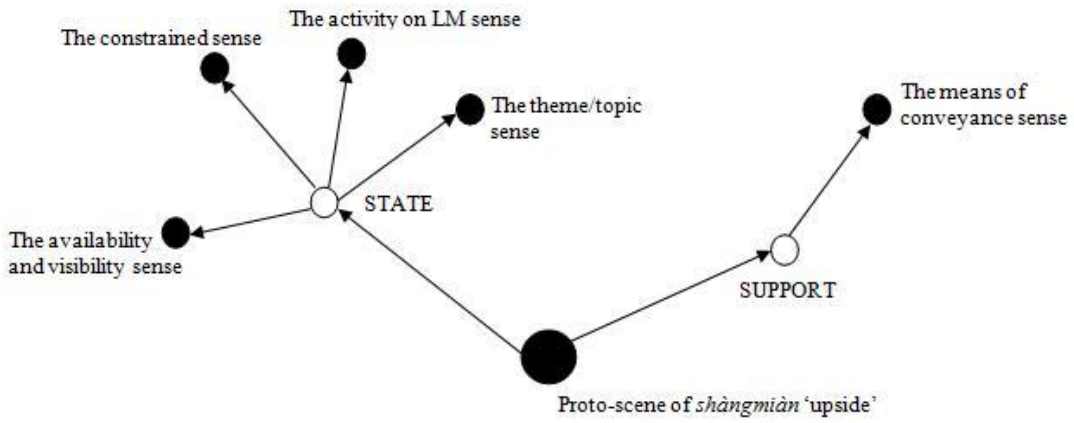


Figure 5-5 Semantic network for *shàngmiàn* 'upside'

Figure 5-5 shows the semantic network for *shàngmiàn* 'upside'. The result shows that the semantic network for *shàngmiàn* 'upside' contains the State cluster and the Support cluster. In the State cluster, there are the Availability and Visibility sense, the

Constrained sense, the Activity on LM sense, and the Theme/Topic sense. In the Support cluster, there is the Means of Conveyance sense.

5.3.3 Comparisons between *on* and *shàngmiàn* 'upside'

The detailed descriptions of the semantic network for *on* (Ho, 2007) can be seen in Section 2.5.2 in Chapter II. To summarize, CONTACT and SUPPORT constructs the proto-scene of *on*. In other words, the TR contacts the LM on the surface, and the LM supports the TR. Beyond the proto-scene, there are three clusters: the Temporal State sense, the Constrained sense, and the Availability and Visibility sense (Examples can be seen in Table 5-2 below). Ho (2007) studies *on* as a spatial particle; therefore, the evidence for the senses provided in the discussions refer to examples in which *on* is used as a preposition or an adverb. When *on* is used as an adverb, it is different from the construction in this study. For example, *keep on talking*. *On* in the example functions as a verb compliment. When it is removed, it does not change the meaning or make the structure to be ungrammatical. This feature leads to the major difference between the semantic network for *in* and *shàngmiàn* 'upside.'

The semantic networks for *on*, which is marked in black (Ho, 2007) and *shàngmiàn* 'upside,' which is marked in gray are combined in Figure 5-6 to show the similarities and the differences. The proto-scene of *shàngmiàn* 'upside' covers not only the proto-scene of *on* but some other spatial-physical scenes that meet the proto-scenes of *above* and *over*. The black sphere that symbolizes the proto-scene of *on* is smaller and covered by the gray sphere that symbolizes the proto-scene of *shàngmiàn* 'upside.'

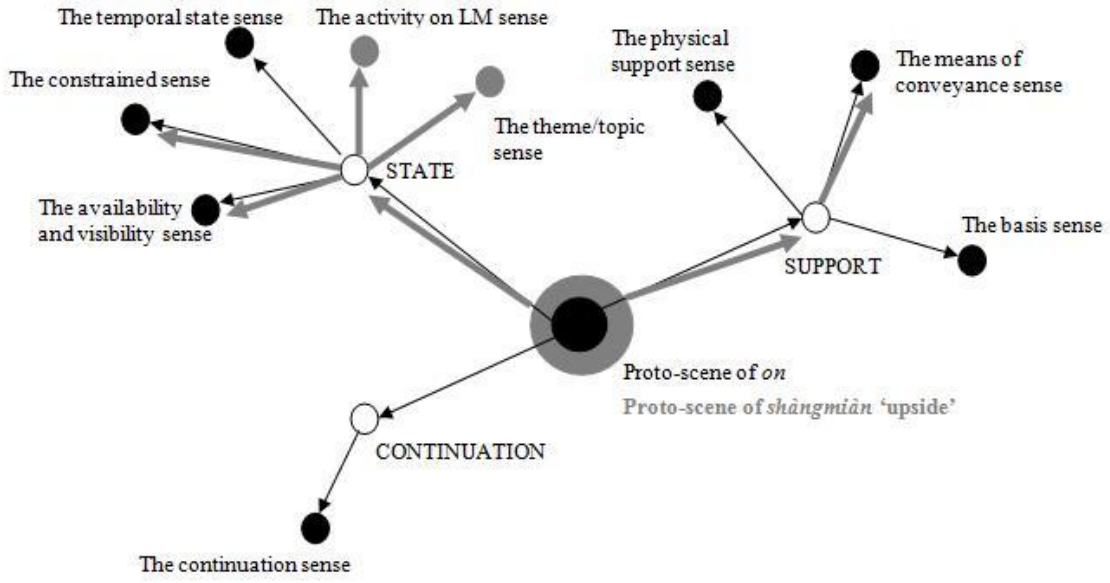
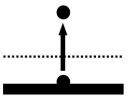


Figure 5-6 Combination of *on* and *shàngmiàn* 'upside'

Besides the proto-scenes, two of the three clusters, STATE and SUPPORT exist in the both semantic networks, but CONTINUATION occurs only in the semantic network for *on*. In the two shared clusters, there are some differences. In SUPPORT, the two semantic networks only share the Means of Conveyance sense. In other words, *shàngmiàn* 'upside' does not denote the Basis sense and the Physical Support sense. In STATE, the Constrained sense and the Availability and Visibility sense exist in both semantic networks. The Temporal State sense is unique to *on* whereas the Activity on LM sense and the Theme/Topic sense are particular to *shàngmiàn* 'upside.' To summarize the comparisons between *on* and *shàngmiàn* 'upside,' the results are compiled into Table 5-2. In the table, the proto-scenes, the clusters, and the senses which exist in the semantic networks for *on* and *shàngmiàn* 'upside' are listed. A check mark leads to the fact that a sense exists; a cross mark leads to the fact that a sense does not exist.

Table 5-2 Overview of similarities and differences between *on* and *shàngmiàn* ‘upside’

	on	***shàngmiàn* ‘upside’**
Proto-scene *Put the cat on the floor*		
CONTINUATION		
The Continuation sense *Please don’t stop, keep on talking*	✓	×
SUPPORT		
The Basis sense *The movie is based on the true story*	✓	×
The Means of Conveyance sense *We are going on foot, not by car*	✓	✓
The Physical Support sense *She was on her knees weeding the garden*	✓	×
STATE		
The Temporal State sense *The DVD is on pause*	✓	×
The Constrained sense *What effect will these changes have on the tourist industry*	✓	✓
The Availability and Visibility sense *The program will be broadcast on the Channel 32*	✓	✓
The Theme/Topic sense *zài* jīngjì kāifā *shàngmiàn* shòudào xiānjìnguójiāde yuánzhù ‘receive assistants on economic exploitation from other countries’	×	✓
The Activity on LM sense *zài* páizhuō *shàngmiàn* yíngqián ‘win money at a table for gambling’	×	✓

5.4 Semantic network for *xiàmiàn* ‘downside’

The specific criteria applied to the searched corpus data (See Section 3.3.2 in Chapter III), and thirty entries were considered for analyses (See Appendix Q). The analyses are based on the semantic network for *under* (Tyler & Evans, 2003). (See Semantic network for *under* in Chapter II). First of all, twenty-seven entries which denote spatial-physical senses were sorted for the proto-scene of *xiàmiàn* ‘downside,’ and three entries were considered spatial-functional scenes. The entries were classified based on the framework and the semantic network for *under* (Tyler & Evans, 2003).

5.4.1 The proto-scene of *xiàmiàn* ‘downside’

In the twenty-seven entries, there are some evident examples that meet the concept of LOWER and PROXIMAL which constructs the proto-scene of *under*. For example,

(33) 在 窗框 下面 加 釘 (Entry 3)
Zài chuāngkuàng *xiàmiàn* jiā dīng.
at window-frame downside add nails
‘Add nails under the window frame.’

(34) 我 窩 在 茶桌 下面 (Entry 6)
Wǒ wō *zài* cházhuō *xiàmiàn*.
I stay at table downside
‘I stay under the table.’

In Example (33), the TR, *dīng* (nail) is added to the area that is lower than the LM, *chuāngkuàng* (window frame). *Dīng* (nail) is physically lower than *chuāngkuàng* (window frame) in proximity. In Example (34), the TR, *wǒ* (I) is physically lower than *cházhuō* (table) in proximity. The above two examples provide evidence to the proto-scene of *xiàmiàn* ‘downside’ that is identical to the proto-scene of *under*.

It should be noted that there are two additional senses, the Covering sense and the Non-existence sense in the semantic network for *under* (Tyler & Evans, 2003). These two senses are derived from the proto-scene of *under*. According to Tyler and Evans’ analyses (2003), the Covering sense does not belong to the DOWN cluster, and the LM in the sense “intervene and obscure the TR from view” (Tyler & Evans, 2003: 126). The

sense was additionally created because Tyler and Evans (2003: 126) argue that "a vertical relation does not exist between the TR and the LM" as in *the decorated walls were draped under plastic sheeting*. This consideration is acceptable but does not necessarily apply to have a separate sense in the semantic network. It should be part of the definition of the proto-scene. In the sense, the TR is physically lower than the LM. When a vertical relation does not exist, the scene can be rotated ninety degrees either to the left or the right. The rotated scene shows that the LM is lower than the TR. In other words, when this feature is defined in the proto-scene, it is not necessary to separate the scene from the proto-scene.

In the corpus data, some evidence is also found to the sense. In Example (35), *bǎnshū* (board writing), which is the TR, refers to the writing on a board like a blackboard in a classroom, and *huītǔ* (dirt) is the LM. The vertical relation in the spatial scene does not exist, but if the scene is rotated 90 degrees to the right, the TR turns to be physically lower than the LM.

(35) 板書 被掩 在 一 層 薄薄 的 灰土 下面 (Entry 17)
Bǎnshū bèi yǎn *zài* yī céng bóbó de huītǔ *xiàmiàn*.
board-writing particle covered at a CL particle thin dirt downside
'Boarding writing is covered under thin dirt.'

As for the Non-existence sense, *the person is buried under six feet of dirt* (Evan & Tyler, 2003: 127) denotes a spatial-physical scene which is considered the proto-scene. However, Tyler and Evans (2003: 127) argue that "the correlation in experience has given rise to an implicature of non-existence having become associated with *under*" as in *the business went under* (Tyler & Evans, 2003: 127). The example, *the business went under* can be evident for having the Non-existence sense because *the business* is rather an abstract concept, but *the person is buried under six feet of dirt* should be seen as an example in the sense if the analyses tend to distinguish the spatial-physical and spatial-functional senses. Plus, the particle, *under* as in *The business went under* is used as an adverb, not a preposition. It is valid to include *under* as in *The business went under*, but the use is not included in this study. It is believed that this sense should not be considered an additional sense, at least in the semantic network for *xiàmiàn* 'downside'.

In the corpus data, there is evidence to NON-EXISTENCE. In Example (36), according to the context, the TR is a person, but it is omitted. The LM is *nà qiángjiǎo* (that wall). Literally, it means that a person is buried under that wall. This entry indicates a spatial relation that is identical to *the person is buried under six feet of dirt*. It implicates NON-EXISTENCE, but it is not considered a separate sense from the proto-scene in the semantic network for *xiàmiàn* 'downside.'

(36) 埋 在 那 牆角 下面 (Entry 19)
Mái *zài* nà qiángjiǎo *xiàmiàn*.
bury at that corner-of-wall downside
'Bury (something) under that corner.'

Example (37) denotes a spatial scene that can be seen from two perspectives in both languages. In English, it is appropriate to use either *in the moonlight* or *under the moonlight*. The two uses do not distinguish each other. *Light* as in *moonlight* or *sunlight* is not an abstract concept because people can perceive the temperature or the brightness it brings. When *in* is used, *moonlight* is rather considered a container as Tyler and Evans (2003: 185) state that "*in* also denotes spatial scenes in which a prevailing atmospheric condition is conceptualized as enveloping the TR." This also applies to Mandarin Chinese. It is believed that using *zài+yuèguāng+lǐmiàn* (*yuèguāng* refers to moonlight) is also considered appropriate.

When *under* is used, *moon* as in *moonlight* takes the priority. It means that this scene is more likely to indicate the spatial relation between the TR and the moon. It meets the concept of LOWER. *Light* as in *moonlight* is later considered. People can perceive the temperature and the brightness it brings. It meets the concept of PROXIMAL. This conceptualization also applies to Mandarin Chinese speakers as what Example (37) denotes. The TR is a person which is omitted in the text, and the LM is *yuèguāng* (moonlight). Xiàmiàn 'downside' mediates the TR and the LM.

(37) 在 月光 下面 看 (Entry 18)
Zài yuèguāng *xiàmiàn* kàn.
at moonlight downside read
'Read (something) under moonlight.'

In Example (38), the TR is *xùnxí* (message), and the LM is *zhèfēng xìnde* (this letter) which refers to an Email message according to the context. When an Email message is displayed, it is in the vertical layout on a computer screen. The sender can reply to the Email message by typing the response in a dialogue box in a lower position than the body text of the Email message. It should not be ambiguous to say in English, *type your message under the letter*.

(38) 在 這 封 信 的 下面 開始 打入 要 回覆的 訊息 (Entry 21)
Zài zhè fēng xìn de *xiàmiàn* kāishǐ dǎrù yào huífùde xùnxí.
at this CL letter particle downside start key-in want reply message
'Start to type the message for reply at the bottom of the letter.'

When *zhèfēng xìnde* (this letter) refers to a traditional letter, it can be explained that *zhèfēng xìn* (this letter) refers to the content of the letter not the whole sheet. It is distinct from the following example.

(39) 在 這封 信 下面 有 兩千元
Zài zhèfēng xìn *xiàmiàn* yǒu liǎngqiān yuán.
at this letter downside have 2000 dollars
'Under this letter, there are 2000 dollars.'

In Example (39), *liǎngqiān yuán* (2000 dollars) is physically lower than *zhèfēng xìn* (this letter). The TR and the LM do not include each other. If it is said, *write your message under the letter*, it might denote a different sense than Example (38) does.

Besides the entries which meet the proto-scene of *under*, there are some entries which denote some spatial relations other than the proto-scene of *under*, but they still denote spatial-physical scenes. For example,

(40) 墳 就 在 纜線 下面 (Entry 16)
Fén jiù *zài* lǎnxiàn *xiàmiàn*.
*tomb right at cab*le downside
'The tomb is below the cable.'

In Example (40), the TR, *fén* (tomb) is lower than *lǎnxiàn* (cable) which is used for cable cars between hills for transportation. In the sense, the distance between *fén* (tomb) and *lǎnxiàn* (cable) should not be in proximity. Tyler and Evans (2003: 121) define that "*below* denotes a relation in that the TR is lower than and distal with respect to the LM."

Therefore, Example (40) provides evidence that *xiàmiàn* ‘downside’ covers the proto-scene of *below*. There is another group of entries which denote spatial-physical scenes but meet the proto-scenes of other spatial prepositions in English. For example,

(41) 你們　在　體育館　下面 (Entry 24)
Nǐmen *zài* tǐyùguǎn *xiàmiàn*.
you at gymnasium downside
‘You are on the ground floor of the gymnasium.’

(42) 在　戲台　下面　去抽　魷魚(Entry 27)
Zài xìtái *xiàmiàn* qùchōu yóuyú.
at stage downside draw squid
‘Draw squids around the stage.’

In Example (41), the TR is *nǐmen* (you), and the LM is *tǐyùguǎn* (gymnasium). The entry refers to the location where the TR is on the ground floor in a multi-story building for sports. It is not likely to refer to the position that the TR is physically lower than the gymnasium. If the entry is directly translated into English, it could be *you are under the gymnasium*, which does not make any sense. In other words, this entry indicates a spatial relation which refers to some other spatial prepositions in English depending on how speakers describe the location.

Example (42) illustrates a distinct scene which is not related to verticality. The TR is a person which is not stated in the text, and the LM is *xìtái* (stage) which refers to a mobile stage which can be easily assembled especially for performances such as folk songs or traditional plays in an open-air location. When a performance is administered on the stage, there are street food venders around the stage for spectators. The stage is always higher than the ground where the spectators are. The scene is viewed from two vantage points, on-stage and off-stage. Everything that involves in a play is on-stage; the rest in the scene is off-stage. It is not a vertical relation but still meets LOWER and PROXIMAL. When the spatial relation in such the scene is translated into English, it is more likely to use some other prepositions (e.g., around) based on the context.

To sum up the above discussions, the proto-scene of *xiàmiàn* ‘downside’ is created as in Figure 5-7. The dark sphere refers to the TR, and the dark line refers to the LM. The dashed line demonstrates the proximity. For *xiàmiàn* ‘downside,’ the LM can

also be seen as a container of several layers as in Example (41). The configuration between the TR and LM in the proto-scene is a continuum, which is different from the proto-scene of *under*. The continuum covers some other prepositions than *under*. From the results, it covers at least *on*, *under*, and *below*.

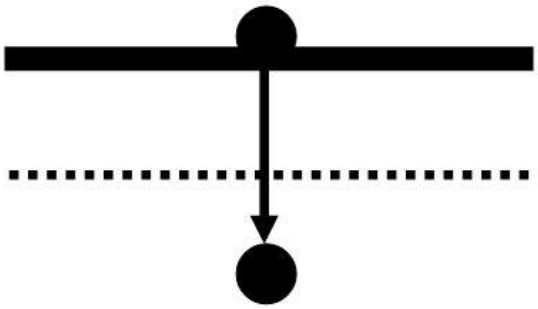


Figure 5-7 Proto-scene of *xiàmiàn* ‘downside’

5.4.2 Beyond the proto-scene of *xiàmiàn* ‘downside’

Beyond the proto-scene, there are two clusters, the Down cluster and the State cluster. The Down cluster exists in the semantic network for *under*, but the State cluster was newly created for *xiàmiàn* ‘downside’. In the Down cluster, no entries in the corpus data are found identical to the existing senses in the semantic network for *under*. The Descendant sense was created for xiàmiàn ‘downside’. For example,

(43) 在 我 下面 那 幾代 (Entry 28)
zài wǒ *xiàmiàn* nàjǐ dài
at I downside those generation
‘generations after mine’

Example (43) is an independent prepositional clause which does not modify the verb, so in the example, the verb was not presented. *Dài* (generation) is the TR and *wǒ* (I) is the LM. The TR is not physically lower than the LM, but the spatial-functional relation still meets the concept of DOWN. It meets neither the Control sense nor the Less sense. The TR is not in any way controlled by the LM. The relation does not implicate that the TR has less of something in quantity than the LM. Consequently, the Descendant sense was

created for the fact that *under* does not denote this sense. In Example (43), the most appropriate English preposition should be confirmed according to the context.

The State cluster contains the State sense. In Example (44), the TR is a person (not presented in the example), and the LM is *yālì* (pressure), which is an abstract concept. The TR is not physically lower than the LM. The scene is conceptualized that the TR is in a state which the LM denotes.

(44) 在　那個　壓力　下面 (Entry 29)
zài nàgè yālì *xiàmiàn*
at that pressure downside
'under that pressure'

In other words, when a spatial relation in Mandarin Chinese is used, it refers to a person that is in a state of mentality. The connotation of the state can be either positive or negative. While *yālì* (pressure) in Example (44) illustrates a negative state, the following example shows a positive state.

(45) 在　快樂　的　氣氛　下面
zài kuàilè de qìfēn *xiàmiàn*
at happiness particle downside
'in happiness'

According to the overall discussions, the semantic network for *xiàmiàn* 'downside' (Figure 5-8) shows that beside the proto-scenes, there are two clusters, the Down cluster and the State cluster. In the two clusters, there are the Descendant sense and the State sense.

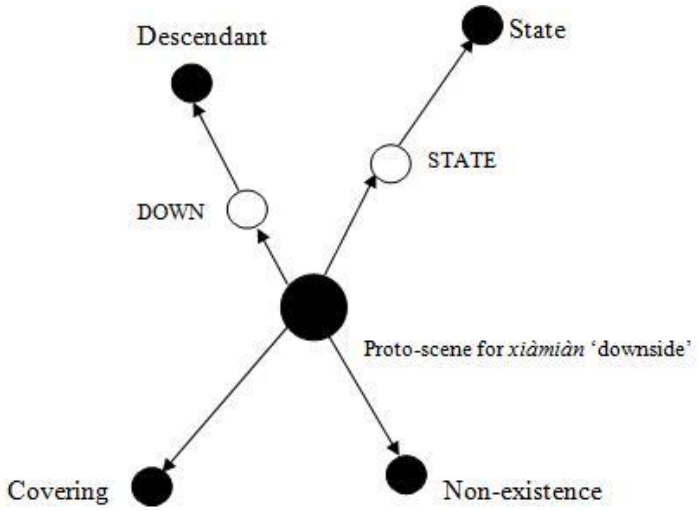


Figure 5-8 Semantic network for *xiàmiàn* 'downside'

5.4.3 Comparisons between *under* and *xiàmiàn* 'downside'

The detailed descriptions of the semantic network for *under* (Tyler & Evans, 2003) can be seen in Section 2.5.3, Chapter II. It can be summarized that the proto-scene of *under* is based on the notions of LOWER and PROXIMAL. In other words, the TR is in the lower position of the TR. The TR and the LM are in a reachable distance. Beyond the proto-scene, there is the Down cluster, which includes the Less sense and the Control sense. Apparently, *under* is frequently used in a prepositional phrase. Unlike *in* or *on*, it is not likely to be used as a verb compliment. The semantic network for *under* shows that *under* denotes few metaphorical extended meanings.

The semantic networks for *under* (in black) and *xiàmiàn* 'downside' (in gray) are combined in Figure 5-9 to show the similarities and the differences. The proto-scene of *xiàmiàn* 'downside' covers some proto-scenes of English prepositions such as *in*, *under*, and *below*. The black sphere that symbolizes the proto-scene of *under* is smaller than and covered by the gray sphere that symbolizes the proto-scene of *xiàmiàn* 'downside.' The two additional senses in the semantic network for *under* also appear in the semantic network for *xiàmiàn* 'downside.' However, as discussed, it is not necessary to have the two senses independent from the proto-scene of *xiàmiàn* 'downside.' They should be involved in the proto-scene.

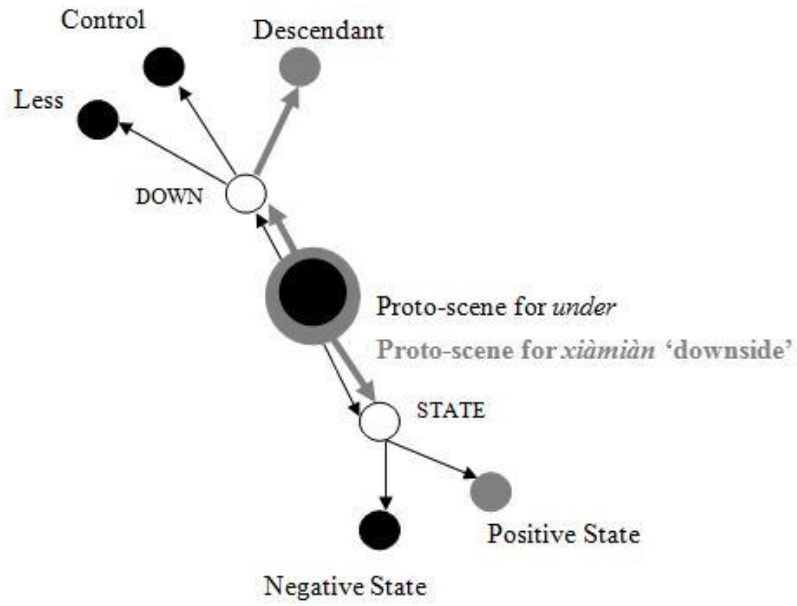
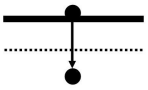


Figure 5-9 Combination of *under* and *xiàmiàn* 'downside'

Besides the proto-scenes, the Down cluster exists in both of the semantic networks carrying two different senses. *Under* denotes the Less sense and the Control sense, and *xiàmiàn* 'downside' denotes the Descendant sense. The State sense was found in the semantic network for *xiàmiàn* 'downside', but it is not listed in the study (Tyler & Evans, 2003). To summarize the comparisons between *under* and *xiàmiàn* 'downside', the results were compiled into Table 5-3. In the table, the proto-scenes, the clusters, and the senses which exist in the semantic networks for *under* and *xiàmiàn* 'downside' were listed. A check mark leads to the fact that a sense exists; a cross mark leads to the fact that a sense does not exist.

Table 5-3 Overview of similarities and differences between *under* and *xiàmiàn* 'downside'

	under	***xiàmiàn* 'downside'**
Proto-scene *The life jacket is kept under the seat*		
The Covering sense *My diary is under all this paperwork*	✓	✓
The Non-existence *The dead person is buried under six feet of dirt*	✓	✓
DOWN		
The Less sense *Sorry, you cannot drink here if you're under 21*	✓	×
The Control sense *George works under his father's close supervision at the family business*	✓	×
The Descendant sense *zài* wǒ *xiàmiàn* nàjǐ dài 'generations after mine'	×	✓
STATE		
The State sense *zài* nàgè yālì *xiàmiàn* 'under that pressure'	×	✓

5.5 Further discussions of semantic networks

5.5.1 Suggestions of modifying existing semantic networks

In the comparative analyses of the semantic networks for *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' and their counterparts, *in, on,* and *under*, there are some suggestions of modifying their existing semantic networks. The significant parts which are missing in Tyler and Evans (2003) include the temporal reference in the semantic network for *in* and *on* and the state sense in the semantic network for *under*.

Tyler and Evans (2003) purposely exclude the temporal reference; however, Principled Polysemy studies all of the related meanings that a particular lexical form denotes and finds the semantic continuums. According to this notion, the temporal reference in the semantic networks for English prepositions such as *in* and *on* should be included. In the semantic network for *in*, there are *in January* and *in time* as evidence that *in* denotes the temporal reference. In the semantic network for *on*, there are *on Monday* and *on time* as the examples. This suggestion is related to Kemmerer's empirical study (2004) that explore whether the metaphor actively influences the way that modern adults process prepositional meanings during language use. The result of the study suggests that "understanding the temporal meanings of prepositions does not necessarily require establishing structural alignments with their spatial correlates" (Kemmerer, 2005: 797). It suggests that temporal meanings are still possible to be related to the spatial relations.

In the semantic network for *under*, the State sense is excluded in Tyler and Evans' study (2003), but it is worth noting that there are evident examples to prove that the sense also exists in English. When someone is *under* some state of mentality, the state is rather of a negative connotation such as *under the pressure* and *under the pain*. It is not likely to utter *under the happiness*. It is suggested that the State sense should be included in the semantic network for *under*.

The two points are suggested because it is inevitable to mention them when the semantic networks are cross-linguistically compared to investigate whether the similarities and the differences matter in cognitive mapping. The integrated semantic

networks would be more helpful for the analyses. The revisions of the existing semantic networks are not the focus of the current study; therefore, these suggestions are made for further studies.

5.5.2 Suggestions of theoretical adjustments

This current study emphasizes the localizers in the particular construction: *zài*+NP+localizer, which is similar to the prepositional uses in English. However, there are some discussible issues which should be addressed to elaborate the findings. These issues evolve from the construction used to select Mandarin Chinese corpus data. The valid entries for the analyses must strictly contain *zài*+NP+localizer.

First of all, *zài* 'at' in Mandarin Chinese can function as a static verb, a preposition, and a progressive aspect marker (Li, 1988 and 1993). When it functions as a static verb or a preposition, it indicates a spatial relation. This current study focuses on the construction: *zài*+NP+localizer no matter what it functions. It is found that a localizer is not always required to indicate a spatial relation. For example,

(46) 他 在 廚房 煮飯
Tā *zài* chúfáng zhǔfàn.
he at kitchen cook
'He is cooking in the kitchen.'

Zài 'at' in the above example can be seen as a static verb when a localizer is omitted. Even though a localizer is not seen, the example still denotes a spatial scene. When the spatial scene is translated into English, the preposition varies mainly depending on the LM. In this case, the preposition can be either *in* or *at*, but *in* would be preferred. To MLEs, the spatial relations which *in* and *at* denote are more likely to be identical or difficult to distinguish the differences. It can be generalized that the use of *at* is taught as part of *in* to MLEs. CO-LOCATE is not much conceptualized by MLEs.

Second, in this study, the localizer in the construction must contain two Mandarin Chinese characters as a compound noun. For example, *shàngmiàn* 'upside' is composed of *shàng* 'up' and *miàn* 'side.' This criterion narrowed the number of the entries in the corpus data. When *miàn* 'side' as in *shàngmiàn* 'upside' is omitted, the meaning that

shàng ‘up’ in the construction denotes is considered parallel. For example, shū (book) *zài* ‘at’ *zhuōzǐ* (table) *shàngmiàn* ‘upside’ is identical to *shū* (book) *zài* ‘at’ *zhuōzǐ* (table) *shàng* ‘up.’ If the study used *lǐ* ‘in,’ *shàng* ‘up,’ and *xià* ‘down’ as the localizers in the construction, there would be a larger number of entries for analyses. The findings would likely turn out to be the same, but the evident examples would be far more abundant in quantity.

Third, the findings of the semantic networks for the Mandarin Chinese localizers and their counterparts in English do not match in most senses merely because the construction, *zài*+NP+localizer restricts the findings. The construction only emphasizes the prepositional uses, but the semantic networks for the English prepositions (Tyler & Evans, 2003) are created based on each particle (e.g., *in*, *on*, and *at*) as a single linguistic form which functions more than just a preposition. The analyses are rather in a broader perspective. For example, *on* as in *come on* and *in* as in *rub in the lotion*. It seems possible that the spatial concepts in Mandarin Chinese can be studied in the same perspective. For example, study *shàng* ‘up’ and *xià* ‘down’ as individual linguistic items but not in the construction. The results might be closer to the semantic networks for the English prepositions such as *in* and *on* (Tyler & Evans, 2003). Fortunately, the perspective does not cover some spatial concepts in English in parallel such as *lǐ* ‘in.’ There would be some problems comparing the two languages.

The problems can be traced from previous studies. The spatial concepts in Mandarin Chinese such as *shàng* ‘up’ and *xià* ‘down’ have been studied with cognitive approaches (Lan, 2002; Lu, 2011) for the fact that *shàng* ‘up’ and *xià* ‘down’ denote both non-dynamic and dynamic senses. Lan (2002) studies *shàng* ‘up’/*xià* ‘down’ metaphors and lists the three prototypical models of *shàng* ‘up’/*xià* ‘down’ and the metaphorical uses (See Figure 5-10). The prototypical models are sorted into non-dynamic and dynamic *shàng* ‘up’/*xià* ‘down’. Non-dynamic *shàng* ‘up’/*xià* ‘down’ include contact *shàng* ‘up’/*xià* ‘down’ and static *shàng* ‘up’/*xià* ‘down’. Examples (Lan, 2002) for the above-mentioned senses are:

(47) 氣溫 上 升 到 三十八 度 (Dynamic *shàng* ‘up’)
Qìwēn *shàng* shēng dào sānshíbā dù.
temperature up rise to 38 degree
‘The temperature has risen up to 38 degrees.’

(48) 氣溫 下 降 到 零 下 十 度 (Dynamic *xià* ‘down’)
Qìwēn *xià* jiàng dào ling xià shí dù .
temperature down drop to zero down 10 degree
‘The temperature has dropped to 10 degrees below zero.’

(49) 紅 旗 在 操場 上 空 飛揚 (Static Non-dynamic *shàng* ‘up’)
Hóng qí *zài* cāochǎng *shàng* kōng fēiyáng.
red flag at playground up sky fly
‘The red flag is flying in the wind over the playground.’

(50) 報紙 上 放 住 一 支 筆 (Contact, Non-dynamic *shàng* ‘up’)
bàozhǐ *shàng* fàng zhù yī zhī bǐ.
newspaper up-contact place-ing one NC pen
‘There is a pen on the newspaper.’

(51) 種子 埋 在 底 下 (Static, Non-dynamic *xià* ‘down’)
Zhǒngzǐ mái *zài* dǐ *xià*.
seed bury at ground down
‘The seeds are buried deep down in the earth.’

(52) 報紙 下面 有 一 支 筆 (Contact, Non-dynamic *xià* ‘down’)
Bàozhǐ *xiàmiàn* yǒu yī zhī bǐ.
newspaper down-contact side have one NC pen
‘There is a pen under the newspaper.’

These three prototypical models of *shàng* ‘up’/*xià* ‘down’ meet the findings of the study. There is a difference between Lan’s study (2002) and the current study. Lan (2002) includes metaphorical uses in the prototypical models. This current study separates spatial-physical (proto-scene) and spatial-functional senses (metaphorical uses). Contact *shàng* ‘up’/*xià* ‘down’ can refer to the proto-scenes of *on* and *under*, and static *shàng* ‘up’/*xià* ‘down’ can refer to the proto-scenes of *over*/*above* and *under*/*below*. Dynamic *shàng* ‘up’/*xià* ‘down’ refer to *shàng* ‘up’/*xià* ‘down’ as verb complements, which are excluded in this study.

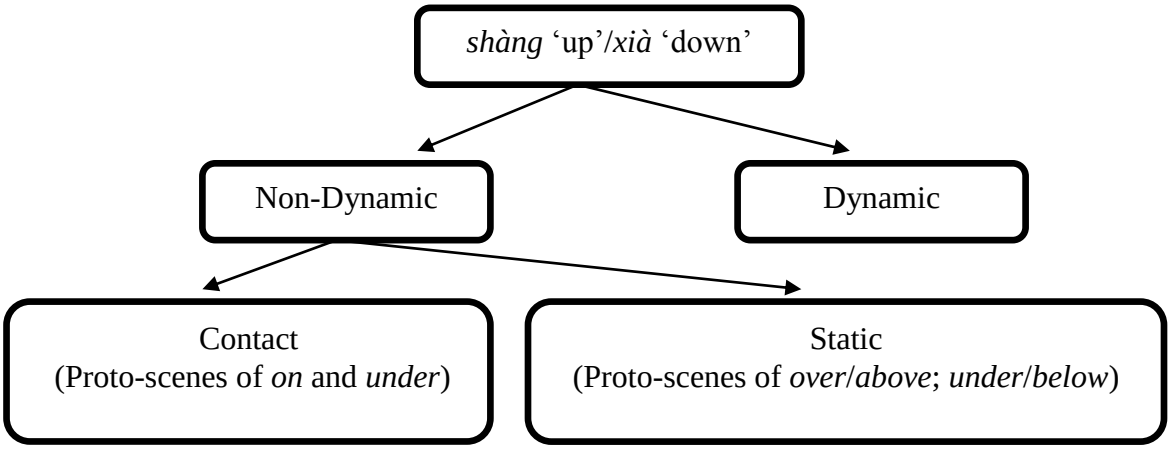


Figure 5-10 Prototypical models (Lan, 2002)

It should be mentioned that this adjustment does not suit *lǐ* ‘in’ because *lǐ* (in) is not likely to function as a verb complement. It tends to be some other Mandarin Chinese character such as *jìn* (into) or *rù* (into) that indicates directions (Parinyavottichai, 2009). In other words, *lǐ* ‘in’ does not denote dynamic senses. Consequently, *lǐ* ‘in’ does not denote senses such as *trains arrived in* in the semantic network for *in* (Tyler & Evans, 2003). The discussion has confirmed that studying *lǐ* ‘in,’ *shàng* ‘up,’ and *xià* ‘down’ is not appropriate for this current study; therefore, the construction emphasized in the research design best suits the study. It also reminds of one important step to revise the existing semantic networks. The semantic networks for the English prepositions (Tyler & Evans, 2003) include dynamic senses (e.g., *keep on talking*). It would be appropriate to remove those senses with dynamism (e.g., *in* as in *the train arrived in*) from the existing semantic networks and the revised versions of the semantic networks would be more suitable for the discussions in this current study.

5.5.3 Beyond comparisons with assumed counterparts

The above analyses compared the localizers, *lǐmiàn* ‘inside,’ *shàngmiàn* ‘upside,’ and *xiàmiàn* ‘downside’ to the counterparts in English, *in*, *on*, and *under* respectively. The results have indicated that the proto-scene of *shàngmiàn* ‘upside’ also covers *above* and *over*, and the proto-scene of *xiàmiàn* ‘downside’ also covers *below*. It is necessary to

further discuss the comparisons between these localizers and the additionally covered English prepositions.

First of all, Figure 5-11 (Tyler & Evans, 2003) demonstrates the vertical axis in English. The dark spheres refer to TRs, the dark line refers to the LM, and the dashed lines refer to the proximity. The stated proto-scenes denote static scenes.

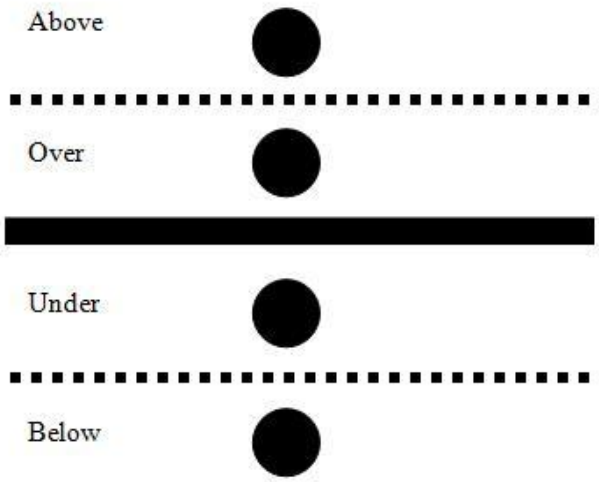


Figure 5-11 Vertical axis in English

The semantic network for *above* (Tyler & Evans, 2003) (Figure 5-12) demonstrates the proto-scene, the Up cluster, and two additional senses (the Next-one-up sense and the Topographical Distance sense) which are consistent with the proto-scene. The Next-one-up sense refers to a sense such as *His office is on the floor above mine* (Tyler & Evans, 2003: 120). The Up cluster can refer to the notion that "being higher than another entity is experienced as being positive in some way (Tyler & Evans, 2003: 115). In the Up cluster, there are the More sense as *The price of that stock is now above $ 20* (Tyler & Evans, 2003: 116) and the Superior sense as *He's above me in the company* (Tyler & Evans, 2003: 118). For the More sense, Tyler and Evans (2003: 115) observe that "there is an independently motivated experiential correlation between quantity and vertical elevation." This also includes that "measuring systems that count quantity are often conceptualized as vertical systems" (Tyler & Evans, 2003: 116). For example, *The temperature rose to above* 100 (Tyler & Evans, 2003: 116). This current study proposes

that measuring systems (e.g., temperature) should also include ranking systems (e.g., military ranks) and layers (e.g., building floors) which are conceptualized as vertical systems. Measuring systems and ranking systems are metaphorical uses; layers are more likely to be part of the proto-scene. For the Superior sense, Tyler and Evans (2003) claim that *above* and *over* are nearly synonymous. It depends on how the speakers define what is distal and what is proximal. For the two additional senses, the Next-one-up sense refers to *His office is on the floor above mine* (Tyler & Evans, 2003: 120), which, as mentioned earlier, is related to layers. The Topographical-distance sense refers to *The nearest bridge is about half a mile above the falls* (Tyler & Evans, 2003: 121), which meets the notion of proto-scene, LOWER and DISTAL. As stated earlier, it is not necessary to separate the two additional senses which are consistent with the proto-scene as independent senses. Both of them are perfectly covered and defined in the proto-scene. According to the Mandarin Chinese corpus data of *shàngmiàn* 'upside' (Appendix P), the proto-scene of *shàngmiàn* 'upside' covers the proto-scene of *above*, but no entries which meet any of the metaphorical extended meanings in the semantic network for *above* could be found.

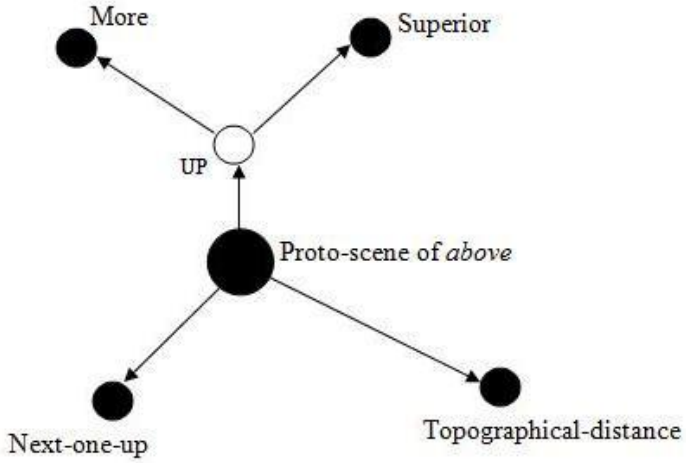


Figure 5-12 Semantic network for *above*

The semantic network for *over* (Tyler & Evans, 2003) (See Figure 5-13) is relatively complicated. It includes the proto-scene, the A-B-C Trajectory cluster, and the Up cluster. Besides, there are three additional senses: the Covering sense, the Examining

sense, and the Reflexive sense. These senses are summarized in detail later. In general, the proto-scene of *over* (Tyler & Evans, 2003) is similar to the proto-scene of *above* (Tyler & Evans, 2003). (See Figure 5-10). It is explained that when only HIGHER is concerned, *over* is roughly equivalent to *above* (Lakoff, 1987). For example (Tyler & Evans, 2003:65),

(53) The picture is above/over the mantel

Above and *over* in Example (53) are synonymous. In this case, *above* and *over* are both appropriate. In addition to the definition, Lindstromberg (1998) offers DYNAMISM to distinguish *above* and *over*. *Over* denotes dynamism while *above* does not. This feature is considered insufficient to define the distinction between the two prepositions. For example (Tyler & Evans, 2003),

(54) They could hear the German war planes circling high above/over them

In Example (54), the TR is in motion. It should require a preposition which denotes dynamism, but above is also appropriate in this case. Tyler and Evans (2003) state that CONTACT matters in the following case:

(55) The maid hung the jacket over/above the back of the chair

In Example (55), *over* denotes CONTACT while *above* does not. Kreitzer (1997) argues that *above* denotes a less specific location than *over*. This argument is denied by Tyler and Evans (2003) because the evidence that Kreitzer used is not supportive. Tyler and Evans (2003) argues that all the previous examination of the evidence is not accurate, so they propose that the most significant difference between *above* and *over* is whether a scene is DISTAL or PROXIMAL.

As for the extended meanings, Tyler and Evans (2003: 80-90) state that the A-B-C Trajectory cluster includes five senses: 1) the On-the-other-side-of sense (e.g., *The ball landed over the wall*), 2) the Above-and-beyond sense (*Your article is over the page limit*), 3) the Completion sense (*The film is over*), 4) the Transfer sense (*The old government handed its power over to the newly elected officials*), and 5) the Temporal sense (*The festival will take place over the weekend*). According to Tyler and Evans

(2003), the A-B-C trajectory refers to the path including three points that the TR moves. The most common path refers to the traverse that the TR starts from Point A and then moves to Point B which is higher than Point A. Point B is HIGHER than the LM in a potentially reachable distance. Then the TR moves from Point B to Point C which is LOWER than Point B. For example (Tyler & Evans, 2003: 69), *The cat dumps over the wall*. *Over* in the On-the-other-side-of sense, the Above-and-beyond sense, and the Temporal sense function as a preposition. In the Completion sense, and the Transfer sense, *over* is more likely to function as an adjective or an adverb. This study focuses on the prepositional uses only; therefore, the latter two senses are ignored.

Tyler and Evans (2003: 97) explain that the Up cluster or the vertical elevation refers to an upward orientation in which "a vertically elevated position is experienced as being positive or superior." The Up cluster includes the More sense (e.g., *He weighs just over 150 pounds*), the Control sense (e.g., *She has a strange power over me*), and the Preference sense (e.g., *I would prefer tea over coffee*). The More sense that *over* denotes is related to the metric measure system. Compared to the More sense that *above* denotes, they are nearly replaceable with each other only in some cases. Tyler and Evans (2003: 117) hypothesize that in some cases, "synonymy is the result of the subjectivity of speakers' interpretation of what is distal and what is proximal." Apart from this hypothesis, this study observes that for the More sense, when *over* is used, a speaker should have had an expected value of the measure system in mind. The expected value is similar to "some kind of standard or measurement" (Tyler & Evans, 2003: 97). The expected value should be inferred from contexts. In other words, when *over* is used, it implicates that some effects (either positive or negative) should occur. In contrast, when *above* is used, a speaker simply states the fact without an expected value in mind. Tyler and Evans (2003) also state that the Over-and-above sense (e.g., *The heavy rains caused the river to flow over its banks*) is in addition to the More sense. This sense "adds an interpretation of too much to the more construal" (Tyler & Evans, 2003: 98). The Control sense refers to the TR (the controller) who "has been in physical control of another person, control has been experienced as the controller being physically higher" (Evans & Tyler 2003: 101). The Preference sense refers to the implicature that the TR is of "greater

quantity, which generally is preferred to a lesser quantity," which is the LM (Tyler & Evans, 2003: 103).

The Covering sense (*The fence fell over*), the Examining sense (*Mary looked over the manuscript quite carefully*), and the Reflexive sense (*He played the same piano piece over*) are the three additional senses which are consistent to the proto-scene of *over* (Tyler & Evans, 2003). There is another sense under the Examining sense: the Focus-of-attention sense (*The little boy cried over his broken toy*), in which *over* is likely to be a substitute of *about*. Among these senses, the examples for the Covering sense, the reflexive sense shows that the uses are not constructed in prepositional uses. *Over* in the examples functions as an adverb. In this study, this part of the uses is not considered. Regarding the Examining sense including the Focus-of-attention sense, this study suggests that both of them should be categorized as metaphorical uses simply because the TRs in the examples do not physically interact with the LMs. The configurations are rather in abstract concepts.

With the summarized semantic network for *over* (Tyler & Evans, 2003), it is more convenient to compare *shàngmiàn* 'upside' to *over*. According to the Mandarin Chinese corpus data of *shàngmiàn* 'upside,' no entries could be found to meet the metaphorical extended meanings. In other words, the proto-scene of *shàngmiàn* 'upside' covers the proto-scene of *over*. However, the findings of this study suggest that the proto-scene of *over* (Tyler & Evans, 2003) should be re-defined in a more concise way because a proto-scene should be the primary image stored in conceptualization. The image should be a simple fundamental in a broader perspective. The fundamental may not cover all the notions but should function as the most important base for human beings to extend linguistic products. It should include a static scene as proposed by Tyler and Evans (2003) and a dynamic scene. The dynamic scene refers to a traverse in which a TR moves up to a higher point and drops down to a lower point. The notion of a traverse is categorized especially in the More sense and the Over-and-above sense by Tyler and Evans (2003). Therefore, it would be more convenient to observe that MLEs treat the traverse differently from a spatial relation. It is more likely for them to use some other expressions related to EXCESS to describe a sense which *over* denotes.

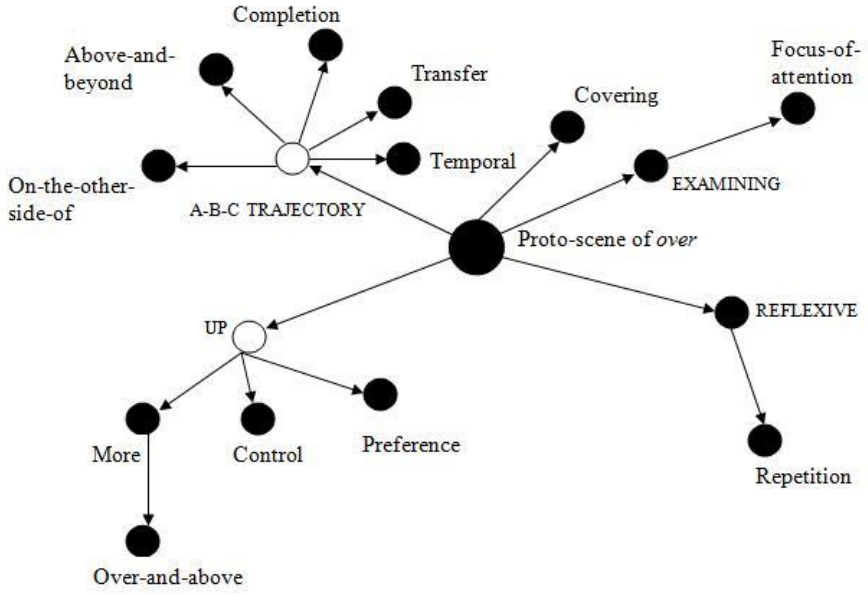


Figure 5-13 Semantic network for *over*

The semantic network for *below* (Tyler & Evans, 2003) (Figure 5-14) is a counterpart of the semantic network for *above*. It is obvious that the two semantic networks are totally opposite to each other. It consists of the proto-scene, the Down cluster, and two additional senses which are consistent with the proto-scene. The Down cluster includes the Less sense (e.g., *The temperature dropped below freezing*) and the Inferior sense (e.g., *Her reading comprehension is below average compared to that of other twelve-year-olds*). Tyler and Evans (2003: 128) state that "When an entity is vertically lower, there is less quantity." The two additional senses which are consistent with the proto-scene are the Next-one-down sense (e.g., *His office is on the floor below mine*) and the Topographical Distance sense (e.g., *They stood a mile or so below the falls*). Same as the semantic network for *above*, *below* is tightly related to measuring systems which should also include ranking systems and layers.

The proto-scene of *xiàmiàn* 'downside' covers the proto-scene of *below*, but no entries could be found to meet the metaphorical extended meanings. The rest of the suggestions are the same as those to the semantic network for *above* because the two prepositions are considered each other's counterpart.

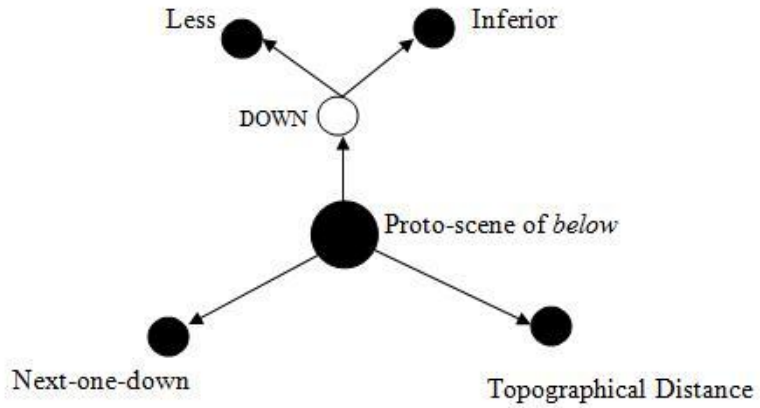


Figure 5-14 Semantic network for *below*

5.5.4 Revised semantic networks for English prepositions

In Section 5.2, 5.3, and 5.4, the semantic networks for *lǐmiàn* ‘inside,’ *shàngmiàn* ‘upside,’ *xiàmiàn* ‘downside’ are compared to the semantic networks for *in*, *on*, and *under* (Tyler & Evans, 2003). In Section 5.5.1, 5.5.2 and 5.5.3, this study proposes the suggestions for revising the semantic network for the three English prepositions such as adding the Negative State sense in the semantic network for *under* (Tyler & Evans, 2003). In this section, the semantic networks for the three English prepositions as well as those related English prepositions are revised exclusively for this study. The findings for this chapter are concluded based on the revised semantic networks for the English prepositions and the semantic networks for the three Mandarin Chinese localizers.

First of all, some senses in the semantic network for *in* (Tyler & Evans, 2003) should be removed. These senses refer to the senses in which *in* does not function in prepositional phrases according to the examples (Tyler & Evans, 2003). In other words, *in* in these senses mostly functions as an adverb. The removed senses are: 1) the In Situ sense, 2) the In Favor sense, 3) the Arrival sense, 4) the Disappearance sense, 5) the Blockage sense, and 6) the Reflexive sense. Apart from the removed senses, the Time sense in the Temporal Reference cluster is added to the semantic network of *in*. The revised semantic network for *in* is presented in Figure 5-15. The revised semantic network for *in* suits best in this current study. The revised proto-scene remains the same

as the original edition (Tyler & Evans, 2003). It includes the notion of ENCLOSURE and PARTIAL INCLUSION. The LM is a bounded area, and in most cases, it is viewed as a three-dimensional container.

To compare the revised semantic network for *in* and the semantic network for *lǐmiàn* 'inside' (Figure 5-2), the Temporal sense in the Location cluster is changed to the Time sense in the Temporal Reference cluster (See Figure 5-16).

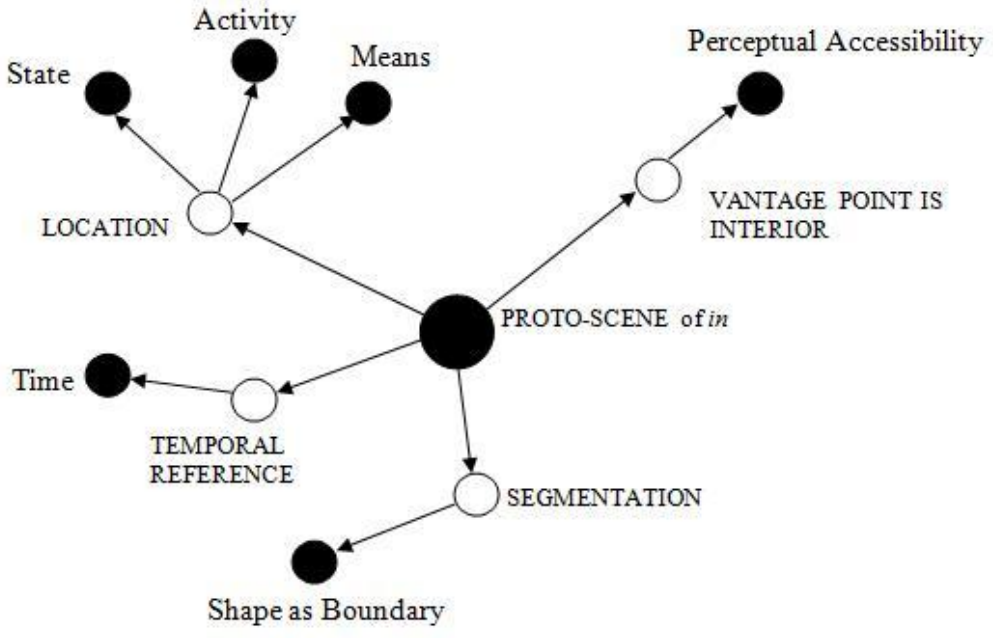


Figure 5-15 Revised semantic network for *in*

Figure 5-16 is presented in black and gray. The black part refers to *in*, and the gray part refers to *lǐmiàn* 'inside.' It is more precise and appropriate to this study than Figure 5-3. As what it shows, there are some similarities. Both of *in* and *lǐmiàn* 'inside' denote the the State sense and the Activity sense in the Location cluster as well as the Time sense in the Temporal Reference cluster. There are also differences. *In* denotes the Mean sense in the Location cluster, but *lǐmiàn* 'inside' does not. In contrast, *lǐmiàn* 'inside' denotes the Visibility sense in the Location cluster, but *in* does not. *In* denotes the Perceptual Accessibility sense in the Vantage Point is Interior sense and the Shape as Boundary

sense in the Segmentation cluster, but *lǐmiàn* ‘inside’ does not. *Lǐmiàn* ‘inside’ denotes the Theme sense in the Constrain cluster, but *in* does not.

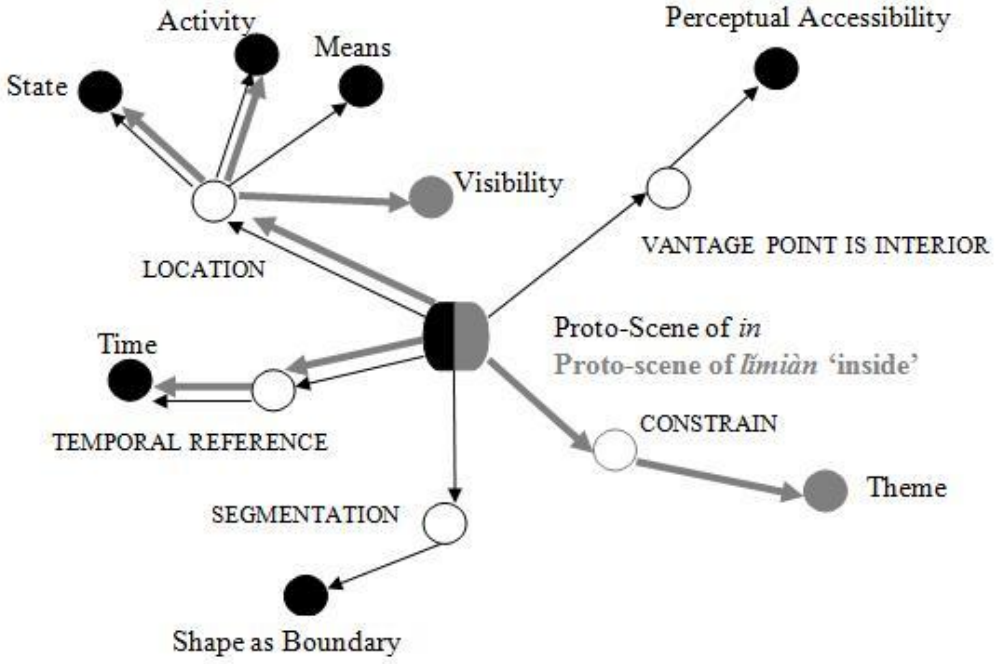


Figure 5-16 Comparison of revised *in* and *lǐmiàn* ‘inside’

Second, the semantic network for *on* should be revised as what it is suggested. The Continuation sense is the only sense which is suggested be removed because the evidence provided by Tyler and Evans (2003) shows that on *in* such as the sense does not function in a prepositional phrase. Besides, the Time sense in the Temporal Reference cluster is added. The revised semantic network for *on* is presented in Figure 5-17. It is similar to the original semantic network for *on* (Ho, 2007). The revised proto-scene is still identical to the original edition (Tyler & Evans, 2003). It includes the notion of CONTACT and SUPPORT. The LM, in most cases, is considered as a two-dimensional path. When a scene rotates ninety degrees or one hundred and eighty degrees, the scene does not seem to be a typical scene but still meets the proto-scene.

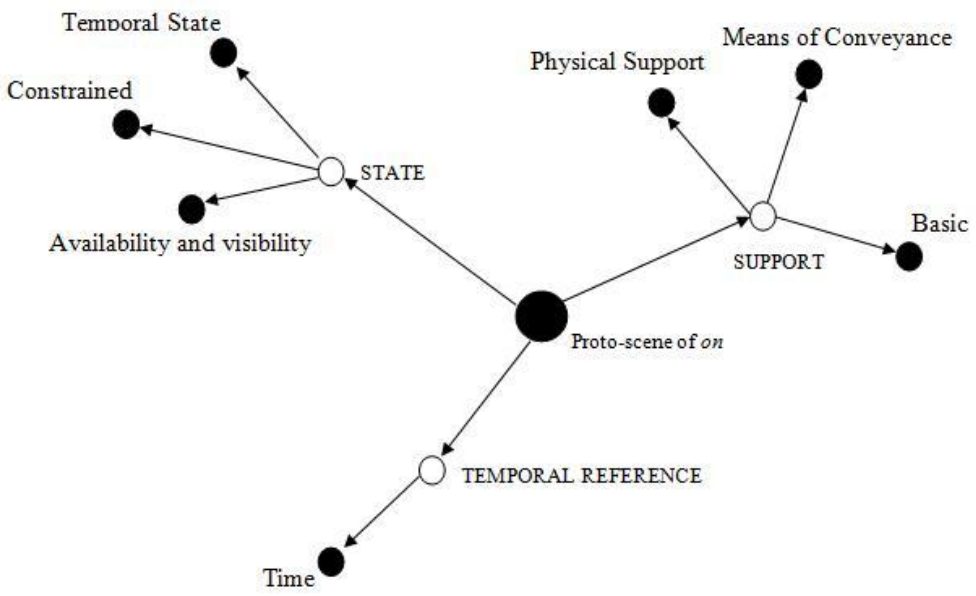


Figure 5-17 Revised semantic network for *on*

The revised semantic network for *on* (Figure 5-17) is compared to the semantic network for *shàngmiàn* 'upside' (Figure 5.5) in Figure 5-18. The revised semantic network for *on* is presented in black, and the semantic network for *shàngmiàn* 'upside' is presented in gray. The two semantic networks share some senses: the Availability and Visibility sense, the Constrained sense, the Means of Conveyance sense. *On* denotes the Temporal State sense, the Physical Support sense, the Basis sense, and the Time sense, but *shàngmiàn* 'upside' does not. On the other hand, *shàngmiàn* 'upside' denotes the Activity on LM sense, the Theme/topic sense, but *on* does not.

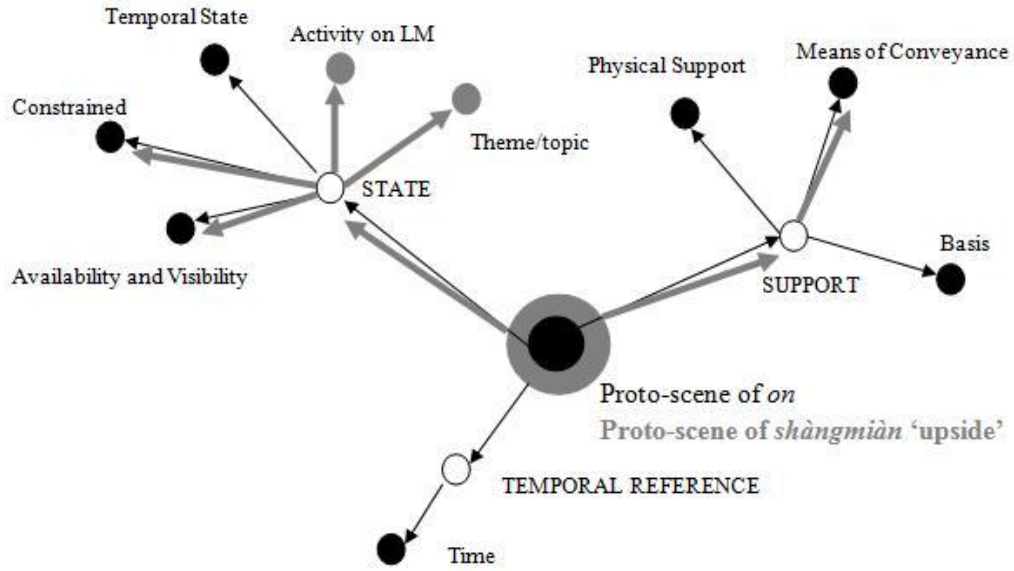


Figure 5-18 Comparison of revised *on* and *shàngmiàn* 'upside'

Third, the semantic network for *under* (Tyler & Evans, 2003) is revised. The two additional senses which are consistent with the proto-scene are removed because they should be in the definition of the proto-scene. The revised proto-scene of *under* is basically the same as the original edition (Tyler & Evans, 2003). It includes the notion of LOWER and DISTAL. It also includes the notion of COVER and CONTACT. COVER is also related to whether a TR is either completely or partially covered by a LM. When a TR is completely covered by a LM, it can relate to non-existing. The Negative State sense is added into the State cluster. The revised semantic network for *under* is shown in Figure 5-19.

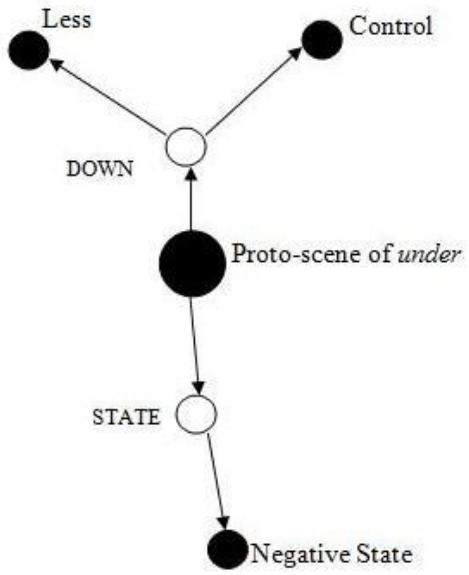


Figure 5-19 Revised Semantic Network for *under*

The revised semantic network for *under* is compared to the semantic network for *xiàmiàn* ‘downside’ (Figure 5-8) in which the State sense is split into the Negative State sense and the Positive State sense because *under* does not denote the Positive State sense. The comparison is shown in Figure 5-20. The two semantic networks share very limited senses in common. Strictly speaking, they only share the Negative State sense. Besides, they share the notion of DOWN, but not the senses. The revised *under* denotes the Less sense and the Control sense, but *xiàmiàn* ‘downside’ does not. *Xiàmiàn* ‘downside’ denotes the Descendant sense and the Positive State sense, but *under* does not.

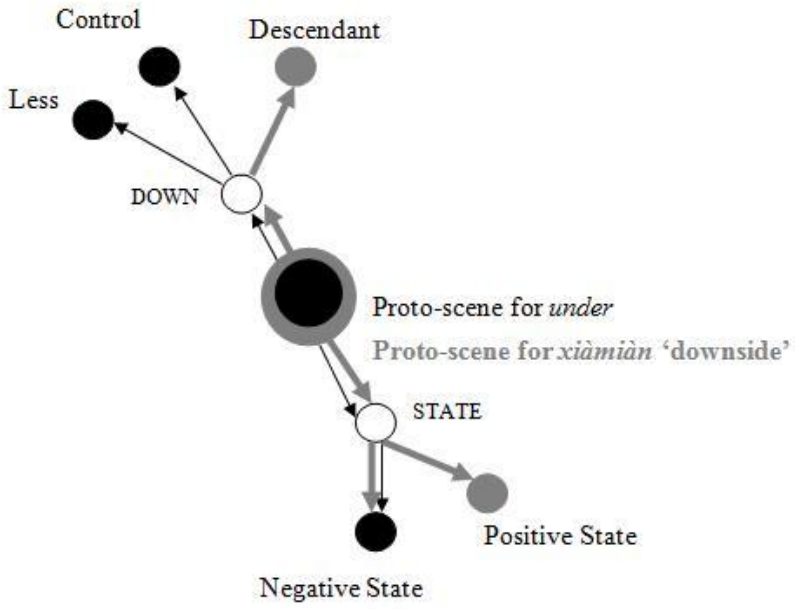


Figure 5-20 Comparison of revised *under* and *xiàmiàn* 'downside'

In addition to the semantic networks for the localizers and the three counterparts in English, the mentioned English prepositions (See Section 5.5.3) are modified to satisfy the suggestions. It is not necessary to largely revise the semantic network for *above* and *below* (Tyler & Evans, 2003) (See Figures 5-11 and 5-13). For these two semantic networks, the additional senses which are consistent to their proto-scenes should be removed. Nothing new should be added to the original edition. The rest of the senses remain as usual. The semantic network for *over* (Tyler & Evans, 2003) should be modified. The revised semantic network for *over* is presented in Figure 5-21.

The revision is mainly to remove those senses in which *over* does not function as a preposition according to the examples (Tyler & Evans, 2003). The removed senses from the original semantic network for *over* (Tyler & Evans, 2003) are: 1) the Completion sense, 2) the Over-and-above sense, 3) the On-the-other-side-of sense, 4) the Covering sense, 5) the Focus-of-attention sense, and 6) the Repetition sense. The Temporal sense in the original edition (Tyler & Evans, 2003) is changed to the Time sense in the Temporal Reference cluster. Like the revised semantic network for *in* and *on*, making the temporal reference as an independent cluster marks this sense which is

omitted in the previous study (Tyler & Evans, 2003). The revised proto-scene of *over* is more complicated than *above* and *below* because *over* not only denotes static scenes but scenes with paths. The revised proto-scene includes the notion of HIGHER and PROXIMAL which refers to static scenes. Some static scenes include the notion of COVER. In addition, the notion of EXCEED which refers to the Over-and-above sense in the original semantic network for *over*.

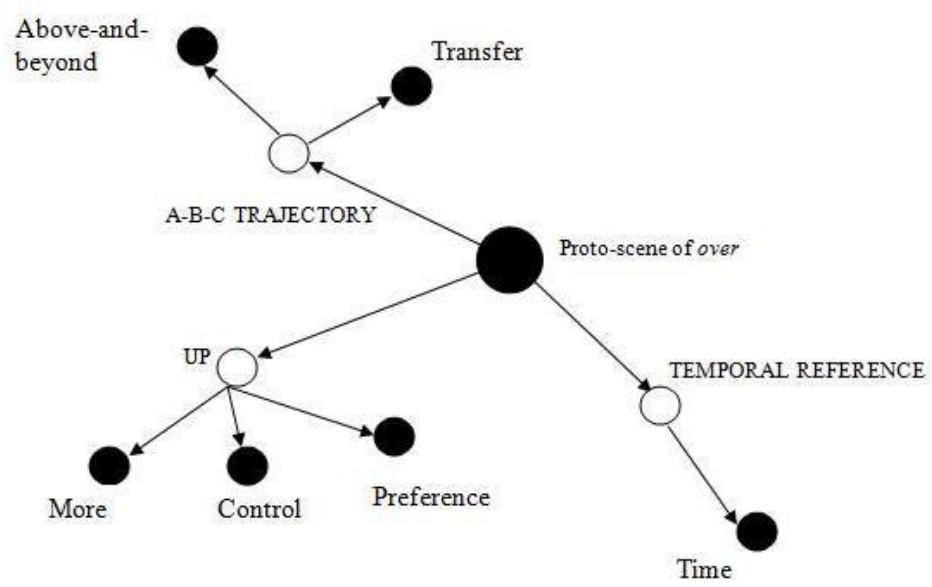


Figure 5-21 Revised Semantic network for *over*

5.6 Conclusion

This chapter aims at investigating the similarities and the differences of spatial concepts in English and Mandarin Chinese. Spatial concepts cover a wide range of linguistic fields, e.g., Syntax and Semantics. To satisfy the scope of this study, the analyses of the spatial concepts in Mandarin Chinese focus on the construction, *zài*+NP+ localizer. The localizer in the construction indicates a specific spatial relation. Without the localizer, the spatial relation is not clearly indicated. In addition, this study especially concerns verticality (the up and down relations), for it is assumed that verticality should leave ambiguities between English and Mandarin Chinese.

In Chapter IV, the TSR results suggest the Learning Difficulty Index (LDI) and Distractor Influence Index (DII). This chapter tends to compare the spatial concepts in English and Mandarin Chinese from the perspective of L1 interference. MLEs have built spatial concepts in Mandarin Chinese before studying English prepositions. Therefore, three Mandarin Chinese localizers which are related to verticality are decided. These localizers are *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside.' After the Mandarin Chinese localizers are decided, their counterparts in English are considered for the comparisons. The counterparts are *in*, *on*, and *under*. After the localizers are analyzed to build the semantic networks, they are compared to the initial counterparts.

The results show that the proto-scene of *lǐmiàn* 'inside' is similar to the proto-scene of *in*. The semantic network for *lǐmiàn* 'inside' differs from that of *in* (See Figure 5-3). Even though the proto-scenes of *lǐmiàn* 'inside' and *in* are similar, the two languages view some spatial scenes differently. The main difference refers to whether a LM in a spatial-physical scene should be treated as a two-dimensional path or a three-dimensional container. Moreover, *lǐmiàn* 'inside' and *in* denote some senses in common and some senses distinctively (See Table 5-1). *Lǐmiàn* 'inside' denotes fewer metaphorical senses than *in* does. The senses in common do not necessarily means that the uses are absolutely identical.

The proto-scene of *shàngmiàn* 'upside' is similar to the proto-scenes of *on*, and the results suggest that the proto-scene of *shàngmiàn* 'upside' is a continuum which covers the proto-scenes of *on, above*, and *over* (See Figure 5-4). *Shàngmiàn* 'upside' does not denote as many metaphorical senses as *on* does (See Figure 5-6). Besides, it does not denote any metaphorical senses that *above* and *over* denote. Similar to *shàngmiàn* 'upside,' the proto-scene of *xiàmiàn* 'downside' is a continuum that covers at least *on*, *under*, and *below*. It denotes some particular metaphorical senses that *under* denotes, but that does not necessarily mean the uses are absolutely identical. Besides, it does not denote any metaphorical senses that *on* and *below* denote.

It can be generalized that the three Mandarin Chinese localizers and the three counterparts share the same canonical spatial-physical senses, but the non-canonical

spatial-physical senses leaves ambiguities between the two languages. The Mandarin Chinese localizers denote a very limited number of metaphorical senses that are similar to the English counterparts denote. Even though they denote some metaphorical senses in common, the uses in the two languages still differ.

CHAPTER VI
COGNITIVE EXPLANATION FOR MANDARIN CHINESE SPEAKERS' DIFFICULTIES WITH ENGLISH PREPOSITIONS

This section is to trace the relationships between Mandarin Chinese speakers' difficulties with English prepositions shown in the test results and their cognitive systems represented by the semantic networks. The analyses are to answer the third research question: *Do the similarities enhance the comprehensibility of the spatial relations in the two languages and the differences suggest the learning difficulties for Mandarin Chinese learners of English?* The answers are also to prove the third hypothesis: *The similarities within the semantic networks for the spatial relations in the two languages enhance the ease of learning, and the differences suggest the learning difficulties.* The analyses are conducted to discuss the spatial scene in each test item and trace the relationships between the test results (Chapter IV) and the revised semantic networks (Chapter V).

6.1 Types of transfer

The purpose of this chapter is to investigate how the similarities and differences between two languages help language learning or vice versa. The investigation, based on the above-mentioned sources of errors and factors, emphasizes whether the spatial scenes in the TSR are related to positive transfer, negative transfer, or non-transfer. Categorizing different types of transfer for this study is complicated because one Mandarin Chinese localizer may include a couple of English prepositions. One test item is to test one English preposition, and that English preposition may or may not have a counterpart in Mandarin Chinese. When there is a counterpart, the counterpart would cover several English prepositions. There is only one the most appropriate option to each test item with three distracters. Considering whether a distracter is negative transfer or non-transfer in this study can be multi-faceted and causes controversy. To avoid ambiguities, categorizing types of transfer for this study is streamlined as shown in Figure 6-1. The analysis in this chapter is to qualitatively discuss the spatial scenes in the test items especially associated with the findings in Chapter V. In addition, the analysis is also to investigate the reasons why the participants chose the options in the cognitive approach

and generalize cognitive features. Adopting the concepts of contrastive analysis and error analysis for the analysis should best yield satisfactory outcomes.

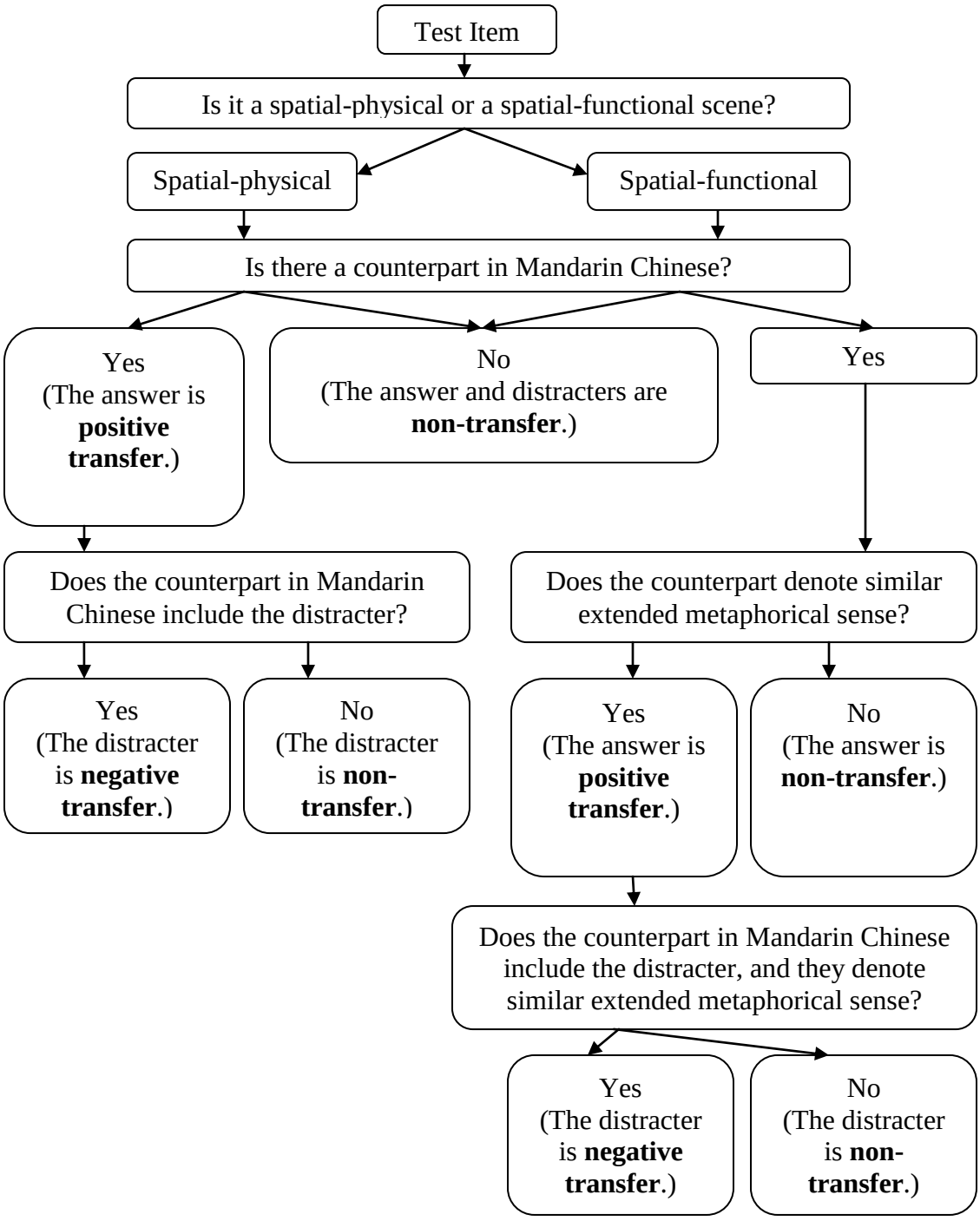


Figure 6-1 Categorizing types of transfer

6.2 Cognitive features between *above* in English and related spatial concepts in Mandarin Chinese

There were five test items which contained *above* as the answer. Three of them (Q14, Q26, and Q43 in Appendix E and also see Section 6.2.1 below) denote spatial-physical scenes; two of them (Q13 and Q20) denote spatial-functional scenes. The analyses are conducted mainly based on the semantic networks for *above* (Tyler & Evans, 2003) and *shàngmiàn* (upside) as well as Learning Difficulty Index (LDI) and Distractor Influence Index (DII). LDI as shown in Chapter IV includes Absolute Difficulty (AD), Major Difficulty (MaD), Minor Difficulty (MiD), and Fair Difficulty (FI). DII includes Fair Influence (FI), Minor Influence (MiI), Major Influence (MaI), and Absolute Influence (AI). The related spatial concepts are mentioned to supplement the analyses. The proto-scene of *above* is defined rather simple. The notion of HIGHER POSITION and DISTANT applies. The proto-scene for *shàngmiàn* 'upside,' according to Chapter V, covers at least *above*, *on*, and *over*.

6.2.1 Spatial-physical scenes of *above*

- Q14: *It is easy to find the bank in the building. It is <u>above</u> McDonald's*.
- Q26: *Daniel: My note's ready. Where do you think I should put the recipient's name? Susan: Write it just <u>above</u> the subject of your note.*
- Q43: *The picture is hanging <u>above</u> the sofa.*

The underlined prepositions were left blank, and the participants were required to choose the most appropriate options to fill up the blanks. In Q14, the TR is *bank*, and the LM is *McDonald's*. The preposition should mediate the TR-LM configuration. The answer was *above* for this test item to denote a spatial-physical scene. This test item is a MaD, and *at* functions as a MiI. The rest of the distractors, *from* and *on* function as FIs. In Q26, the TR is the pronoun, *it* which refers to *the recipient's name*. The LM is *the subject of your note*. Q26 is a MaD, and *at* functions as a MiI while *from* and *through* function as FIs. *The picture* in Q43 is the TR, and *the sofa* is the LM. Q43 is a MiD, and *at*, *over*, and *with* are all FIs.

To analyze these three test items, the proto-scene of *shàngmiàn* ‘upside’ first takes part because it covers the proto-scenes of *on*, *over*, and *above*. According to Hierarchy of Difficulty, it can be categorized into Level 5, which means that a spatial concept in Mandarin Chinese refers to at least three English prepositions. Based on the strong version of contrastive analysis hypothesis, these test items should cause noticeable difficulties because the proto-scene of *above* is just a part of the proto-scene of *shàngmiàn* ‘upside’. The concept of *shàngmiàn* ‘upside’ is a continuum which contains the spatial scenes in which the TRs are anywhere in the upper position of the LMs. In addition, as mentioned in Chapter V, the notion of layers or rankings which *above* denotes is not mentioned in the semantic network for *above* (Tyler & Evans, 2003) and *shàngmiàn* ‘upside.’ Hence, this notion seems weak and ignorable to MLEs. Nevertheless, the spatial-scenes in Q14, Q26, and Q43 are not absolutely unfamiliar to MLEs. Consider the following examples:

(1) 銀行　在　麥當勞　上面
Yínháng *zài* màidāngláo *shàngmiàn*.
bank at McDonald’s upside
‘The bank is above McDonald’s.’

(2) 收件人　的　名字　寫　在　主旨　上面
Shōujiànrén de míngzì xiě *zài* zhǔzhǐ *shàngmiàn*.
Recipient particle name write at subject upside
‘Write the recipient’s name above the subject.’

(3) 那　幅　畫　掛　在　沙發　上面
Nà fú huà guà *zài* shāfā *shàngmiàn*.
that CL picture hang at sofa upside
‘That picture is hanging above the sofa.’

In the examples, *shàngmiàn* ‘upside’ is used to describe the spatial scenes. This localizer can refer to more than one English prepositions, such as *on, above*, and *over*. Language transfer might evolve from the confusion.

In Q14, even though *on* is one of the distractors, most of the participants were influenced by *at*. The outcome was not expected from the comparison of the two languages. When the TSR was being created, *on* was considered to distract the participants most because it was covered in the proto-scene of *shàngmiàn* ‘upside.’ It is

possible that, for MLEs, *on* is conceptualized more with the notion of CONTACT and SUPPORT. In this case, the test item did not confuse and lead the participants to link the notion to *shàngmiàn* ‘upside’ and then influence their decisions between *on* and *above*. The test result of Q43 is different. The distractor *over* is the same as an FI as *at* and *with*, but the actual frequent count of *over* (thirteen) is slightly more than *at* (ten) and *with* (four) in quantity. It is possible to explain the result that the fine line between *above* and *over* is not preciously conceptualized by MLEs.

At functions as a MiI in Q14 and Q26. It is extraordinary because there is not a Mandarin Chinese localizer which is parallel to *at* or can be seen as a counterpart of *at*. Therefore, the use of *at* is rather arbitrary to MLEs. Since it is arbitrary, MLEs learn how to use it simply from the pedagogical descriptions. It is normal that, in a language classroom, instructors introduce *at* as a preposition to precede a relatively smaller place (e.g., *at home*) to learners. It is usually compared to the use of *in* which is introduced as a preposition to precede a relatively larger place (e.g., *in Bangkok*) in terms of measure of area. Such descriptions are inappropriate because the notion of CO-LOCATE is not mentioned or covered at all. Nevertheless, it is also hard to reject the descriptions. For example, it is common to use *at the airport* while *in the airport* is also acceptable. CO-LOCATE is more likely to be the dominating factor in the use of *at*, but this minimal distinctiveness is not paid much attention. Since the use of *at* is arbitrary to MLEs, it could be a possible option in several spatial scenes, especially when MLEs are not confident of which English preposition preceding a place (a LM) should be the most appropriate. In this case, perhaps MLEs were not aware of the spatial scene the test item was supposed to denote. Consequently, *above* was not taken into consideration. They merely chose *at* to make the test item to form a spatial sense which looked more familiar than the rest of the prepositions would. Plus, the LM is *McDonald’s*, which is a relatively smaller place when *in the building* appears in the test item, so *at* functioned as a MiI.

As a matter of fact, *from* is not covered in the proto-scene of *shàngmiàn* ‘upside;’ therefore, it can be anticipated that *from* functions as a FI. Furthermore, some other features of *from* are emphasized in a language classroom. It is strongly related to a starting point which *from* denotes. First of all, MLEs are taught that *from* is used to

indicate traverse (e.g., *He borrows some pens from me*.). Traverse refers to an object which moves from one point to another due to the action. In other words, there should be a verb triggering the traverse. In Q14, such a verb is not seen, so *from* was not taken. Second, in some cases, an ending point should follow a starting point. For example, *He walks from the library to the cafeteria*. *From* would be more likely to collocate with *to* for indicating a complete traverse. In Q14, this use of *from* does not seem to happen to MLEs. However, in Q26, the actual frequency count of *from* is seventeen. According to DII, it is a FI, but it actually was chosen by a noticeable number of the participants. Possibly, those MLEs who did not fully understand the spatial scene in the test item; therefore, they randomly chose one option to fill in the blank.

Table 6-1 sums up the discussions regarding the use of *above* for spatial-physical senses. Since the proto-scene of *shàngmiàn* 'upside' covers the proto-scenes of *on*, *above*, and *over*, in this group, that *above* was chosen is considered positive transfer. That *on* and *over* were chosen is considered negative transfer. When some other prepositions were chosen, it is considered non-transfer. Positive transfer does not seem to function in the case, and negative transfer does not seem to influence the performance much, either. The distracters in these test items are mostly non-transfer.

Table 6-1 Summary of *above* indicating spatial-physical scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q14	Level 5	MaD	*at* (MiI/Non)	*from* (FI/Non)	*on* (FI/NT)
Q26	Level 5	MaD	*at* (MiI/Non)	*From* (FI/Non)	*through* (FI/Non)
Q43	Level 5	MiD	*at* (FI/Non)	*over* (FI/NT)	*with* (FI/Non)

6.2.2 Spatial-functional scenes of *above*

- Q13: *It is pretty cold outside. I guess the temperature is just <u>above</u> freezing.*
- Q20: *The toy is made for kids <u>above</u> the age of 3. Don't give it to your baby girl.*

In Q13, the suggested preposition is *above* to mediate the TR, *the temperature* and the LM, *freezing*. Q13 is a AD. Among the distractors, *on* and *over* functioned as MiIs, and *from* functioned as an FI. In Q20, *above* mediates the TR, *kids* and the LM, *the age of 3*. Q20 is a MiD, and the distractors, *from*, *in*, and *through* functioned as FIs.

The English prepositions, *above*, *on*, and *over* are covered in the same concept in Mandarin Chinese, but the spatial-functional senses that *shàngmiàn* 'upside' denotes does not cover all the spatial-functional senses that the three English prepositions denote. According to the test results, the spatial-functional scene in Q13 is arbitrary to MLEs. In other words, the sense that *above freezing* denotes does not exist in *shàngmiàn* 'upside.' According to Hierarchy of Difficulty, it refers to overdifferentiation, a Level 4 of difficulty. The participants chose *on* and *over* probably because they tried to cognitively transfer the concept of *shàngmiàn* 'upside' toward the uses of the two English prepositions. Between *on* and *over*, the frequency counts of the two prepositions (nineteen and thirty-five, respectively) still suggest a significant difference in which *over* distracted the participants far more than *on* did. As stated earlier, a fine line between *above* and *over* is not preciously conceptualized by MLEs. This fact influences how the participants judged which English preposition would be the most appropriate to fit in the test item. Plus, the semantic network for *shàngmiàn* 'upside' does not cover any extended senses especially the measuring systems (e.g., temperature) as *above* denotes. For example, *It is above freezing/boiling point*. It is relatively an abstract concept for MLEs to learn the differences between the two prepositions for a spatial-functional sense. According to the result, *over* was preferred probably because it was mainly viewed as a concept of EXCESS. Moreover, it is also possible to say that both of the semantic networks for *above* and *over* denote the More sense; nevertheless, the More sense in the semantic network for *above* is not identical to the semantic network for *over*. This feature should cause learning difficulties.

The use of *above* is still cognitively traceable to MLEs from another perspective. The perspective refers to the Up clusters in the semantic networks for *above* and *over*, which are still related to *shàngmiàn* 'upside.' *Shàng* 'up' as in *shàngmiàn* 'upside' is studied and found that SUPERIOR IS SHANG is one of the four metaphors which are

related to the prototypical sense (Kim, 2005). For Q20, the majority of the participants chose the answer. It explains that the notion of MORE/SUPERIOR is familiar to MLEs. It can expected that if *over* was included as one of the options, it could probably influence the performance to a noticeable degree. Other than *above*, some of the participants chose *on* for Q13 and *in* for Q20 instead, for a possibility that they did not understand the senses in the test items and then chose *in* and *on* to make the test items look like familiar spatial scenes. There is another possibility that when some participants were trying to make a decision from the four options, they were not led to the spatial scenes in the test items by the contexts. Consequently, guessing took place.

The above discussions are compiled in Table 6-2. All the distracters in this group are considered non-transfer because the two languages do not share the senses in common. Language transfer does not seem to happen. However, cognition should not merely take place only in a certain construction. Note that this study focuses on the construction. Mapping and transfer can start from some similar concepts which are not in the construction. For example, the notion of UP might function as a factor for cognitive mapping, but it is not in the construction. It does not necessarily mean that UP would not trigger cognitive mapping.

Table 6-2 Summary of *above* indicating spatial-functional scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q13	L4	AD	*from* (FI/Non)	*On* (MiI/Non)	*over* (MiI/NT)
Q20	L4	MiD	*from* (FI/Non)	*in* (FI/Non)	*through* (FI/Non)

6.3 Cognitive features between *at* in English and related spatial concepts in Mandarin Chinese

There are seven test items which contain *at* as the answer. Two of them (Q10 and Q55) denote spatial-physical scenes; five of them (Q8, Q11, Q12, Q25, and Q30) denote spatial-functioned scenes. The preposition, *at* has not yet been formally studied with Principled Polysemy. However, the most important notion of the proto-scene of *at* is CO-

LOCATE (Tyler & Evans, 2003). Since a counterpart in Mandarin Chinese of *at* cannot be found, the discussions are conducted to explore how *at* was chosen and whether the distractors that were most chosen reveal concrete cognitive features based on LDI and DII.

6.3.1 Semantic network for *at* based on dictionary entries

At has not yet been studied in Principled Polysemy, but a quick semantic network for *at* can be created by analyzing the entries in the dictionary for this study. This section is not included in Chapter V because there is not a concrete counterpart of *at* in Mandarin Chinese. It cannot be compared; therefore, it is separated. In Longman Dictionary of Contemporary English (2009), *at* denotes 18 senses. These senses are reorganized according to the discussions. The eighteen senses are listed below. They are not sorted in the original order in the dictionary.

1. used to say exactly where something or someone is, or where something happens, e.g., *at 18 Victoria Street* and *at the bus stop*.
2. used to say what someone tries to touch, or keeps touching, e.g., *clutched at the rope* and *picking at his food.*

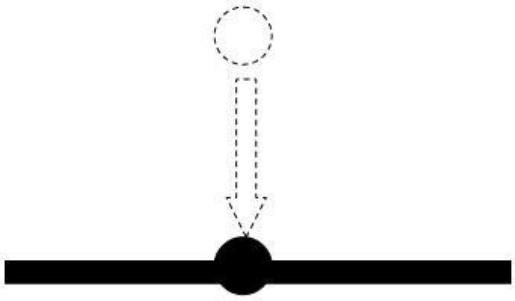


Figure 6-2 Proto-scene of *at*

Entries 1 and 2 can refer to the proto-scene of *at* (Figure 6-2). The TR physically interacts with the LM at a certain point indicating CO-LACATE. Let's first examine Entry 1. *At* treats the LM as a one-dimensional point. When *at* is used to indicate a

physical location, it is different from *on* and *in*. The difference would be minute to MLEs, or MLEs cannot be aware of the difference. Especially when a LM is described in a slightly different way, the English prepositions vary in meanings. For example, *at 18 Victoria Street* is used because *18*, which refers to a very specific location, is indicated. When *18* is removed, *on Victory Street* should be the most appropriate phrase. *At the bus stop* is used because *stop* does not refer to a concrete building which can be seen as a bounded area. However, *at a bus station* and *in a bus station* are both acceptable in this case even though they are semantically different to NSEs. They would confuse MLEs who cannot see the difference. In Mandarin Chinese, whether a localizer is used seems to make a difference in this case. For example,

(4) 我 在 車站 裡面
Wǒ *zài* chēzhàn *lǐmiàn*.
I at bus-station inside
'I am in the bus station.'

(5) 我 在 車站
Wǒ *zài* chēzhàn.
I at bus-station
'I am at the bus station.'

Example (4) is expressed with the localizer, *lǐmiàn* 'inside' where Example (5) without. It is likely that when expressing a physical location without localizers, *at* is more appropriate in English. This would help MLEs clarify the uses of the three similar and confusing English prepositions, *in*, *on* and *at*. It can be confirmed by the following two examples,

(6) 我 住 在 中山 路 上面
Wǒ zhù *zài* zhōngshān lù *shàngmiàn*.
I live at Zhōngshān Road upside
'I live on Zhōngshān Road.'

(7) 我 住 在 中山 路 八 號
Wǒ zhù *zài* zhōng shān lù bā hào.
I live at Zhōng Shān road 8 number
'I live at No. 8 Zhōng Shān Road.'

In Example (6), *shàngmiàn* 'upside' is indicated without an exact number. Example (7) shows the exact number, and *shàngmiàn* 'upside' is not used. It is likely that when an

exact number on a road is indicated in Mandarin Chinese, *shàngmiàn* ‘upside’ is not compulsory. This is identical to the uses of English prepositions. This feature should be introduced to MLEs.

Entry 2 denotes a spatial-physical sense, but it is distinct from Entry 1. The scene in Entry 1 is more likely to have the whole TR involved in the LM as a point; the scene in Entry 2 includes part of the TR connecting to the LM. The area that the TR and LM connect is viewed as a one-dimensional point. For example, *clutched at the rope* indicates a person touches the rope with one or two hands. The part of the rope touched by the person is just a portion of the whole volume; hence, it is viewed as a point. *Picking at his food* provides a scene where the TR touches or tries to touch the LM especially with two fingers, especially the index finger and the thumb which meet at a point. To sum up, Entry 1 and 2 explain that the proto-scene of *at* indicates the TR CO-LOCATE with the LM either partially or completely.

Apart from the proto-scene, the following entries provide instances of the extended metaphorical meanings. Start from the Location cluster in which the LMs are treated as a bounded area. The boundary that *at* indicates is not as much emphasized as that *in* does.

3. used to say what event or activity someone is taking part in, e.g., *at a meeting* and *at lunch*.
4. used to say that someone is studying somewhere regularly, e.g., *at school* and *at Oxford*.

Entry 3 and 4 can be categorized into the Activity sense. In this sense, the TRs participate into the LMs, some activities. There is a difference between Entry 3 and Entry 4. The length of time of the activities makes the difference. In Entry 3, for instance, *at a meeting* and *at lunch* indicate two short activities in length whereas in Entry 4, *at school* and *at Oxford* indicate two relatively time-consuming activities. The activities in Entry 3 last a short period of time, e.g., one hour or a couple of hours. The activities in Entry 4 last at least months or years. There is one more feature in Entry 4 that the LMs symbolize the places where the TRs belong. They identify what the TRs are.

Entry 5 and 6 can be seen as the Time sense in the Temporal Reference cluster, which means they indicate an exact time or a particular period of time. When it denotes a particular period of time, the LMs are viewed as a whole. The activities that take place during the period of time are not described in detail. When it has to describe the activities in detail, some other prepositions and LMs are used. For example, *on the first day of Christmas* or *in the early evening*.

5. used to say exactly when something happens, *at eight o'clock*.
6. during a particular period of time, e.g., *at night* and *at Christmas*.

The Target sense in the Path cluster best described Entry 7 and 8. In these two entries, the LMs are the targets which are viewed as a point. The spatial scene refers to a path linking the TRs and the LMs. The path in the sense is not marked, which is different from the path that *over* as in *the cat jumps over the wall* denotes. The path as *over* denotes is clearly displayed where the path as *at* denotes emphasizes the end of the path (or the target). *The* path cannot be seen in the semantic networks for *in* and *on*, but when they collocate with *to*, the path is clearly indicated. For example, *walk into a room* and *first step onto the moon*. It should be noted that *throw stones at me* should be seen as a spatial scene which belongs to the proto-scene. The proto-scene of *at* should include the notion of TARGET. The difference between *throw stones at me* and *throw stones to me* is that the end of the path of *at me* is the TR; that of *to me* is not necessarily the TR.

7. used to say which thing or person an action is directed towards or intended for, e.g., *shout at me* and *throw stones at me*.
8. used to say what or who causes an action or feeling, e.g., *laughed at his jokes* and *mad at me*.

The following senses can be categorized into the same cluster, the State cluster. *At* as in Entry 9 and 10 refer to the Skill sense. This sense denotes whether TRs succeed or fail in the LMs. Entry 11 and 12 are likely to refer to the State sense. The TRs are in a certain state either voluntarily or involuntarily showing situations (e.g., *at risk*) and willingness (e.g., *attempt at a piece of research*). According to Principled Polysemy (Tyler & Evans, 2003), all the senses are similar but still distinct. What is distinct is not obviously stated. The features should be clarified from the similarities.

9. used to say which subject or activity you are talking about when you say whether someone is skilful, successful etc or not e.g., *good at maths* and *bad at handling people*
10. used to say that, at a particular time, someone or something is as good, bad etc as they can be, e.g., *at its best* and *at his most powerful*.
11. used to say that someone or something is in a particular state e.g., *at war* and *at risk.*
12. used to say what someone tries to do, e.g., *attempt at a piece of research* and *have a go at growing them.*

The following two entries illustrate the Base sense in the Support cluster. Actions are done or words are said based on someone or something. In this sense, the prepositional phrase stands independently. It provides more information to support the TR. When it is removed, the main clause still functions. The semantic of the clause does not change or leaves ambiguity. For example (Longman Dictionary of Contemporary English, 2009), *At my suggestion, Bernard went to see his former teacher*. When *at my suggestion* is removed, *Bernard went to see his former teacher* still provides enough information.

13. because of what someone has said, e.g., *at my suggestion* and *at the invitation*.
14. A: also or besides, e.g., *It's a new idea, and a good one, at that.* B: after something is said, e.g., *Tess called him a liar and at that he stormed out of the room.*

Entry 15 refers to the Value sense in the Quantity cluster. In this sense, *at* introduces the LM which is a value in a measuring system to describe the TR. It is similar to the measuring system in the semantic network for *above* and *below*, e.g., *above freezing*. In other words, *at*, *above*, and *below* should be introduced as a group to learners for clarifying the uses.

15. used to show a price, rate, level, age, speed etc, e.g., *travelling at about 50 mph* and *selling at 10 cents*.

Entry 16, 17, and 18 are not concerned because they are rather informally used in spoken contexts. The descriptions and the examples are not evident or clear enough to generalize a separate feature. They are more likely to be the shortened forms based on the above-

mentioned senses. For example (Longman Dictionary of Contemporary English, 2009), *I'm just going for a cup of coffee. Shall I bring you one while I'm at it* is probably related to the proto-scene or the State sense. *While I am at it* can refer to *at the coffee shop* or *at the state of having a cup of coffee* in the store.

16. (*old-fashioned informal*) used to say that a place or activity is very popular, exciting, and fashionable, e.g., *be where it's at*
17. (spoken) used to suggest that someone should do something while they are doing something else, e.g., *Shall I bring you one while I'm at it?*
18. (informal) if you say that someone is at it again, you mean that they are doing something you disapprove of, which they have done before, e.g., *She's at it again. Interfering in other people's business.*

To sum up, the semantic network for *at* (Figure 6-3) based on the dictionary includes the proto-scene which denotes CO-LOCATE and TARGET, the Location cluster, the Temporal Reference cluster, the Path cluster, the State cluster. The Location cluster includes the Activity sense. The Temporal Reference cluster includes the Time sense. The Path cluster includes the Target sense. The State cluster includes the Skill sense and the State sense.

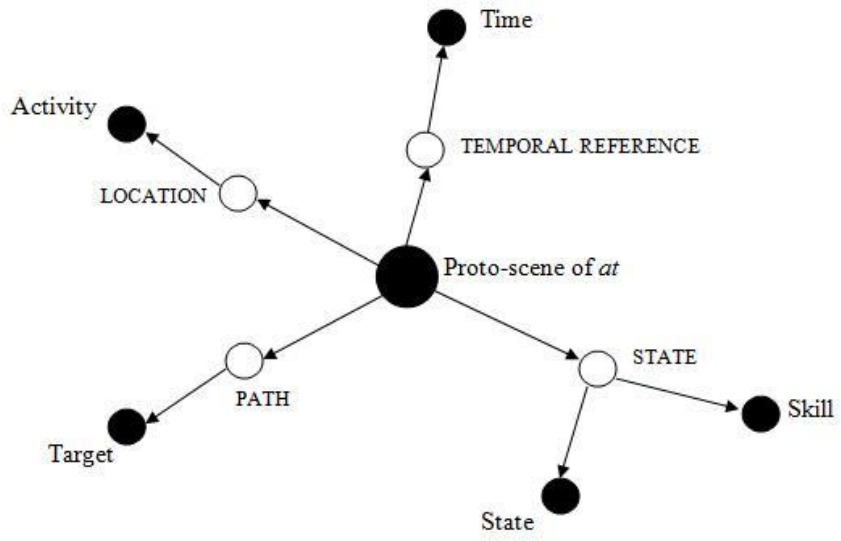


Figure 6-3 Semantic network for *at*

6.3.2 Spatial-physical scenes of *at*

- Q10: *Susan studied very hard in high school. She then became a student at Harvard in the 1980s.*
- Q55: *Snoopy is sitting at the desk.*

First of all, according to Hierarchy of Difficulty, both of the two test items in this group is Level 4 of difficulty because the use of *at* does not exist in the parallel construction in Mandarin Chinese. Second, it can be controversial to categorize *at Harvard*. This spatial scene was first considered a spatial-physical scene. The LM, in a modern view, does not necessarily physically CO-LOCATE with the LM, e.g., a student status with an online learning program. It leaves uncertain and disputable because the sense can also be seen as a spatial-functional scene as in the previous section. In this study, the test item was considered one example of spatial-physical scenes in a traditional view when the test items were sorted into SP and SF groups for statistic calculations. On

the contrary, the analysis in Section 6.3.2, Chapter VI categorizes a scene such as *at Harvard* into one of the metaphorical uses.

According to the LDI, Q10 is a MiD, which means a significant number of the participants chose the answer. *On*, *under,* and *with* function as FIs. According to the TSR results, the three distracters were chosen by different numbers of the participants. *On* was chosen by fifteen participants. It was most preferred among the three distracters. It can be related to the observed situation that the three prepositions, *in*, *on*, and *at* frequently make MLEs confused in various cases by most MLEs. More accurately, MLEs are confused with pairs of *in* and *on*, *in* and *at*, and *on* and *at*. These confusions are caused because the two language users view an LM distinctively. In some cases, the LM is viewed as a three-dimension container by English speakers while Mandarin Chinese users view it as a two-dimension path. The use of *at* is not well conceptualized, and MLEs commonly relate *at* to *in* or *on*. In this case, in was not one of the distracters; therefore, most of the participants who did not choose *at* preferred *on*.

In Q55, the TR is *Snoopy*, and the LM is *the desk*. According to LDI, the test item is a MaD. *On* was preferred among the distracters: *in*, *on*, and *under*. *In* and *under* was not chosen by significant numbers of the participants because the enclosed image apparently does not show INCLUSION or LOWER POSITION. *On* is a MiI, and the authentic figure shows that thirty-two participants chose it as the answer. It was preferred possibly because the participants linked the scene with *on the chair* when they were not confident with the use. The LM physically interacts with the chair, and *on* seems the most appropriate option in this case if it is compared to *in* and *under*. It would be difficult for MLEs to choose the answer because in the scene as shown in the image, MLEs would prefer:

(8) 坐　在　桌子　前面
Zuò *zài* zhuōzǐ *qiánmiàn*.
sit at desk front
‘(Someone) sits in front of the desk.’

The use of *qiánmiàn* ‘front’ refers to mirror-image alignment in a closed scene (Tyler & Evans, 2003). Tyler and Evans (2003) elaborate that in a closed scene involving a

inanimate scene, "the LM is construed as having a front/back orientation because of the way in which such LMs are typically accessed." More examples are:

(9) 坐 在 電視機 前面
Zuò *zài* diànshìjī *qiánmiàn*.
sit at television front
'(Someone) sits in front of the TV.'

(10) 坐 在 電腦 前面
Zuò *zài* diànnǎo qiánmiàn.
sit at computer front
'(Someone) sits in front of the computer.'

It could not be found that any of the options in Q55 was related to the concept of *qiánmiàn* 'front,' and that should cause a learning difficulty. It would be possible that they first excluded *in* and *under* (as one of the test taking strategies), for the fact that the two prepositions do not seem reasonable to collocate with the LM, *the desk*. Most of them made a decision between *at* and *on*.

It is shown in Table 6-3 that choosing the distracters is not related to either positive or negative transfer because the uses of *at* for spatial-physical scenes are abstract to MLEs. When it is abstract, MLEs do not have a concrete base to link the two languages. They are more likely to apply what they have learned from pedagogical descriptions regarding the prepositions to the unfamiliar scenes. Guessing maybe based on some weak features occur in this case.

Table 6-3 Summary of *at* indicating spatial-physical scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q10	L4	MiD	*on* (FI/Non)	*under* (FI/Non)	*with* (FI/Non)
Q55	L4	MaD	*in* (FI/Non)	*on* (MiI/Non)	*under* (FI/Non)

6.3.3 Spatial-functional senses of *at*

- Q08: *My father's garden is full of flowers and plants. I think it is <u>at</u> its best in June.*
- Q11: *Jessica is patient. She is good <u>at</u> making things out of junk.*

- Q12: *Let's leave for mountain climbing <u>at</u> dawn. We should wake up very early.*
- Q25: *Mary: We're going to have a math test tomorrow morning. Bryan: I am never <u>at</u> ease when taking a test.*
- Q30: *Naomi: How did you feel when your father told you the destination for the family trip this year? Angie: My sister and I, <u>at</u> the same time, screamed out loud.*

Same as the spatial-physical sense, the use of *at* is abstract to MLEs. According to LDI, Q8 is a MaD. *On* is a MiI, and *in* and *under* are FIs. Between *in* and *under*, there is still a difference. *In* was chosen by seventeen participants while *under* was chosen only by eight participants. *Under* denotes DOWN and LESS, which do not implicate what *its best* in the context tends to denote. *Under* is also related to *xià* 'down' as in *xiàmiàn* 'downside'. One of the metaphors which are related to the prototypical sense is *XIÀ* IS INFERIOR (Kim, 2005). INFERIOR is opposite against what *at its best* denotes. Therefore, it is comprehensible that *under* did not influence much of the participants' performance. Once again, *in*, *on*, and *at* are confusing as they are members in the same group. In this case, *on its best* was preferred to *in its best*. According to the semantic network for *at*, *at* denotes the notion of STATE. In the network, a sense such as *at its best* is considered the Skill sense in the State cluster. *Its best* can refer to the peak of something which is viewed as a point. For example, a pyramid is often used to metaphorically refer to the levels of a category. Top of the pyramid symbolizes the elite, which graphically shows a point. This feature should be introduced to MLEs. Q11 also denotes the Skill sense. It is a FD which means sixty-two participants chose the answer. The distracters, *above*, *over*, and *with* almost did not influence the performance simply because they do not denote senses similar to the Skill sense in the State cluster. If these distracters were replaced with *in* and *on*, the test result would have been different. Both *in* and *on* denote STATE even though SKILL is not exactly included in their semantic networks.

At dawn in Q12 is a MaD, which refers to the test result that only twenty-six participants chose the answer. *At* denotes the Time sense as *in* and *on* do. The time sense that *at* denotes views time a point, not a bounded area or a path. It is more likely to emphasize a short period of time, e.g., *dawn* or seven o'clock. *Dawn* should be seen as a

short period of time because it often refers to the moment that the sun rises. Sometimes, *at* can refer to holidays, e.g., *at Christmas*. The holidays should include several days either before or after the exact holidays. In American culture, people usually have several days off school or work before and after Christmas or Thanksgiving. Those days are viewed as a whole. Therefore, When *at* is used to indicate a specific of time, the time is treated as a whole chunk. It is not likely to be parted to describe anything in detail. In Q12, *in dawn* and *on dawn* were chosen by twenty-one and sixteen participants, respectively. Both of *in* and *on* also denote the time sense. It is obvious that MLEs do not distinguish the differences. *With dawn* was chosen for some reason that is not easily traceable because it seems not to denote the time sense. Plus, *with* is not the focus in the study. Detailed discussion regarding *with* is excluded. At least, this test item exemplifies MLEs' confusion among *in*, *on*, and *at*.

The Time senses that *in*, *on*, and *at* denote are of minute differences. In Tyler and Evans' study (2003), time reference is not included when spatial particles are examined. In this study, it is believed that there should be clues to relate time reference with spatial concepts. To contrast *in*, *on*, and *at*, Table 6-4 summarizes the uses of these three English prepositions.

Table 6-4 Uses of *in*, *on*, and *at* for time reference

Units of time reference	Prepositions		
	in	*on*	*at*
Year e.g., *He started to work in the company in 2012.*	X		
Season e.g., *The weather is good in Spring.*	X		
Month e.g., *It rains a lot in March.*	X		
Week e.g., *Turn in this assignment in the first week of July.*	X		
Parts of a week e.g., *We usually go grocery shopping on weekends.*		X	
Day/holiday e.g., *She does not work on Monday.* e.g., *There are lots of activities on Martin Luther King Jr. Day*.		X	
Parts of a day/specific day e.g., *The traffic is bad in the afternoon.* e.g., *Let's go to a movie on Sunday afternoon.*	X	X	
Holiday season (several days around a holiday) e.g., *Family members get together at Christmas.*			X
Points of time in a day e.g., *I usually go to bed at midnight.*			X
Clock time e.g., *The game will start at 19:00.*			X

The units for time reference in English are listed from top to bottom according to the lengths. Generally speaking, the English prepositions change from *in* to *at* from top to bottom in Table 6-4, and indicating time reference becomes more specific. When there are sub-units in a main category, the uses of English prepositions change. The uses in the bold boarder especially cause confusions. Under Week, there is Parts of a week. For Parts of a week, *on* is used. Under Day/Holiday, there are Parts of a day/specific day, Holiday season, and Points of time in a day. The uses of prepositions for these three sub-units vary. For Parts of a day/specific day, *in* and *on* are used. The uses are confusing because the features are nearly identical. Points of time in a day is relatively comprehensible when the notion of POINT is clarified. It can be said that when a specific date/day is mentioned, the use of *on* dominates. Otherwise, when a more specific time is mentioned, it is likely to use *in* and *on* no matter what units of time reference it is. Holiday season refers to a holiday itself excluding the around days. For example, *at Christmas* indicates

the days around Christmas, but *on Christmas* refers to Christmas Day. The overlap of the uses makes MLEs confused. From this observation, *in* seems to function in a wider range. It covers every unit of time reference. *On* and *at* function specifically for certain senses, e.g., *on Monday* and *at 7:30*. The confusion evolves when the senses in test items refer to the sub-units for time reference because at the time, *in* would have to be considered except the prepositions for the main units.

Q25 is an example of the State sense. It is a AD according to LDI. *Under* in the test item functions as a FI, which means it did not influence the performance much. *On* and *with* function as MiIs. The numbers of the participants who chose *on ease* and *with ease* were larger than that of those who chose *at ease*. It infers that *at ease*, which indicates feeling relaxed, is not conceptualized at all by MLEs; therefore, it caused the difficulty. When the participants were making a decision for this test item, they would just guess the answer from the distracters. *With ease* was chosen by thirty participants. It might be that *with ease* is also used in English to indicate doing something without difficulty. Those participants would have heard of this use, therefore, it sounded more familiar with the other options.

Q30 is a MiD of LDI. In the test result, it is obvious that the participants chose between *at the same time* and *in the same time* because **on the same time* and **under the same time* were chosen by very limited participants. The test item mentioned *my sister and I* as the subject of the sentence, in which two persons conduct one same action simultaneously. *At the same time* denotes CONCURRENT which can be related to CO-LOCATE. *In the same time* seems also possible in other cases, but not in this case. *In* is more likely to indicate the duration of one action, e.g., *My sister jogs in the same time as I do every day*. The action should at least last in length. It refers to viewing the LM as a bounded region or a container. The twenty-four participants who chose *in the same time* would not have built CO-LOCATE in the conceptualization.

There is one observation worth paying attention from Table 6-5. When language transfer does not apply, the participants relied on their understanding of the English prepositions to choose the answers. The understanding might not be thorough because the

pedagogical descriptions do not clarify the uses. For example, for Time Reference, related English prepositions, e.g., *in*, *on*, and *at* are taken into consideration, but the decisions did not meet the answers.

Table 6-5 Summary of *at* indicating spatial-functional scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q08	L4	MaD	*in* (FI/Non)	*on* (MiI/Non)	*under* (FI/Non)
Q11	L4	FD	*above* (FI/Non)	*over* (FI/Non)	*with* (FI/Non)
Q12	L4	MaD	*in* (MiI/Non)	*on* (FI/Non)	*with* (FI/Non)
Q25	L4	AD	*on* (MiI/Non)	*under* (FI/Non)	*with* (MiI/Non)
Q30	L4	MiD	*in* (MiI/Non)	*on* (FI/Non)	*under* (FI/Non)

6.4 Cognitive features between *below* in English and related spatial concepts in Mandarin Chinese

There are three test items which contain *below* as the answer. Q59 denotes a spatial-physical scene; Q17 and Q29 denote spatial-functional scenes. *Below* is related to *xiàmiàn* ‘downside’ and usually discussed with *under*. The following discussions are basically conducted to explore how *below* was chosen by the participants and whether the distracters reveal concrete cognitive features based on LDI and DII as well as Hierarchy of Difficulty (Bowen & Martin, 1965).

6.4.1 Spatial-physical scenes of *below*

- Q59: *The meat is <u>below</u> the cheese.*

There is one test item that denotes a spatial-physical scene in this group. The TR is *the meat*, and *the cheese* is the LM. Q59 is a AD, which means the majority of the participants did not choose *below the cheese* as the answer. Instead, *under the cheese* functioned as a MaI. Forty-one participants chose it as the most appropriate answer after they saw the image (See Q59 in Appendix E) with the test item. The use of *below* is not

abstract. At least, it can be related to *xiàmiàn* ‘downside.’ In Chapter V, the semantic network for *xiàmiàn* ‘downside’ is compared with that for *under*. Besides, the semantic network for *below* is also mentioned. The proto-scene of *xiàmiàn* ‘downside’ covers *below* and *under.* According to Hierarch of Difficulty, it is a Level 5 difficulty.

The reason why the majority of the participants chose *under the cheese* would be that they were not taught the notion of LAYER. As proposed in Chapter 5, the notion of LAYER should be included in measuring systems (Tyler & Evans, 2003). This notion should have been ignored in language classrooms. Consequently, the participants knew that the scene was to describe LOWER; therefore, *under* was preferred. When the notion of LAYER is not clearly introduced, the proto-scenes of *above*, *over*, *under*, and *below* (See Figure 5-11) do not explain the uses of these prepositions for spatial-physical scenes. *In the cheese* was chosen by twelve participants might cause from the image. In the image, *the meat* seems to be partially wrapped by the cheese. It meets PARTIAL INCLUSION that *in* denotes. As for *on the cheese*, CONTACT between *the cheese* and *the meat* can be related to *on*. In this case, *on* and *in* did not influence the performance much because *under* shares some features in common with *below*.

Table 6-6 shows that the confusion between *below* and *under* is obvious in Q59. These two English prepositions are merged into one Mandarin Chinese localizer. The merge causes the confusion, especially for spatial-physical scenes.

Table 6-6 Summary of *below* indicating spatial-physical scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q59	L5	AD	*in* (FI/Non)	*on* (FI/Non)	*under* (MaI/NT)

6.4.2 Spatial-functional scenes of *below*

- Q17: *John is having difficulty in a math class. His math score is <u>below</u> average.*
- Q29: *Ted: Why have you decided to raise a fund for those people in the pictures? Mark: Because most of them are living <u>below</u> the poverty line.*

Q17 is a MaD of LDI, and *under* functions as a MaI of DII. *In* Q17, most of the participants chose either *below average* or *under average*. Q29 is a AD, which means very limited participants chose *below the poverty line*. In Q29, *in the poverty line* functions as a MaI. Q17 is another example to prove that the participants were confused with the senses that *below* and *under* denote. Both *below* and *under* denote the Less sense. They are used to indicate that the TR is less than a particular amount or number. In this case, these two prepositions are nearly synonymous. Tyler and Evans (2003) state that *over* and *above* are tightly related to quantity and vertical elevation. *Over* and *above* are the counterparts of *under* and *below*. Hence, *under* and *below* should denote the opposite senses to *over* and *above*. For the Less sense, *below* is more likely to indicate measuring systems, but *under* is more likely to indicate a particular number or amount. The LMs in Q17 and Q29 refer to two measuring systems; therefore, *below* is more appropriate. For Q29, forty-two participants chose *in the poverty line* instead of *below average* or *under average*. Perhaps the word, *line* influenced the performance most, for that the participants linked *in line* to this scene. For one more thing, that *in the poverty line* was preferred might evolve from the word, *living* which precedes the blank. To MLEs, *live* seems to collocate with *in* frequently as in *He lives in Bangkok*.

Even though *xiàmiàn* ‘downside’ in the construction does not denote any extended meanings that *below* denotes, one example should be considered:

(11) 他 的 數學 成績 在 平均 以下
Tā de shùxué chéngjì *zài* píngjūn *yǐxià*.
he particle math score at average down
‘His math score is below the average.’

In this example, the concept of *xià* ‘down’ is used, but it is not in the exact construction for this study. Even though it is not in the construction, the use of *xià* ‘down’ in the example explains the two languages share this feature in common. In other words, the Less sense of *below* and *under* is not abstract at all to MLEs. The difficulty between the uses of *below* and *under* in Q17 is the matter of how MLEs understand the uses, not directly related to language transfer. Plus, Table 6-7 shows that negative transfer applies, for example, *under* in Q17 and Q29, but in most cases, non-transfer would be the source of errors.

Table 6-7 Summary of *below* indicating spatial-functional scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of Transfer** (NT: Negative transfer, Non: Non-transfer)		
Q17	L4	MaD	*at* (FI/Non)	*between* (FI/Non)	*under* (MaI/NT)
Q29	L4	AD	*in* (MaI/Non)	*under* (FI/NT)	*with* (FI/Non)

6.5 Cognitive Features between *in* in English and related spatial concepts in Mandarin Chinese

6.5.1 Spatial-physical senses of *in*

- Q31: *Jason: Gary, I don't see your son at the party. Gary: He's in the Spiderman's costume playing over there with the boys.*
- Q42: *The dog is lying in the grass.*
- Q44: *There are hill tribes in the mountains.*
- Q45: *The woman slaps the man in the face.*
- Q46: *The airplane is flying in the sky.*
- Q49: *People are sitting in the shade.*
- Q50: *The bird is singing in the tree.*
- Q52: *The dog is sitting in the chair.*
- Q56: *The socket is installed in the wall.*
- Q57: *There is a hole in the tree.*
- Q60: *The man is lying in the hammock.*

The proto-scene of *in* and *lǐmiàn* 'inside' are basically identical to each other. According to Hierarchy of Difficulty, it is a Level 0 of difficulty, which refers to positive transfer. It is controversial because even though the two proto-scenes are identical, MLEs conceptualize some spatial-physical scenes in this group differently from NSEs. The difference mainly refers to the cases that MLEs do not view some LMs as bounded regions. In these cases, MLEs are mostly confused with *in* and *on*. In some cases, *at* also functions as one of the strong influential distracters.

Q31 is a MaD, and *at, on*, and *under* function as FIs. Among the three distracters, the participants especially chose *at the Spiderman's costume* and *on the Spiderman's costume*. First, MLEs does not seem to describe the scene in the same construction as *in the Spiderman's costume* in Mandarin Chinese. For example, to describe such the scene, it is not likely to utter Example (12) because Example (13) would sound more natural.

(12) 他 在 蜘蛛人 的 服裝 裡面
Tā *zài* zhīzhūrén de fúzhuāng *lǐmiàn*.
he at Spiderman particle costume inside
'He is in the Spiderman's costume.'

(13) 他 穿著 蜘蛛人 的 服裝
Tā chuānzhù zhīzhūrén de fúzhuāng.
he wear Spiderman particle costume
'He is wearing the Spiderman's costume.'

Example (12) is comprehensible to MLEs but does not sound natural in Mandarin Chinese. Example (13) is relatively natural, but it does not contain the prepositional phrase in the construction: *zài*+NP+localizer. To elaborate, for a static scene like this, the concept of *lǐmiàn* 'inside' is not likely to occur in Mandarin Chinese. For a dynamic scene, the concept of *lǐmiàn* 'inside' seems possible. For example,

(14) 這 件 褲子 我 穿得 進去
Zhè jiàn kùzǐ wǒ chuāndé jìnqù.
this piece pants I wear into
'I can fit in the pants.'

In Example (14), it is a dynamic scene where *jìnqù* (into) indicates a path from the outside of the LM to the inside of the LM. *Jìnqù* (into) implicates that the LM is viewed as a container. Besides, consider the following example:

(15) 這件 褲子 我 穿得 下
Zhè jiàn kùzǐ wǒ chuāndé xià.
this piece pants I wear down
'I can put on the pants.'

Example (15) would sound natural, too. In this example, the concept of *xià* 'down' is used. It is related to *xiàmiàn* 'downside,' which is considered the counterpart of *under* in Chapter V. It might be the reason why some participants chose *under* as the answer to Q

31. The counterpart of *xià* ‘down’ is *shàng* ‘up,’ which is related to *on*. Perhaps, *put on* was taken into consideration when those fifteen participants chose *on* as the answer. It is rather difficult to find the cognitive features regarding the reason why *at the Spiderman’s costume* was chosen. It is possible that the participants simply chose *at* because they were confused with *in*, *on*, and *at*. The seventeen participants guessed at *at* as the answer.

An image is provided with Q46, which is a MiD. The distracters, *on* and *at* function as FIs, and *through* functions as a MiI. In the picture, the path is not emphasized; therefore, *through* does not seem appropriate, but *in* does. In Mandarin Chinese, such the scene is not likely to be described in the construction with *lǐmiàn* ‘inside’ as in Example (16).

(16) *飛機 在 天空 裡面 飛
Fēijī *zài* tiānkōng *lǐmiàn* fēi.
airplane at sky inside fly
‘The airplane is flying in the sky.’

It is more likely to be uttered in the following two ways with other localizers:

(17) 飛機 在 天空 上 飛
Fēijī *zài* tiānkōng *shàngmiàn* fēi.
airplane at sky upside fly
‘The airplane is flying on the sky.’

(18) 飛機 在 天空 中 飛
Fēijī *zài* tiānkōng *zhōng* fēi.
airplane at sky middle fly
‘The airplane is flying in the middle of the sky.’

Example (17) uses the concept of *shàngmiàn* ‘upside,’ which is similar to *on*. From this case, it can be anticipated that some MLEs would use *on* instead of *in*. The test result shows that only six participants chose this answer. It might the reason that when MLEs utter this scene, *fēi* (fly) denotes a path; hence, *through* was preferred to *on* and *in*. Example (18) uses *zhōng* ‘middle’ as the localizer. The gloss for this lexical item is middle, the use of which is very similar to that of *lǐmiàn* ‘inside’ for some cases in terms of collocation. In other words, they can substitute for each other in particular cases. The following two examples are identical in terms of semantics and syntactic structures.

(19) 在 教室 裡面
zài jiàoshì *lǐmiàn*
at classroom inside
'in the classroom'

(20) 在 教室 中
zài jiàoshì *zhōng*
at classroom middle
'in the middle of the classroom'

In this case, *in the sky* should not be absolutely unfamiliar to MLEs. It has proved that forty-three participants chose *in the sky* for Q46.

The rest of the test items are in the similar situation where MLEs and NSEs view the same spatial-physical scene differently. Let's start with Q52 which is a AD. *On* functioned as a AI. In other words, only four participants chose *in the chair* while fifty-six participants chose *on the chair*. The result was expected because in Mandarin Chinese, when you describe the spatial relation in which the TR conducts the actions such as *sit* and *stand* with the LM, furniture, *shàngmiàn* 'upside' is, most of the time, preferred. The surface of the LM is strongly considered. The notion of *shàngmiàn* 'upside' is transferred to the target language, so *on the chair* was chosen by the majority of the participants.

In English, the shape of the furniture decides the uses of prepositions. A chair refers to a piece of furniture with a back, a seat, and four legs (Longman Dictionary of Contemporary English, 2009). The definition is too simple to ignore some important feature which causes the difficulty. Apart from the definition, whether a chair is with or without arms is the element to change from *on* to *in* in such a spatial scene. In Q52, it is an armchair (a chair with arms) in the image (Appendix E); therefore, the most appropriate answer is *in the chair*. Similar to Q52, Q60 also deals with furniture as a LM. This test item is a AD, and *on the hammock* functioned as a MaI. In Section 5.3.1, Chapter V, this feature is mentioned. *Hammock* in Mandarin Chinese is *diàochuáng*, which consists of two lexical units: *diào* (hang) and *chuáng* (bed). It is viewed as one item in the category of *chuáng* (bed). *Chuáng* (bed) collocates with *on*, for the surface is where a TR is. In English, *He is in bed* and *He is on the bed* indicate two different scenes. *He's in bed* indicates that the TR is sleeping or about to sleep under the blanket. *He is on*

the bed means the TR is on the blanket reading or doing something else other than sleeping. This study observes that *in bed* is used as both a spatial-physical and a spatial-functional sense. For example, *He is lying in bed* or *He is having breakfast in bed* is a spatial-physical sense. The TR is not necessarily in the state of sleeping. It can merely indicate the location. *He is in bed* is more likely to especially indicate that the TR is in state of sleeping.

Q42 is a AD, and *on* functions as a MaI. *On the grass* was chosen by more participants than *in the grass*. The result can be referred to the expression in Mandarin Chinese that describes the scene in the picture:

(21) 狗 趴 在 草地 上面
Gǒu pā *zài cǎodì shàngmiàn*.
dog lie at grass upside
'The dog is lying on the grass.'

In Example (13), *shàngmiàn* 'upside' is used. It is similar to *on*. When the participants viewed the image provided next to the test item, they would simply link to the expression to the localizer, so forty-seven participants chose *on the grass* for the test item. In the image, the grass is tall enough to partially cover (the notion of *in*) the dog; hence, *in the grass* is used in English. If the grass is not tall enough to either partially or fully cover the dog, *on the grass* is also possible. This feature applies to both Mandarin Chinese and English.

Q44 provided with an image is a AD, and *on* functions as a MiI. The other two distracters, *at* and *between* function as FIs. This case involving *in the mountains* and *on the mountains* is disputable. One of the participants who is a native speaker of American English in the pilot study, states that both of them work referring to different scenes; however, in the test, he chose *in the mountains* in the first place. To triangulate the statement, a quick search on British National Corpus (BNC) is conducted. Table 6-8 lists the searched data from BNC. The frequency of *in the mountains* is greater than that of *on the mountains*. The numbers of hits also show the significant difference. After the two queries are scrutinized, it is found that when *in the mountains* is used, it refers to the environment as a bounded region. When *on the mountains* is used, it refers to an

emphasis on the height that *mountains* denotes. Nevertheless, the searched data have proved that the use of *on the mountains* is relatively rare.

Table 6-8 Data of *in*/*on the mountains* on BNC

BNC	*in the mountains*	*on the mountains*
Frequency	243	21
Number of hits (per million words)	2.47	0.21

In Mandarin Chinese, the concepts of *shàngmiàn* ‘upside’ and *lǐmiàn* ‘inside’ are acceptable and, to an extent, substitutable. Consider the following two examples:

(22) 在 山 上面 有 原住民
Zài shān *shàngmiàn* yǒu yuánzhùmín.
at mountain upside have hill-tribes
‘There are hill tribes on the mountains.’

(23) 在 山 裡面 有 原住民
Zài shān *lǐmiàn* yǒu yuánzhùmín.
at mountain inside have hill-tribes
‘There are hill tribes in the mountains.’

Example (14) and (15) use *shàngmiàn* ‘upside’ and *lǐmiàn* ‘inside,’ respectively. Both of them sound natural. This study observes that the use of *shàngmiàn* ‘upside’ and *lǐmiàn* ‘inside’ with *shān* (mountains) is similar to that of *on* and *in* with *mountains*, but it is more flexible to substitute *shàngmiàn* ‘upside’ with *lǐmiàn* ‘inside’ or vice versa. As for *at* and *between*, *at* is often an influential distracter when a scene is related to *in* and *on*. That *between* was chosen would be caused by *mountains*. The plural form of *mountain* made the participants indecisive. Plus, the image does not appropriately display the tested scene. It would also be one of the factors influencing the performance.

The use of *in the face* in Q45 is abstract to MLEs. In Mandarin Chinese, it is more likely to use *shàngmiàn* ‘upside’ with *face* or alike. In such cases, the surface is emphasized. The TR interacts with the LM on the surface, not anywhere underneath. For example,

(24) 在 我 的 臉 上面 打 一 巴掌
Zài wǒ de liǎn *shàngmiàn* dǎ yī bāzhǎng.
at I particle face upside hit a slap
‘(Someone) slaps me in the face.’

In Mandarin Chinese, it is more likely to view *liǎn* (face) as a surface. Other body parts, e.g., eyes and nose are attached to *liǎn* (face). In such cases, *shàngmiàn* ‘upside’ is used. On the contrary, *in the face* is used in English in such cases. When *face* refers to where your eyes, nose, and mouth are, it is considered a container; hence, *in* is used to indicate the spatial scene. When someone is hit *in the face*, it infers that some parts e.g., mouth contained would be injured. Those parts are not attached to *face*. They are enclosed to *face*. Consider *Put a mask on your face*. It indicates that *mask* is placed on the surface, which is emphasized. *Mask* is never enclosed. The scene that *in the face* denotes is similar to Q56 and Q57. Q56 is a AD, and Q57 is a MiD. For Q56, *on* is a MaI. Forty-two participants chose *on the wall*. MLEs seem to see that *socket* is what can be seen on the surface, the parts behind the wall are not emphasized. For Q57, the majority of the participants chose *in the tree*. The distracters were all FIs, which means limited participants chose them as the answers. This result was not anticipated because the scene of *a hole in the tree* is more likely to be uttered:

(25) 在 樹幹 上面 有 一 個 洞
Zài shùgàn *shàngmiàn* yǒu yī gè dòng.
at tree upside have a CL hole
‘There is a hole in the tree.’

The localizer, *shàngmiàn* ‘upside’ is used in the scene. In other words, the localizer, *lǐmiàn* ‘inside’ would not sound appropriate in Mandarin Chinese for such the scene. The image provided with the test item might influence the performance. In the image, there is a hole. In the hole, there is a squirrel. The scene proves a strong schema of the spatial scene that *in* indicates; thus, forty-four participants chose *in the hole* instead.

Q49 and Q50 are two examples that show how MLEs and NSEs view some particular spatial scenes differently. Q49 is a MaD. In this test item, *at* and *on* function as MiIs. In the image provided with the test item, there are people. Those people are sitting

under the tree because of the shade. In Mandarin Chinese, *xiàmiàn* ‘downside’ would be the most appropriate with *shùyìn* (shade). Consider the following example:

(26) 在 樹蔭 下面
zài shùyìn *xiàmiàn*
at shade downside
‘under the shade’

All the distracters are not directly related to *xiàmiàn* ‘downside,’ e.g., *under,* so the result does not show how the participants would be influenced by this concept. Among the distracters, *on the shade* was chosen by nineteen participants. This result can refer to the image in which *the shade* seems like a rug laid on the ground under the tree. The people in the image are sitting on the rug. This scene should cause that the nineteen participants chose *on the shade*. Q50 is a MaD, and *on the tree* function as a MiI. In Mandarin Chinese, this scene is most described:

(27) 鳥 在 樹 上面 唱歌
Niǎo *zài* shù *shàngmiàn* chànggē.
bird at tree upside sing
‘A bird is singing in the tree.’

It is not likely to use *lǐmiàn* ‘inside’ in this case. The localizer, *shàngmiàn* ‘upside’ influenced the performance, so thirty participants chose *on the tree* instead of *in the tree*. The number of the participants who chose *in the tree* is higher than anticipated. The reason would be that in the image, *the bird* is partially covered by the branches of the tree. When those participants made a decision, they were influenced by the scene they perceive.

To summary, Table 6-9 displays that even though the proto-scene of *lǐmiàn* ‘inside’ is almost identical to the proto-scene of *in,* there are still difficulties. These difficulties can be attributed to different conceptualizing of LMs in the two languages. Viewing LMs in different ways of conceptualization also causes the distracters to be non-transfer. In this case, Learning Difficulty Index does not reflect how positive transfer functions.

Table 6-9 Summary of *in* indicating spatial-physical scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q31	L0	MaD	*at* (FI/Non)	*on* (FI/Non)	*under* (FI/Non)
Q42	L0	AD	*at* (FI/Non)	*on* (MaI/Non)	*with* (FI/Non)
Q44	L0	AD	*at* (FI/Non)	*on* (MiI/Non)	*between* (FI/Non)
Q45	L0	AD	*at* (FI/Non)	*on* (MaI/Non)	*over* (FI/Non)
Q46	L0	MiD	*at* (FI/Non)	*on* (FI/Non)	*through* (MiI/Non)
Q49	L0	MaD	*at* (MiI/Non)	*on* (MiI/Non)	*with* (FI/Non)
Q50	L0	MaD	*at* (FI/Non)	*on* (MiI/Non)	*over* (FI/Non)
Q52	L0	AD	*at* (FI/Non)	*above* (FI/Non)	*on* (AI/Non)
Q56	L0	AD	*from* (FI/Non)	*at* (FI/Non)	*on* (MaI/Non)
Q57	L0	MiD	*at* (FI/Non)	*on* (FI/Non)	*with* (FI/Non)
Q60	L0	AD	*from* (FI/Non)	*at* (FI/Non)	*on* (MaI/Non)

6.5.2 Spatial-functional senses of *in*

- Q02: *I went to an interview yesterday. All the interviewees were nervous and waiting for the result in silence.*
- Q03: *Boys and girls, before we start the class today, let's put all the chairs in a circle.*
- Q21: *Jenny: Have you seen Robert recently, Fred? It has been a long while since we last met. Fred: Robert? He met a girl several weeks ago and has been busy seeing her frequently. I think he's so much in love now.*
- Q32: *Jack: Have you heard that they're going to release iPhone 5 soon this year? Brendon: Yes, I read the news in the newspaper two days ago.*
- Q34: *Paula: It's really nice to meet you again. I think I'd better get going. Janice: All right, let's stay in touch.*

- Q37: *Citizen: Here's the required document for the service, Sir. Official: I am afraid that you should fill out your form again <u>in</u> ink. It's stated in the instructions.*

According to Chapter V, *lǐmiàn* 'inside' also denotes the State sense as *in* denotes. This study observes that even though *lǐmiàn* 'inside' denotes the State sense, it is not used as much as the State sense that *in* denotes in the construction. For example, *in silence* is not likely to occur in Mandarin Chinese. In Q2, it indicates a static scene. In other words, it does not include a motion, which is usually indicated by a verb. In Mandarin Chinese, the State sense does not seem to describe a static scene. It is more likely to collocate with a verb. For example,

(28) 他 活 在 恐懼 裡面
Tā huó *zài* kǒngjù *lǐmiàn*.
he live at fear inside
'He lives in fear.'

The above example seems appropriate and natural in Mandarin Chinese. The verb, *live* makes *in fear* valid in the structure. Consider the following example:

(29) 他 在 恐懼 裡面
Tā *zài* kǒngjù *lǐmiàn*.
he at fear inside
'He is in fear.'

In the above example, *lǐmiàn* 'inside' is used to indicate what *in fear* denotes in the same construction. It obviously does not sound authentic even though it is comprehensible to MLEs. The result of this test item suggests that even when *lǐmiàn* 'inside' and *in* share the State sense, the uses in the two languages vary. The use of L1 cannot completely transfer to the target language. *On silence* and *under silence* were chosen by thirteen and fifteen participants, respectively. It can be related to the fact that *on* and *under* also denote senses similar to the State sense (See Figure 5-17 and 5-20). There is one test item in the same situation, but the result of it is quite different from that of Q2. Q21 is the only one test item in this group that caused the minimal difficulty. It is a FD, which means the majority of the participants chose *in love*. Q21 denotes the State sense, and it is included in the semantic network for *lǐmiàn* 'inside,' too. As stated earlier,

the State sense that *lǐmiàn* ‘inside’ denotes is more likely to collocate with a verb for a non-static scene. For example,

(30) 他 沉浸 在 愛 裡面
Tā chénjìn *zài* ài *lǐmiàn*.
he soak at love inside
‘He soaks in love.’

In this case, *in love* does not cause too much difficulty to MLEs. It can be a positive transfer to the target language. Let’s consider Q34, which is a MiD. *On touch* was chosen by twelve participants, which is the most preferred among the distracters. *In touch* refers to the Perceptual Accessibility sense, which *lǐmiàn* ‘inside’ does not denote. Fifty-four participants chose *in touch*. It could be the reason that *in touch* is taught and memorized as a chunk. For those who chose *on touch*, *on* would more likely collocate with *touch*. When someone touches something, the surface of something is emphasized. The surface refers to *shàngmiàn* ‘upside,’ which is related to *on*.

Q3 denotes the Shape as Boundary sense. This sense is not included in the semantic network for *lǐmiàn* ‘inside.’ According to Hierarchy of Difficulty, it is a Level 4 difficulty. The test result shows that Q3 is a MaD of LDI. *Through a circle* is a MaI. Thirty-six participants chose it as the answer. The Shape as Boundary sense is abstract to MLEs. It is not conceptualized in Mandarin Chinese. That *through* was preferred should be related to *a circle*, which guided the participants to think of a path. Among the distracters, *through* would sound more like a preposition that denotes a path, e.g., *the passengers walked through the metal detector*.

Q32 is very close to a spatial-physical scene, but the TR, *the news* in this test item is intangible; hence, it can be considered one example of a sense close to the Perceptual Accessibility sense. In English, the TR, *the news* is included in the LM, *the newspaper*. *The news* can be perceived by human beings. On the contrary, for such the scene, *the news* should be printed *on the newspaper*. For example,

(31) 在 報紙 上面 刊登 廣告
Zài bàozhǐ *shàngmiàn* kāndēng guǎnggào.
at newspaper upside publish advertisement
'Publish an advertisement in a newspaper.'

Newspaper is not viewed a bounded region. It is rather viewed as a path. The surface of *newspaper* prints information such as news and advertisement. In the example, *shàngmiàn* 'upside' is used. MLEs view this spatial scene differently from NSEs. The result shows that Q32 is a AD, and *on* functions as a MaI.

The Means sense that *in* denotes does not appear in the semantic network for *lǐmiàn* 'inside.' Q37 is a Level 4 of difficulty according to Hierarchy of Difficulty. The test result shows that Q37 is a AD of LDI, and *with ink* functions as a MaI. Thirty-eight participants chose *with ink* as the answer. *With* has not yet studied in previous studies (Tyler & Evans, 2003). It is not the focus of this study, so it will not be discussed in detail. In short, *with* to MLEs denotes some sense that is close to the Means sense. When *with* is used preceding a LM to describe a spatial-physical scene, it denotes TOGETHER, CARRYING, and USING. For example, *she went shopping with her family*, *they left with some cash*, and *he cuts the robe with a knife*. The notion of USING is similar to the Means sense. Hence, *with ink* was chosen by most participants in this case.

Table 6-10 shows that for spatial-functional senses, English and Mandarin Chinese users also view LMs differently. The difference causes the significant difficulty to MLEs. The use of Q21 perfectly matches the same use in Mandarin Chinese. The result proves positive transfer should function in this case; however, in other cases, neither positive nor negative transfer was of significant influence. Instead, non-transfer plays the dominant role.

Table 6-10 Summary of *in* indicating spatial-functional scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q2	L0	MiD	*between* (FI/Non)	*on* (FI/Non)	*under* (FI/Non)
Q3	L4	MaD	*on* (FI/Non)	*through* (MaI/Non)	*under* (FI/Non)
Q21	L0	FD	*at* (FI/Non)	*on* (FI/Non)	*under* (FI/Non)
Q32	L0	AD	*below* (FI/Non)	*at* (FI/Non)	*On* (MaI/Non)
Q34	L4	MiD	*on* (FI/Non)	*under* (FI/Non)	*with* (FI/Non)
Q37	L4	AD	*from* (FI/Non)	*on* (FI/Non)	*with* (MaI/Non)

6.6 Cognitive features between *on* in English and related spatial concepts in Mandarin Chinese

6.6.1 Spatial-physical senses of *on*

- Q04: *After you finish reading the books in the library, please leave them <u>on</u> the table over there.*
- Q09: *The grocery store is not far away from here. It is just there <u>on</u> Maple Street.*
- Q41: *There is a bruise <u>on</u> his face.*
- Q47: *Two ducks are walking <u>on</u> the grass.*
- Q53: *The players are <u>on</u> the court.*

The proto-scene of *on* is part of the proto-scene of *shàngmiàn* ‘upside’ (See Chapter V). The localizer, *shàngmiàn* ‘upside’ covers *on*, *over*, and *above*. According to Hierarchy of Difficulty, it can be categorized as a Level 5 of difficulty. One item in L1 refers to several items in the target languages. The biggest problem in this group of test items is related to different conceptualization of the same scene in the two languages. The result shows that Q4 is a MiD, and the three distracters are FIs. Among the distracters, *on* and *with* were most chosen. *On the table* is identical to *zài* ‘at’ zhuōzǐ (table) *shàngmiàn* ‘upside’ in terms of semantics and syntax. It is not likely to cause difficulty, but there are

still some participants who did not choose *on the table* as the most appropriate answer. *At* very often influences the performance especially when the answers are *in* and *on*. MLEs understand the fundamental uses of *at* but are still confused with the extended uses. This is the reason why *at* distracts the participants. *With the table* was chosen, perhaps, because *leave* influenced the decision. The pedagogical descriptions such as *leave somebody with something* or *leave something with somebody* were considered when the participants were about to make a decision.

The scene of *on Maple Street* is discussed in Section 6.3.1. To summarize on previous discussions, *at* denotes a particular point where the TR and the LM co-locate. A specific number should be indicated, e.g., *we live at 16 Maple Street*. *On Maple Street* does not indicate a particular point but views the LM as a path. The uses of *at* and *on* for this scene are identical to the uses in Mandarin Chinese. This feature does not seem to be included in the pedagogical descriptions, for the fact that Q9 is a MaD. Thirty participants chose the answer, but the rest of the participants (a total of forty-three) chose the distracters. That *at Maple Street* was chosen by 21 participants can be avoided if instructors had help the participants clarify that a particular number should be indicated either in Mandarin Chinese or English. *Above Maple Street* should be an example that the participants were confused with *shàngmiàn* 'upside' and *on*, *above*, and *over* that are covered by *shàngmiàn* 'upside.'

Q41 can be analyzed with the previous discussions regarding *in the face* (Q45 in Section 6.5.1). It is a FD, which explains that the majority of the participants chose *on his face*. Limited participants chose the distracters. As *bruise* is not naturally included from the inside of the body, *in* does not apply. This scene is described in the same way in Mandarin Chinese. It should not cause as much difficulty as *in the face,* and the result has proved it. Q47 can also be analyzed in pairs with Q42 in Section 6.5.1. The difference between *on the grass* and *in the grass* in English is the relationship between the height of grass and the TR. If the TR is either covered or partially covered by the LM, *in* is more appropriate. This feature also applies to Mandarin Chinese. For example,

(32) 警方 在 草叢 裡面 找到 證物
Jǐngfāng *zài* cǎocóng *lǐmiàn* zhǎodào zhèngwù.
police at grass inside find evidence
'The police found the evidence in the grass.'

This example uses *lǐmiàn* 'inside' and implies that *zhǎodào* (grass) is tall enough to either partially or completely cover the evidence or the police themselves.

Q53 was initially considered a spatial-physical scene in this study, and it was included in the group of spatial-physical scenes for the statistic descriptions (Chapter IV). It is more appropriate to see it as a spatial-functional scene because *on the court* with *the players* denotes IN PLAY. It does not indicate the scene where the players are even though the players physically interact with the LM. *On the court* indicates that the players are in the play of a game. Consider *the player is on the court* and *the player is off the court*. They indicate a player is in the play or not in the play. Then consider *the ball fell in the court* and *the ball went out of the court*. These two examples emphasize *the court* as a bounded region. This test item with the image does not clearly state the tested scene; therefore, it is a AD, and *in the court* functions as a MiI. The concepts of *in*/*out of court* and *on*/*off court* are also in Mandarin Chinese, but they might not be exactly stated in the same construction. For example,

(33) 五 號 球員 在 場 上
Wǔ hào qiúyuán *zài* chǎng *shàng*.
five number player at court up
'The No. 5 player is on the court'

It is not likely to utter *zài* 'at' *chǎng* (court) *xià* 'down' to indicate *off the court*, but it can be described:

(34) 五 號 球員 準備 下場 休息
Wǔ hào qiúyuán zhǔnbèi *xià* chǎng xiūxí.
five number player prepare down court rest
'The No. 5 player prepares to get off the court to rest.'

In the example, *xià* 'down' is used to indicate a similar scene as *get off court*. *Get on court* is identical to *shàng* 'up' *chǎng* (court). This example proves that the concept of *on/off court* as spatial-functional scenes is not unfamiliar to MLEs. This feature should be

articulated in the pedagogical descriptions to help MLEs differentiate *on*/*off court* and *in/out of court*.

Table 6-11 summarizes that *on* in spatial-physical scenes contain difficulties to MLEs, except Q41 and Q47 which are the examples of positive transfer because the proto-scene of *shàngmiàn* 'upside' includes the proto-scene of *on*. It was anticipated that positive transfer should function in Q53, but the result did not prove it. The distracters in the group are considered non-transfer because the counterpart in Mandarin Chinese is not cognitively related to those distracters.

Table 6-11 Summary of *on* indicating spatial-physical scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q4	L5	MiD	*between* (FI/Non)	*at* (FI/Non)	*with* (FI/Non)
Q9	L5	MaD	*at* (MiI/Non)	*in* (FI/Non)	*above* (FI/NT)
Q41	L5	FD	*in* (FI/Non)	*at* (FI/Non)	*with* (FI/Non)
Q47	L5	FD	*in* (FI/Non)	*at* (FI/Non)	*with* (FI/Non)
Q53	L5	AD	*in* (MiI/Non)	*at* (MiI/Non)	*with* (FI/Non)

6.6.2 Spatial-functional senses of *on*

- Q01: *Today in class we are going to learn how to backup your files. It is important you regularly backup your files which are saved <u>on</u> your computer.*
- Q05: *Sarah's wedding ring is missing. She is now <u>on</u> her hands and knees searching for it.*
- Q06: *Peter is planning a trip to India. Do you have any books <u>on</u> India for him to read?*
- Q07: *A lot of kids in this community are <u>on</u> drugs at the age of 12. The local government is trying to solve the problem.*
- Q33: *Mother: You've been <u>on</u> the phone for ages. Hang it up, please. Daughter: Jenny just broke up with her boyfriend. She needs someone now.*

- Q35: *Harry: You've been working so hard. I haven't seen you for a long time. Larry: I live <u>on</u> my own, so I have to work hard to make enough money to live.*
- Q36: *Miles: The protestors set the theater <u>on</u> fire last night. Did you watch the news? Nelly: Yes, I did. It's sad to see it burned.*

The semantic networks for *on* differs from the semantic network for *shàngmiàn* 'upside' in some senses (See Figure 5-18). Q1 refers to the Availability and Visibility sense. Both *on* and *shàngmiàn* 'upside' indicate this sense. This sense in common does not make forty-eight participants choose *on your computer*. Q1 is a MaD, and *in your computer* function as a MaI. In English, *computer* is rather viewed as a platform or a media where *files* are available for computer users. It should be also mentioned that in English *newspaper* is viewed as a container, not a platform or a media. In Mandarin Chinese, *computer* is seen a container where *files* are stored. It is discussed in Section 5.3.2, Chapter V. This confusion made forty-four participants chose *in your computer*.

Q5 refers to the Physical Support sense. The localizer, *shàngmiàn* 'upside' does not denote this sense. According to Hierarchy of Difficulty, it is a Level 4 difficulty. The result shows that Q5 is a MaD. *Under* and *with* function as MiIs. *Under her hands and knees* was chosen by eighteen participants who randomly guessed of an option. *With her hands and knees* was chosen by thirty-two participants. These participants would direct the scene to what *with* denotes. It denotes USING.

Q6 refers to the Basis sense. This sense is not included in the semantic network for *shàngmiàn* 'upside.' Q6 is a AD, and *in* and *with* function as MiIs. *In India* was chosen by thirty-one participants. They might just choose one preposition that looks the most appropriate to collocate with *India*. *India* is a proper name of a country, and *in India* seems the most frequently-seen combination to the participants. *With India* could probably be related to POSSESS that *with* denotes, but this observation is not strong enough to explain the result. This sense is abstract to MLEs. It is difficult for them to find the hints linking the two languages. In the same sense, consider Q35 as the Basic sense. Q35 is a MaD, and *in* and *with* function as MiIs. For the Basic sense, *with* was preferred in these two test items. It would be possible that when a sense is abstract to MLEs, they

would prefer a preposition that is not even close to the scene. It would relate to test taking strategies for some participants. Guessing of one unfamiliar option among the distracters would be safe because they think the more familiar prepositions do not seem possible in the test items.

In this group, there are three test items that contain the Temporal State sense. The test results of these three test items vary when the sense is not included in the semantic network for *shàngmiàn* 'upside.' These test items are Q7 (AD), Q33 (MiD), and Q36 (MiD). *On drugs* in Q7 is abstract to MLEs. Perhaps, the participants did not really understand what it means when taking the test. *On the phone* in Q33 was chosen by thirty-eight participants. Compared to Q7, the use is more familiar to the participants. *Over the phone* is not a rarely-seen chunk to MLEs. *On fire* is chosen by forty-one participants. This use is the least unfamiliar to MLEs. These three test items denote the same sense, but the results are different. The reason should be directed to collocation. If a use is frequently seen to MLEs, the responses they make are more likely to be supported by memorization not conceptualization.

Table 6-12 lists all the figures that are used in the discussions regarding *on* in spatial-functional senses. Except Q1, all the test items contain extended meanings that *shàngmiàn* 'upside' does not denote. Hence, positive transfer does not function to help understanding the extended metaphorical meanings of *on*. The results of these test items also reveal that non-transfer matters instead of negative transfer.

Table 6-12 Summary of *on* indicating spatial-functional scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q1	L0	MaD	*in* (MaI/Non)	*at* (FI/Non)	*over* (FI/Non)
Q5	L4	MaD	*at* (FI/Non)	*under* (MiI/Non)	*with* (MiI/Non)
Q6	L4	AD	*in* (MiI/Non)	*at* (FI/Non)	*with* (MiI/Non)
Q7	L4	AD	*below* (MiI/Non)	*in* (MiI/Non)	*at* (FI/Non)
Q33	L4	MiD	*in* (FI/Non)	*over* (MiI/Non)	*under* (FI/Non)
Q35	L4	MaD	*in* (MiI/Non)	*under* (FI/Non)	*with* (MiI/Non)
Q36	L4	MiD	*in* (FI/Non)	*below* (FI/Non)	*under* (FI/Non)

6.7 Cognitive features between *over* in English and related spatial concepts in Mandarin Chinese

6.7.1 Spatial-physical senses of *over*

- Q15: *Come visit Bangkok sometime. There are many beautiful bridges <u>over</u> the Chaophraya River.*
- Q27: *Emily: What were you doing here at the balcony? David: We're watching a helicopter flying low <u>over</u> the pond.*
- Q48: *The girl is holding the sign <u>over</u> her head.*
- Q51: *The chandelier is hanging <u>over</u> the sofa.*
- Q58: *The bridge is <u>over</u> the river.*

The proto-scene of *over* is part of the proto-scene of *shàngmiàn* 'upside' as *on* and *above*. It is considered a Level 5 of difficulty according to Hierarchy of Difficulty. It is anticipated that MLEs are especially confused with *on*, *above*, and *over*. All the test items in the groups are MaDs. It means that the great number of the participants did not choose *over* as the most appropriate answer to these test items. From the test results, it

can be found that the distracters such as *on* and *above* were mostly chosen because of the confusion.

Q15 and Q58 indicate the exactly the same scene. The results turned out to be identical. Such the scene can be uttered in Mandarin Chinese:

(35) 在 河 上面 有 一座 橋
Zài hé *shàngmiàn* yǒu yīzuò qiáo.
at river upside have a bridge
'There is a bridge over the river.'

Over in this case denotes an arch-like path, which can refer to the A-B-C Trajectory in the semantic network for *over*. The path matches the shape of a bridge. The two ends of a bridge start and end on the two sides of the river. If this feature is conceptualized, there would not be any difficulty choosing *over* as the answer. In Q15, *between* was chosen by seventeen participants. They might link the scene to the two banks of the river, so *between*, which indicates two objects are connected, was chosen. The image in Q48 also indicates such the scene. The TR, *the girl* is holding the LM, *the sign*. The arms and the sign shape the arch-like path. It can also be referred to the notion of HIGHER and PROXIMAL. Twenty-four participants chose *above her head* probably because they did not know that *over* denotes the notion of PROXIMAL, and *above* denotes DISTAL.

The path that *over* denotes is not necessarily arch-like. It can be a straight line. The line starts from a topologically far point to the right upper side of the viewer, and then ends in a forwarding point that the viewer can perceive. This kind of the path refers to Q27. *Over* does not always denote a path. It can indicate a static scene with the notion of PROXIMAL. In this case, *over* and *above* are synonymous depending on how the speaker judges whether the distance. For example, *the chandelier is hanging above the sofa* is also acceptable. If in Q51, *above* was one of the distracters, it would have been chosen by a significant number of the participants. For Q51, thirty-five participants chose *on* possibly because of the influence by *shàngmiàn* 'upside.'

Negative transfer influences the performance on *over* in spatial-physical senses as shown in Table 6-13. The figures of LDI in this group shows that positive transfer does not function well enough to ease learning.

Table 6-13 Summary of *over* indicating spatial-physical scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (P: Positive transfer, N: Negative Transfer, Non-transfer)		
Q15	L0	MaD	*from* (FI/Non)	*on* (MiI/NT)	*between* (FI/Non)
Q27	L0	MaD	*between* (FI/Non)	*on* (MiI/NT)	*at* (FI/Non)
Q48	L0	MaD	*above* (MiI/NT)	*on* (MiI/NT)	*at* (FI/Non)
Q51	L0	MaD	*on* (MiI/NT)	*from* (FI/Non)	*under* (FI/Non)
Q58	L0	MaD	*in* (FI/Non)	*on* (MiI/NT)	*at* (FI/Non)

6.7.2 Spatial-functional senses of *over*

- Q16: *Holiday seasons are coming. Can we talk about a family trip <u>over</u> dinner tonight?*
- Q24: *Sue: What's the main reason for choosing one restaurant <u>over</u> another, Peter? Peter: It's the taste of the food.*
- Q28: *George: What's the matter with Diana? Britney: She has never gotten <u>over</u> the shock of her mother's death.*
- Q38: *Stockholder A: The company is not in good condition. Stockholder B: I agree. <u>Over</u> the past five years, it has halved in size.*
- Q39: *Nathan: I can see pictures of this country song singer everywhere. Grace: His popularity has spread <u>over</u> the northeastern part of Thailand.*

The semantic network for *shàngmiàn* 'upside' does not include any metaphorical extended senses in the semantic network for *over*. It means that all the test items are L4 of difficulty according to Hierarchy of Difficulty. The test results show that these five test items are two ADs, two MaDs, and one MiD. In Q16, *over dinner* denotes the Time sense. *Dinner* in the test item refers to the period of time having dinner. It does not refer to a meal. *Over* emphasizes an action taking place within the period of time. In Mandarin Chinese, there is no such a use in the construction. It is rather uttered in different ways such as:

(36) 在 吃 晚餐 的 時候 討論
Zài chī wǎncān de shíhòu tǎolùn.
at eat dinner particle time discuss
'Discuss (something) during the time of having dinner.'

In the example, *zài* 'at' is used, but a localizer is not needed. The preposition, *zài* 'at' in this case can be various English prepositions. For example, it can be equivalent to *in*, *over*, or *during*. The expression (without a localizer) indicates time, but it is not specified. Consider the following example,

(37) 在 吃 晚餐 的 這 段 時間 裡面 每個人 都 很 愉快
Zài chī wǎncān de zhè duàn shíjiān *lǐmiàn* měigèrén dōu hěn yúkuài.
at eat dinner particle this period time inside everyone all very happy
'During the time of having dinner, everyone is happy.'

The above example shows that it is possible to include a localizer in such expressions. A period of time is specified and seen as a bounded region, and the TR is happy in the region. Whether it is with or without a localizer, in Mandarin Chinese, such scenes are more likely to relate to *lǐmiàn* 'inside,' which is most frequently transferred to the use of *in*. Consequently, it would not be surprising that *in dinner* was chosen by forty-nine participants. Q38 is a similar case as Q16. The use of *over the past five years* emphasizes the period of time and the activities taking place gradually within the time. Twenty-eight participants chose *in* for this test item. It cannot be denied that, in this case, *in the past five years* seems acceptable but not the most appropriate when *over* is one of the distracters.

Q24 denotes the Preference sense. The sense is in the UP cluster. In Mandarin Chinese, there seem no such expressions in the construction. The result shows that *above* and *over* among the distracters were mostly chosen by the participants while *below* and *under* were chosen by limited participants. It can be generalized that *shàngmiàn* 'upside' denotes UP, and this notion provides MLEs some ideas to transfer the uses between the two languages.

It is difficult to categorize Q28 because Tyler and Evans (2003) do not directly discuss such as the scene. It is close to the A-B-C Trajector cluster because *the shock of her mother's death* metaphorically looks like a rock in the TR's way. The TR, *she* has to

move from where she is now to the other side of the rock. The other side denotes the removal of obstacles or problems, which, most of the time, refer to mental states. The metaphorical path is emphasized in this case. On the contrary, in Mandarin Chinese, *shàngmiàn* ‘upside’ denotes a path for spatial-physical scenes, but it is not likely to indicate a metaphorical path. In Q28, *in*, *on*, and *at* instead of *over* were chosen by the majority of the participants. There is one possibility that the participants did not really understand the scene that the test item tended to indicate. Those who chose *in*, *on*, and *at* thought of another meaning which is different from the tested one. The observation comes from the use of *in shock*. It refers to a totally different meaning, and it is possible in terms of semantics and syntax. The uses of *at shock* and *on shock* would be the effects from the misuses of *in*.

Q39 can be related to the Transfer sense. The TR, *his popularity* is a non-physical object. It cannot physically interact with the LM, *the northeastern part of Thailand*. The use of *over* in this test item emphasizes a metaphorical path as stated earlier when Q28 is discussed. Not only does this case can be referred to the Transfer sense, but it is derived from the notion of COVERING from the proto-scene. *His popularity* metaphorically covers *the northeastern part of Thailand*. The result of the test item shows that forty-two participants chose *over*, but sixteen participants chose *on*. That *on* was chosen might be the effects of COVERING because COVERING is strongly related to *on*.

Shown in Table 6-14, *shàngmiàn* ‘upside’ does not denote any extended metaphorical meanings that *over* denotes; thus, all the test items cause difficulties. Except *above* in Q24, all the distracters are non-transfer. *Above* in Q24 denotes the More sense that is very much similar the More sense that *over* denotes. Consequently, negative transfer occurred.

Table 6-14 Summary of *over* indicating spatial-functional scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q16	L4	AD	*from* (FI/Non)	*in* (MaI/Non)	*below* (FI/Non)
Q24	L4	MaD	*below* (FI/Non)	*under* (FI/Non)	*above* (MiI/NT)
Q28	L4	AD	*in* (MiI/Non)	*on* (FI/Non)	*at* (FI/Non)
Q38	L4	MaD	*in* (MiI/Non)	*on* (FI/Non)	*at* (FI/Non)
Q39	L4	MiD	*on* (FI/Non)	*above* (FI/Non)	*with* (FI/Non)

6.8 Cognitive features between *under* in English and related spatial concepts in Mandarin Chinese

6.8.1 Spatial-physical senses of *under*

- Q18: *It is snowing now. Before you go out, wear a jacket under your coat, son.*
- Q19: *In the picture, we were on a cruise for dinner in Bangkok. It stayed still under the Rama 9 Bridge so the guide could explain the history of the architecture.*
- Q54: The *sheep is standing under the tree.*

In the TSR, there are three test items which contain spatial-physical senses in this group. The proto-scene of *under* is included in the proto-scene of *xiàmiàn* ‘downside.’ According to Hierarchy of Difficulty, these test items are Level 5 difficulties. The test results show that Q18 and Q19 are ADs, and Q54 is a MiD. Q18 would sound strange to MLEs because such the expression is likely to be uttered in a different way:

(38) 在 外套 裡面 加 穿 一件 夾克
Zài wàitào *lǐmiàn* jiā chuān yījiàn jiākè.
at coat inside add wear a jacket
‘Wear a jacket in the coat.’

In the example, *lǐmiàn* ‘inside’ is used to indicate the scene, not *xiàmiàn* ‘downside.’ Even though *xiàmiàn* ‘downside’ includes the proto-scene of *under*, the two languages users perceive some spatial scenes differently. The result shows that twenty-one

participants chose *in your coat*, and thirty-seven participants chose *on your coat*. *In your coat* proves the explanation for Example (38). *On the coat* should evolve from the misunderstanding of *jacket* and *coat*. The participants might be confused with which one should be on the upper level. That *on the coat* was chosen because they thought *jacket* was on the upper level.

Q19 is to test if the participants would be confused with *under* and *above*. The test result shows that fifteen participants chose *under*, and fifteen participants chose *below*. The other forty-three participants chose *from* and *with*. The outcome was not anticipated, but it explains that more than half of the participants did not understand the spatial scene in Q19. This also reveals some fact that when a MLE does not understand a test item or the spatial scene in a test item, all the distracters sounds unfamiliar. Cognitive mapping or L1 transfer would not work. Q54 is provided with an image which clearly displays the spatial scene. The result shows that Q54 is a MiD. Forty-nine participants chose *under the tree*, and nine participants chose *below the tree*. Eight participants who chose *on the tree* should probably guess of one option randomly because such the expression is uncommon in Mandarin Chinese. Similar to *on the tree*, those seven participants who chose *from* might simply guess of one option to finish the test because such uses cannot be related to any possible uses either in Mandarin Chinese or English.

The uses of *under* in the spatial-physical scenes are summarized in Table 6-15. It was not anticipated that spatial scenes in Q18 and Q19 would cause significant difficulties because *xiàmiàn* ‘downside’ indicates exactly the same scenes. After the distracters are studied, it suggests that language transfer does not function in the case.

Table 6-15 Summary of *under* indicating spatial-physical scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q18	L0	AD	*in* (MiI/Non)	*on* (MaI/Non)	*at* (FI/Non)
Q19	L0	AD	*from* (MiI/Non)	*below* (FI/NT)	*with* (MiI/Non)
Q54	L0	MiD	*from* (FI/Non)	*on* (FI/Non)	*below* (FI/NT)

6.8.2 Spatial-functional senses of *under*

- Q22: *Mother: In this hospital, how do you manage the record of each newborn baby? Nurse: Each baby's record is filed* under *the mother's last name.*
- Q23: *Boss: How is the profit in this quarter? Secretary:* Under *the new manager's leadership, the revenue doubled in less than 3 months.*
- Q40: *Reporter: How's the investigation on the murder so far? Police: Three people who worked in this place are* under *suspicion.*

The semantic network for *xiàmiàn* 'downside' does not cover any metaphorical extended senses in the semantic network for *under*. They are all Level 4 difficulties according to Hierarchy of Difficulty. First of all, it is disputable to categorize *under the mother's last name* in Q22. It is similar to the Down cluster, but it belongs to neither the Less sense nor the Control sense in the revised semantic network for *under*, which is revised mainly based on the semantic network for *under* (Tyler & Evans, 2003). This use is not totally abstract to MLEs because a similar expression in Mandarin Chinese can be found:

(39) 房子 登記 在 太太 的 名字 下面
Fángzǐ dēngjì *zài* tàitài de míngzì *xiàmiàn*.
house register at wife particle name downside
'The house is registered under the wife's name.'

Example (39) is identical to Q22, and proves that *xiàmiàn* 'downside' denotes the sense. *In the mother's last name* was chosen by twenty-nine participants. One possibility would be that the word, *filed* influenced the performance. The participants might refer the scene to *in the file*; thus, *in* was chosen to fit in the blank.

Under the new manager's leadership in Q23 was chosen by ten participants while *through the new manager's leadership* was chosen by 31 participants. *On* and *below the new manager's leadership* were chosen by sixteen and sixteen participants. The result can be traced in the semantic network for *through* because the use of *through* in this case can refer to the Means sense or the Cause sense in the semantic network for *through* (Tyler & Evans, 2003). The LM in the Means sense is "an important means of reaching a

particular goal" (Tyler & Evans, 2003). In the Cause sense, the LM, a particular process, motivates the TR, a situation or a state (Tyler & Evans, 2003). The result of Q23 raises not only the confusion between *below* and *under*, but also the use of *through*. The use of *under the new manager's leadership* can also be found in Mandarin Chinese even though it is not exactly in the construction:

(40) 在 新 經理 的 領導 下
zài xīn jīnglǐ de lǐngdǎo *xià*
at new manager particle leadership down
'under the new manager's leadership'

In the above example, *xià* 'down' is the localizer to describe the spatial scene. *Xià* 'down' includes *xiàmiàn* 'downside.' In other words, it is a broader spatial concept than *xiàmiàn* 'downside.' This sense should not be unfamiliar to MLEs.

Under suspicion in Q40 was chosen only by nine participants. Instead, *in suspicion* was chosen by 46 participants. *In* denotes the State sense, and that would be the reason why a significant number of the participants chose *in suspicion*. However, *under* also denotes the State sense with a negative connotation (Section 5.5.1, Chapter V). This sense is excluded in the semantic network for *under* (Tyler & Evans, 2003), but in the revised semantic network for *under*. In Mandarin Chinese, there is not likely to have such a sense in the construction.

To sum up (See Table 6-16), *xiàmiàn* 'downside' does not denote the same extended metaphorical meanings that *under* denotes. The distracters are mainly non-transfer, except *below* in Q23. *Below* and *under* both denote the notion of DOWN. They are related, but the relation is not tight.

Table 6-16 Summary of *under* indicating spatial-functional scenes

Test item	**Hierarchy of Difficulty**	**Learning Difficulty Index**	**Distracter Influence Index/ Types of transfer** (NT: Negative transfer; Non: Non-transfer)		
Q22	L4	MaD	*below* (FI/Non)	*in* (MiI/Non)	*at* (FI/Non)
Q23	L4	AD	*on* (FI/Non)	*through* (MiI/Non)	*below* (FI/NT)
Q40	L4	AD	*below* (FI/Non)	*in* (MaI/Non)	*at* (FI/Non)

6.9 Conclusion

Based on the third hypothesis of this study, MLEs apply the spatial concepts in Mandarin Chinese that they have conceptualized to the spatial concepts in English. The similarities between the two semantic networks should ease the learning whereas the differences might cause the difficulties. The findings in the chapter do not prove the third hypothesis of this study: *The similarities within the semantic networks for the spatial relations in the two languages enhance the ease of learning, and the differences suggest the learning difficulties*. The findings suggest that the similarities in spatial-physical scenes help MLEs understand the spatial scenes in English in limited cases. In most cases, the similarities do not positively help the performance. It can be attributed that Mandarin Chinese localizers are continuums which contain a couple of English prepositions. Each preposition occupies only one small section of the continuum, and the small section where the two languages overlap should help the performance, but the rest of the continuum does not.

The findings also suggest that Mandarin Chinese localizers do not denote as many extended metaphorical meanings as the English prepositions do. There are limited similarities between the two languages. In limited cases, the two languages share similar senses, which help MLEs' performance. In most cases, the two languages differ from each other. The extended meanings in English remain abstract concepts to MLEs even though those meanings are denoted by the English prepositions that can be related to the counterparts in Mandarin Chinese.

The results of the distracters analysis suggest that errors regarding conceptualization of spatial scenes are not attributed to negative transfer. The evidence shows that non-transfer is dominating in the results of the TSR. More accurately, when spatial scenes in English are given, and MLEs are asked to choose the most appropriate English prepositions to indicate the scenes, MLEs, in many cases, do not choose the answers or the related prepositions. For example, in an *under* case, *above* and *over* were chosen. It can be inferred that cognition mapping can start from many possible items that are slightly related to the senses in the conceptualization system especially when a scene is abstract to MLEs. When it does not start from the right concept, it can lead to a totally different spatial scene.

CHAPTER VII
CONCLUSION AND DISCUSSION

This chapter first presents the summary of the study. Second, the discussions and the implications of the study are also presented. Finally, there are some suggestions for further studies.

7.1 Summary of the study

The attempt of the study initially evolved from the fact that it is difficult for Mandarin Chinese Learners of English (MLEs) to use English prepositions. No matter how long they have studied English, it is still challenging for them to choose the most appropriate English prepositions to indicate particular spatial scenes. Pedagogical descriptions regarding English prepositions generally provide the overall fundamental uses; however, there are still instances that MLEs choose prepositions differently from those used by native speakers of English (NSEs). There must be a gap of conceptualization regarding spatial relations for MLEs between the first language and the target language. This study aimed to investigate the gap through the assumptions of cognitive linguistics. The analyses were conducted from the perspective of L1 interference.

In order to investigate the gap of conceptualization, the study set to find the answers to three research questions. These questions concerned the English prepositions with which MLEs have difficulties, the similarities and differences of spatial concepts between the two languages, and the cognitive features of the spatial concepts in the two languages. To answer the questions, this study was to fulfill three objectives which were to investigate the difficulties MLEs encounter when choosing English prepositions, to construct the semantic networks for spatial concepts in Mandarin Chinese and modify the existing semantic networks for English prepositions, and finally to explain the difficulties cognitively and generalize cognitive features. The hypotheses corresponded to the research questions. First of all, the study hypothesized that MLEs had difficulties with the up and down relations (verticality), e.g., *over*/*above* and *under*/*below*, especially when they were used metaphorically. Second, the spatial concepts in the two languages

included and excluded each other in certain senses. Third, based on the strong version of contrastive analysis hypothesis, the similarities between the two languages helped learning, and the differences suggested difficulties.

There are a number of English prepositions. This study adopted the chart of common prepositions (Celce-Murcia & Larsen-Freeman, 1999: 409), which suggests the most frequently-used English prepositions in pedagogy. To emphasize verticality, the chart was halved in size. Those that obviously do not denote verticality were ignored, and there left ten English prepositions for the Test of Spatial Relations (See Section 3.2.1.1, Chapter III). In contrast, three Mandarin Chinese localizers regarding verticality were chosen: *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside' (See Section 3.2.2, Chapter III). These localizers must appear in the construction, *zài*+NP+localizer. The main limitation of the study referred to the population. The sample of the study might not represent all the population, but ideally, the results still remained general and could apply to university students in Taiwan who use Mandarin Chinese as the language of instruction.

To conduct the study, two research instruments were adopted to yield valid outcomes for discussions. The instruments were the Test of Spatial Relations (TSR) and Sinica Corpus. The TSR was created exclusively for the study to confirm with which English prepositions MLEs have difficulties. It was prepared with an emphasis on the up and down relations (verticality). The TSR consisted of sixty multiple-choice test items, which were written into three test types: Monologue, Dialogue, and Picture description (See Figure 3-1). Each type of test items was of its own function to effectively display the spatial scenes. Sinica Corpus was adopted to build semantic networks especially for the Mandarin Chinese localizers, while the semantic networks for English prepositions were obtained from Tyler and Evans' study (2003). A corpus-based study was to assure that all the examples were naturally in use with an intention to avoid novel uses.

The TSR was distributed to the participants at a university in Taichung, Taiwan. Eighty-one students majoring in English participated in the TSR, and seventy-three test copies were considered valid data for analyses through the process of judging the validity

of participants (See Figure 4-2). The computerized TSR results were discussed in two perspectives: the pedagogical approach and the analytic approach. To construct the semantic networks for the spatial concepts in Mandarin Chinese, the three localizers were searched in the database. The search results in the construction: *zài*+NP+localizer were selected and compiled in the lists (See Appendix O, P, and Q). The NPs in the construction were translated into English for reference. The analyses for the semantic networks adopted Principled Polysemy, which was developed by (Tyler & Evans, 2003). As far as it reached this step, the collected data were valid for discussions. The findings were seperated into three chapters. Chapter IV defines the learning difficulties based on Learning Difficulty Index (LDI). In addition, Distracter Influence Index (DII) suggests how the distracters in the TSR influenced the participants' performance. Chapter V compares and contrasts the spatial concepts in English and Mandarin Chinese. Chapter VI investigates the cognitive features between the two languages based on the findings in Chapter IV and Chapter V.

Chapter IV quantitatively discusses the TSR results in the pedagogical approach and the analytic approach. In the pedagogical approach, the results show that only four percent of the participants (See Figure 4-3) reached the passing score according to the university regulation. The overall average is 22.42 (See Table 4-6), which directly refers to the number of correctly answered test items. The majority of the participants scored in the categories from 11 to 30 (See Table 4-7). From a pedagogical point of view, the majority of the participants had difficulties with the English prepositions in the TSR. The results also scientifically show that the participants had more difficulties on spatial-functional senses than spatial-physical senses (See Table 4-8). The analytic approach computed the Item Difficulty Index values for each test item (See Table 4-9). The values were converted into the four levels of Learning Difficulty Index (LDI) (See Table 4-10). Table 4-11 displays the learning difficulty level of each test item. It suggests that the TSR contained relatively higher Learning Difficulty Index (Absolute Difficulty and Major Difficulty) more than lower Learning Difficulty Index (Minor Difficulty and Fair Difficulty). Besides, all the distracters in the test items were converted into the four levels of Distracter Influence Index (DII) (See Table 4-13). The index shows that at what level a distracter influenced the participants' performance.

Chapter V qualitatively analyzes the three Mandarin Chinese localizers: *lǐmiàn* ‘inside,’ *shàngmiàn* ‘upside,’ and *xiàmiàn* ‘downside’ to construct the semantic networks. The outcomes were compared to the semantic networks for the related English prepositions. The last section revised the existing semantic networks for the English prepositions (Tyler & Evans, 2003). The results suggest the similarities and differences between the spatial concepts in the two languages. First, the proto-scene of *lǐmiàn* ‘inside’ is identical to the proto-scene of *in* (Tyler & Evans, 2003), but the semantic network for *lǐmiàn* ‘inside’ is different to the semantic network for *in* (Tyler & Evans, 2003). It infers that *lǐmiàn* ‘inside’ does not denote as many metaphorical senses as *in* does. Second, the proto-scene of *shàngmiàn* ‘upside’ is a continuum which covers the proto-scene of *on*, *over*, and *above*, but the semantic network for *shàngmiàn* ‘upside’ does not include the majority of the metaphorical senses in the semantic networks for *on*, *over*, and *above.* Third, the proto-scene of *xiàmiàn* ‘downside’ is also a continuum which covers *under* and *below*. However, *xiàmiàn* ‘downside’ does not denote as many extended metaphorical senses as *under* and *below* do.

Chapter VI qualitatively discusses the relationships between the TSR results and the results of the semantic networks. The discussions aimed at investigating whether the similarities and the differences between the two languages help MLEs learn how to indicate spatial relations in English appropriately. The results suggest that in most cases, the similarities of the spatial-physical scenes between English and Mandarin Chinese do not positively help the performance. In limited cases, the similarities provide MLEs some traceable clues to successfully link what they have conceptualized in Mandarin Chinese with English uses. Regarding spatial-functional senses, the spatial concepts in English and Mandarin Chinese denote similar extended metaphorical meanings in limited cases, which can help MLEs choose the most appropriate English prepositions. In most cases, the two languages do not denote similar extended metaphorical meanings; therefore, the English uses are abstract or unconnected to MLEs. The results of distracter analysis suggest that errors in the TSR are mostly caused by non-transfer. It infers that even though the spatial concepts in the two languages are related to each other, L1 interference does not apply when MLEs learn spatial relations in English.

7.2 Conclusions

The Test of Spatial Relations (TSR) was created mainly to investigate the static verticality; therefore, according to the TSR results in pedagogical approach, it can be generalized that MLEs have difficulties with indicating static verticality. The results also show that MLEs especially have more difficulties with spatial-functional (SF) senses than spatial-physical (SP) senses. It suggests that MLEs are especially confused with extended metaphorical meanings because they are rather abstract or unconnected concepts even though they are transferred from SP senses, which commonly can be perceived by human nature. The transmission of senses from SP to SF makes differences in English and Mandarin Chinese.

The analytic approach for this study adopted the concept of Item Difficulty Index (IDI) and creates Learning Difficulty Index (LDI) for how the test items were responded and Distracter Influence Index (DII) for how the distracters in the test items influenced the participants' performance. The findings show that most of the test items are Absolute Difficulty (ADs) and Major Difficulty (MaDs). Even though MLEs have more difficulties with SF senses than SP senses, LDI suggests that MLEs have learning difficulties with both kinds of senses at different levels. It proves that in some cases (e.g., *in the box* and *zài* 'at' xiāngzǐ 'box' *lǐmiàn* 'inside'), more MLEs can understand the English uses; in some other cases (e.g., *in the tree* and *zài* 'at shù 'tree' *shàngmiàn* 'upside'), MLEs are easily confused with the spatial relations. Besides, DII shows four levels of influence. The level of a distracter suggests how a distracter is related to the answer or the spatial scene in the test item. When a distracter is tightly related, the cognitive features should be paid special attention.

To explore the causes of the difficulties, the semantic networks for the three localizers in the selected construction, *zài*+NP+localizer, were created based on Principled Polysemy which was developed by Tyler and Evans (2003). The results show that even though the proto-scenes are similar, these three localizers share limited extended metaphorical senses with the counterparts in English. For example, *in* and *lǐmiàn* 'inside' both denote the State sense. This fact does not mean *in* and *lǐmiàn* 'inside'

denote the State sense equivalently. This fact applies to other pairs of spatial concepts in English and Mandarin Chinese, such as *on* and *shàngmiàn* 'upside.' In most cases, the three localizers do not denote the extended metaphorical meanings that the English prepositions do. One of the reasons should refer to the fact that the scope of this study excludes dynamic senses which were largely included in the existing semantic networks for the English prepositions (Tyler & Evans, 2003). In English, static verticality can be indicated by a series of English prepositions: *above*, *at*, *below*, *in*, *on*, *over*, and *under*. These seven English prepositions are associated with three localizers in Mandarin Chinese, *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' *xiàmiàn* 'downside.' In other words, the three localizers in Mandarin Chinese, which directly indicate spatial relations, construct continuums to indicate verticality. In the continuums, there are a couple of sections, each of which covers one of the seven English prepositions. Each section overlaps at least with the other two sections. The learning difficulties that MLEs encounter seem to evolve from the overlapping areas.

To connect the TSR results and the comparisons of the semantic networks between the two languages, the test items with the distracters were scrutinized with LDI and DII. The findings suggest that the similarities enhance the ease of learning in some cases, but they also cause difficulties. In contrast, the differences suggest learning difficulties in most cases, but they also contribute to the performance in some cases. It infers that when MLEs learn spatial relations in English, both the similarities and the differences between the two languages can help the performance; meanwhile, the similarities and the differences can also be the sources of learning difficulties. Generally, learning difficulties can be traced with cognitive descriptions.

7.3 Pedagogical implications

This study suggests a few implications toward pedagogy. First of all, Dechert (1983) suggests that learners use interference to predict equivalence between two languages. Ellis (1997) states that transfer refers to the process that learner's L1 influences the acquisition of an L2. Bhela (1999: 31) claims that "As the structures of L1 and L2 have differences, there has been a relatively high frequency of errors occurring in

the target language, thus indicating an interference of the native language on the target language." It is proved that it is important to be familiar with the features in the L1 and L2. The two languages would share some features in common and possess their own unique features. Bhela (1999: 30) explains, "The use of L1 structures as a principle of fundamental language organization and processing has immediate serviceability for these learners." This study investigated the similarities and the differences between the two languages. The features of indicating spatial relations have also been discussed. The findings could be introduced for pedagogical descriptions for MLEs or English learners of Mandarin Chinese.

Second, cognitively approached instructions have been adopted in language classrooms. Boers and Demecheleer (1998: 203) conclude that "Cognitive semantic insights could be helpful in a pedagogical context: tracing the conceptual links between the different senses of a polysemous item may help us anticipate comprehension problems." To implement cognitive approach-based instructions for spatial relations in a target language, it is inevitable to introduce the proto-scenes, which are better presented in figures or images. The proto-scenes help MLEs build the fundamental knowledge regarding the spatial relations in English. With a concrete understanding of the uses of the proto-scenes, MLEs can trace the extended metaphorical meanings with the cognitive features in the semantic networks.

Finally, especially for the dynamic senses, collocation should provide good assistance because in such senses, the English prepositions usually collocate with verbs. Koosha and Jafarpour (2006) compare two ways of instructions for spatial relations. The participants receiving the collocation approached instruction outperformed those receiving the conventional one. A collocation approached instruction can be prepared with a corpus database such as Corpus of Contemporary American English. It provides a good instrument for English instructors to search the collocations of a single linguistic form with frequency of occurrence.

7.4 Suggestions for further studies

There are recommendations for future research, which are based on the limitations of this study. First of all, there should be a larger number of the participants for the TSR. In this study, there were only seventy-three valid test copies for analyses. The number is considered relatively limited. The findings should have reflected the truth in general. If the number of the participants is increased, the results should be more accurate, and the findings can turn out to be much closer to the universal truth reflecting the learning difficulties that all the MLEs encounter.

Second, the test design should be considered more carefully in accordance with the objectives of the study. For example, in the TSR, there were not enough spatial-physical senses that both languages shared in common. In addition, the test results did not help effectively investigate how the participants performed on the similarities and the differences in the semantic networks. However, it is rather difficult to create a test that perfectly matches the objectives especially when there are a number of English prepositions involved in a study. Moreover, it is also difficult to create a test that can balance the similarities and the differences when the number of similarities is significantly smaller than the differences.

Third, it is suggested that the construction for the Mandarin Chinese corpus data can be expanded. It should be better to use *lǐ* 'in,' *shàng* 'up,' and *xià* 'down' as the localizers for corpus data searches instead of *lǐmiàn* 'inside,' *shàngmiàn* 'upside,' and *xiàmiàn* 'downside.' The findings should not be totally different, but the valid entries should satisfy a better scope.

Fourth, this study excludes retrospective interviews with the participants regarding the test-taking strategies. The analyses in Chapter VI of this study were conducted based on the findings from the TSR and the semantic networks. The authentic opinions from the participants are not included. It is suggested that further studies include interviews to explore the reasons why participants prefer one option to the other three options in a test item. Findings from retrospective interviews should be effective to triangulate the analyses.

Last, the TSR can be replicated and translated into Mandarin Chinese to investigate how English learners of Mandarin Chinese perform when indicating spatial relations in Mandarin Chinese. For such a study, the results can be hypothesized that English-speaking learners of Mandarin Chinese have fewer difficulties with spatial-physical senses because the spatial concepts of Mandarin Chinese are relatively broader. It can also be assumed that there will be more examples showing that English learners of Mandarin Chinese directly transfer the metaphorical uses into Mandarin Chinese.

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APPENDICES

Appendix A Entries that *in* as a preposition

Preposition		
	Definition	Example
1.	used with the name of a container, place, or area to say where someone or something is	There's some sugar *in* the cupboard.
2.	into a contain, place etc	I never went *in* pubs.
3.	used to say how something is done or happens	We waited *in* silence.
4.	used with names of months, years, seasons etc. to say when something happens	Shaw first visited Russia *in* 1927.
5.	during a period of time	It was amazing how much we managed to do *in* a day.
6.	at the end of a period of time	I'll be with you *in* a minute.
7.	used with negatives or with 'first' to say how much time has passed since the last time something happened	I haven't enjoyed myself so much *in* years.
8.	used to name the book, document, film etc where something or someone appears	You shouldn't believe everything you read *in* newspapers.
9.	making up the whole of something or included as part of something	There are twelve programmes *in* the series.
10.	doing or affecting a particular kind of job	He's been *in* politics for fifteen years.
11.	wearing something	He looked very handsome *in* his uniform.
12.	used to talk about the state or situation of something or someone	I hear that their marriage is *in* trouble.
13.	used to say what activity a group of people do	About 4,000 students took part *in* the protest.
14.	used to talk about the shape, arrangement, or course of something or someone	I want you all to stand *in* a circle.
15.	used between a smaller number and a larger number to say how common or how likely something is	One *in* ten homes now has cable TV.
16.	used before a plural number or amount to say how many people or things are involved, or how many there are in each group	Eggs are still sold *in* half dozens.
17.	used between a smaller number or amount and a large one to say what a rate is	Income tax stands at 23 pence *in* the pound.

18.	used to say what colour something is or what it is made of	Do you have the same pattern *in* blue?
19.	used to say what specific thing your statement is related to	Milk is very rich *in* calcium.
20.	used to refer to the weather or the physical conditions somewhere	I've been standing *in* the rain for over an hour.
21.	used to say what feeling you have when you do something	She looked at me *in* horror.
22.	used before the name of someone or something when you are saying how they are regarded	You have a very good friend *in* Pat.
23.	used to say what person or thing has the quality you are mentioning	There was a hint of spring *in* the air.
24.	used to name the substance, food, drink etc that contains something	Vitamin D is found *in* butter.
25.	used to say how many parts something is divided into a radio serial in four part	I tore the letter *in* two and threw the pieces *in* the fire.
26.	while doing something or while something is happening, and as a result of this	In all the confusion, it is quite possible that some people got tickets without paying.
27.	**in that** used after a statement to begin to explain in what way it is true	I've been lucky *in* that I have never had to worry about money.
28.	**be in your 20s/30s/40s etc** to be between the ages of 20 and 29, 30 and 39 etc	Matthews was already *in* his mid-40s.

Appendix B Entries that *in* as an adverb

Adverb		
	Definition	Example
1.	into or inside a container, place, vehicle etc	Eric held the boat steady while the children got *in*.
2.	inside or into a building, especially your home or the place where you work	Come *in* and sit down.
3.	if a train, boat, or plane is in, it has arrived at a station, airport etc	Our train's not *in* yet.
4.	given or sent to a person or organization to be dealt with by them	All entries must be *in* by next week.
5.	if you write, paint, or draw something in, you add it in the correct place	Fill *in* your name and address on the form provided.
6.	if a player or team is in during a game of cricket, they are batting	
7.	if a ball is in during a game, it is inside the area where the game is being played	Agassi's second serve was just *in*.
8.	if a politician or a political party is in, they have been elected	Labour recorded its highest vote ever, but the Tories got *in* again.
9.	towards the centre	The map had started to curl *in* at the edges.
10.	when the tide is in, the sea by the shore is at its highest level	The tide was *in*, and the sea lapped against the harbor wall.
11.	**be in for sth** if someone is in for something unpleasant, it is going to happen to them	I'm afraid he's *in* for a bit of a disappointment.
12.	**be in for it** informal if someone is in for it, they are going to be punished	If they find out what I've done, I'll be *in* for it, won't I?
13.	**be/get in on sth** to be or become involved in something that is happening	I think you ought to be *in* on this discussion, Td.
14.	**be in with sb** informal to have a friendly relationship with someone	She's *in* with the theatrical crowd.
15.	**be in at the beginning/start (of sth)** to be present or involved when something starts→ have (got) it in for sb at	

Appendix C Entries that *on* as a preposition

Preposition		
	Definition	Example
1.	ON A SURFACE	
	a) touching a surface or being supported by a surface	Leave your things *on* the table over there.
	b) used to say that someone or something moves so that they are then touching or supported by a surface	He threw himself *on* the bed.
2.	SUPPORTING YOUR BODY used to say what part of someone's body is touching the ground or another surface and supporting their weight	She was *on* her feet in no time.
3.	PART HIT/TOUCHED used to say what part of someone or something is hit or touched	I wanted to punch him *on* the nose.
4.	WRITTEN/SHOWN used to say where something is written or shown	There's a diagram *on* page 25.
5.	ATTACHED attached to or hanging from something	She hung her coat *on* a hook.
6.	PLACE in a particular place	The town is right *on* the border.
7.	POSITION in a particular position in relation to something else	You'll see the school *on* your left.
8.	LOOKING/POINTING looking or pointing towards something or someone	His eyes were *on* the stranger standing in the doorway.
9.	DAY/DATE during a particular day	They'll be here *on* Tuesday.
10.	AFFECTING/RELATING TO affecting or relating to someone or something	There will be new restrictions *on* the sale of weapons.
11.	ABOUT about a particular subject	Do you have any books *on* India?
12.	ORDERS/ADVICE as a result of someone's order, request, or advice	He was killed *on* the King's orders.
13	EAT/DRINK used to talk about what someone usually eats or drinks	They live mainly *on* beans, lentils, and rice.
14.	TRANSPORT	
	a) in or into a bus, train, plane etc	Did you manage to sleep *on* the plane?
	b) riding something	I'll probably come on my bike.
15.	MONEY receiving money for a job or as a regular payment	He's *on* quite a good salary now.
16.	FUEL using a particular type of FEUL or power	Most buses run *on* diesel.
17.	MEDICINE/DRUGS taking a	Are you still *on* antibiotics?

	particular drug or medicine regularly	
18.	**what's sb on?** Spoken used to say that someone is behaving in a very strange way, as if they are taking an illegal drug	
19.	USING EQUIPMENT using a machine or piece of equipment	He's been *on* the computer all afternoon.
20.	MUSICAL INSTRUMENT playing a musical instrument	He played a short piece *on* the piano.
21.	RADIO/TELEVISION being broadcast by radio or television	What's *on* TV tonight?
22.	RECORDED used to say in what form information is stored or music, films etc are recorded	The movie is now available *on* video and DVD.
23.	ACTIVITY/JOURNEY taking part in an activity or traveling somewhere	She's *on* a course all this week.
24.	INCLUDED included in a group or team of people or in a list	Are you still *on* the management committee?
25.	WHEN STH HAPPENS formal as soon as someone has done something or as soon as something has happened	Couples are presented with a bottle of wine *on* their arrival at the hotel.
26.	COMPARED WITH STH compared with another person or thing	This essay is a definite improvement *on* your last one.
27.	CARRYING STH informal if you have something on you, you have it in your pocket, your bag etc	I don't have any money *on* me.
28.	PAY **be on sb** spoken used to say who is going to pay for something	The drinks are *on* me!
29.	TELEPHONE NUMBER used to say what number you should use in order to telephone someone	You can contact me *on* this number.
30.	CAUSING SB PROBLEMS used when something bad happens to you, for example when something you are using suddenly stops working, or someone you have a relationship with suddenly leaves you	Suddenly the telephone went dead *on* me.

Appendix D Entries that *on* as an adjective or an adverb

Adjective or Adverb		
	Definition	Example
1.	CONTINUING used to say that someone continues to do something or something continues to happen, without stopping	We decided to play *on* even though it was snowing.
2.	FURTHER if you move, walk etc on, you move forward or further towards something	If you walk *on* a little, you can see the coast.
3.	LATER later than or after a particular time	Now, 40 years on, this is one of the most successful theatres in the country.
4.	WEARING STH if you have something on you are wearing it	All he had *on* was a pair of tattered shorts.
5.	ATTACHED used to say that something is attached to something else, especially when it is in the correct position	Is the cover *on* properly?
6.	WRITTEN used to say that something is written somewhere	He was wearing a badge with his name *on*.
7.	TRANSPORT in or into a bus, train etc	The train stopped and two people got *on*.
8.	LIGHT/MACHINE if a machine, light etc is on, it is operating	Who left all the lights *on*?
9.	BEING BROADCAST if a radio or television programme etc is on, it is being broadcast	What time is "Star Trek" *on*?
10.	EVENTS if an event is on, it has been arranged and is happening or will happen	The transport union has confirmed that the strike is definitely *on*.
11.	PERFORMING/SPEAKING performing or speaking in public	You're *on* in two minutes.
12.	WORKING if you are on at a particular time, you are doing your job at that time	I'm not *on* again until two o'clock tomorrow.
13	**have sth on** informal if you have something on, there is something that you must do	I haven't got anything *on* tomorrow, so I could see you then.
14.	**on and off** for short periods but not regularly over a long period of time	He's been smoking for ten years now, *on* and off.
15.	**be/go/keep on about sth** informal to keep complaining to someone or asking someone to do something, especially when this annoys them	I've been *on* at him to fix that cupboard for weeks now.

16.	**be/go/keep on about sth** BrE informal to keep talking about something, in a way that is boring or annoying	He's always going *on* about money.
17.	**be not on** BrE spoken if something is not on, it is not acceptable or reasonable	I'm sorry, what you're suggesting is just not *on*!
18.	**be on for sth** spoken to be ready or willing to do something that someone has suggested	Right, how many of you are *on* for a drink after work?
19.	**you're on** spoken used to tell someone that you accept a BET or an invitation to compete against them	I bet you I bet you £20 he won't turn up. You're *on*!

Appendix E Test of Spatial Relations

Learning Background Questionnaire

Check ☒ <u>the most appropriate response</u> (ONLY ONE) to each question.

1. I am ☐ male ☐ female.
2. I am currently I am currently in the ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th year.
3. I studied in a ☐ regular ☐ bilingual/international **elementary school**.
   ☐ regular ☐ bilingual/international **junior high school**.
   ☐ regular ☐ bilingual/international **senior high school**.
4. I used to live in an English-speaking country. ☐ Yes ☐ No
5. If Yes to Q4, I lived there for ☐ fewer than 1 year ☐ 1 to 2 years ☐ more than 2 years.
6. In my family, the most frequently-used language (dialect) is
   ☐ Mandarin ☐ Taiwanese ☐ Hakka ☐ English ☐ Others.

Answer Sheet

1		2		3		4		5	
6		7		8		9		10	
11		12		13		14		15	
16		17		18		19		20	
21		22		23		24		25	
26		27		28		29		30	
31		32		33		34		35	
36		37		38		39		40	
41		42		43		44		45	
46		47		48		49		50	
51		52		53		54		55	
56		57		58		59		60	

Test of Spatial Relations

Directions: There are 60 questions in this test. Choose <u>the most appropriate response</u> (ONLY ONE) to the blank in each question. Please finish all the questions within 30 minutes.

Part 1: Monologue

1. Today in class we are going to learn how to backup your files. It is important you regularly backup your files which are saved _____ your computer.
   - ☐ at
   - ☐ in
   - ☐ on
   - ☐ over
2. I went to an interview yesterday. All the interviewees were nervous and waiting for the result _____ silence.
   - ☐ between
   - ☐ in
   - ☐ on
   - ☐ under
3. Boys and girls, before we start the class today, let's put all the chairs _____ a circle.
   - ☐ in
   - ☐ on
   - ☐ through
   - ☐ under
4. After you finish reading the books in the library, please leave them _____ the table over there.
   - ☐ at
   - ☐ between
   - ☐ on
   - ☐ with
5. Sarah's wedding ring is missing. She is now _____ her hands and knees searching for it.
   - ☐ at
   - ☐ on
   - ☐ under
   - ☐ with

6. Peter is planning a trip to India. Do you have any books _____ India for him to read?

   ☐ at
   ☐ in
   ☐ on
   ☐ with

7. A lot of kids in this community are _____ drugs at the age of 12. The local government is trying to solve the problem.

   ☐ at
   ☐ below
   ☐ in
   ☐ on

8. My father's garden is full of flowers and plants. I think It is _____ its best in June.

   ☐ at
   ☐ in
   ☐ on
   ☐ under

9. The grocery store is not far away from here. It is just there _____ Maple Street.

   ☐ above
   ☐ at
   ☐ in
   ☐ on

10. Susan studied very hard in high school. She then became a student _____ Harvard in the 1980s.

    ☐ at
    ☐ on
    ☐ under
    ☐ with

11. Jessica is patient. She is good _____ making things out of junk.

    ☐ above
    ☐ at
    ☐ over
    ☐ with

12. Let's leave for mountain climbing _____ dawn. We should wake up very early.
    - ☐ at
    - ☐ in
    - ☐ on
    - ☐ with
13. It is pretty cold outside. I guess the temperature is just _____ freezing.
    - ☐ above
    - ☐ from
    - ☐ on
    - ☐ over
14. It is easy to find the bank in the building. It is _____ McDonald's.
    - ☐ above
    - ☐ at
    - ☐ from
    - ☐ on
15. Come visit Bangkok sometime. There are many beautiful bridges _____ the Chaophraya River.
    - ☐ between
    - ☐ from
    - ☐ on
    - ☐ over
16. Holiday seasons are coming. Can we talk about a family trip _____ dinner tonight?
    - ☐ below
    - ☐ from
    - ☐ in
    - ☐ over
17. John is having difficulty in a math class. His math score is _____ average.
    - ☐ at
    - ☐ below
    - ☐ between
    - ☐ under

18. It is snowing now. Before you go out, wear a jacket _____ your coat, son.

- ☐ at
- ☐ in
- ☐ on
- ☐ under

19. In the picture, we were on a cruise for dinner in Bangkok. It stayed still _____ the Rama 9 Bridge so the guide could explain the history of the architecture.

- ☐ below
- ☐ from
- ☐ under
- ☐ with

20. The toy is made for kids _____ the age of 3. Don't give it to your baby girl.

- ☐ above
- ☐ from
- ☐ in
- ☐ through

Part 2: Dialogue

21.

Jenny: Have you seen Robert recently, Fred? It has been a long while since we last met.

Fred: Robert? He met a girl several weeks ago and has been busy seeing her frequently. I think he's so much _____ love now.

- ☐ at
- ☐ in
- ☐ on
- ☐ under

22.

Mother: In this hospital, how do you manage the record of each newborn baby?

Nurse: Each baby's record is filed _____ the mother's last name.

- ☐ at
- ☐ below
- ☐ in
- ☐ under

23.

Boss: How is the profit in this quarter?

Secretary: _____ the new manager's leadership, the revenue doubled in less than 3 months.

- ☐ below
- ☐ on
- ☐ through
- ☐ under

24.

Sue: What's the main reason for choosing one restaurant _____ another, Peter?

Peter: It's the taste of the food.

- ☐ above
- ☐ below
- ☐ under
- ☐ over

25.

Mary: We're going to have a math test tomorrow morning.

Bryan: I am never _____ ease when taking a test.

- ☐ at
- ☐ on
- ☐ under
- ☐ with

26.

Daniel: My note's ready. Where do you think I should put the recipient's name?

Susan: Write it just _____ the subject of your note.

- ☐ above
- ☐ at
- ☐ from
- ☐ through

27.

Emily: What were you doing here at the balcony?

David: We're watching a helicopter flying low _____ the pond.

- ☐ at
- ☐ between
- ☐ on
- ☐ over

28.

George: What's the matter with Diana?

Britney: She has never gotten _____ the shock of her mother's death.

- ☐ at
- ☐ in
- ☐ on
- ☐ over

29.

Ted: Why have you decided to raise a fund for those people in the pictures?

Mark: Because most of them are living _____ the poverty line.

- ☐ below
- ☐ in
- ☐ under
- ☐ with

30.

Naomi: How did you feel when your father told you the destination for the family trip this year?

Angie: My sister and I, _____ the same time, screamed out loud.

- ☐ at
- ☐ in
- ☐ on
- ☐ under

31.

Jason: Gary, I don't see your son at the party.

Gary: He's _____ the Spiderman's costume playing over there with the boys.

- ☐ at
- ☐ in
- ☐ on
- ☐ under

32.

Jack: Have you heard that they're going to release iPhone 5 soon this year?

Brendon: Yes, I read the news _____ the newspaper two days ago.

- ☐ at
- ☐ below
- ☐ in
- ☐ on

33.

Mother: You've been _____ the phone for ages. Hang it up, please.

Daughter: Jenny just broke up with her boyfriend. She needs someone now.

- ☐ in
- ☐ on
- ☐ over
- ☐ under

34.

Paula: It's really nice to meet you again. I think I'd better get going.

Janice: All right, let's stay _____ touch.

- ☐ in
- ☐ on
- ☐ under
- ☐ with

35.

Harry: You've been working so hard. I haven't seen you for a long time.

Larry: I live _____ my own, so I have to work hard to make enough money to live.

- ☐ in
- ☐ on
- ☐ under
- ☐ with

36.

Miles: The protestors set the theater _____ fire last night. Did you watch the news?

Nelly: Yes, I did. It's sad to see it burned.

- ☐ below
- ☐ in
- ☐ on
- ☐ under

37.

Citizen: Here's the required document for the service, Sir.

Official: I am afraid that you should fill out your form again _____ ink. It's stated in the instructions.

- ☐ from
- ☐ in
- ☐ on
- ☐ with

38.

Stockholder A: The company is not in good condition.

Stockholder B: I agree. _____ the past five years, it has halved in size.

- ☐ at
- ☐ in
- ☐ on
- ☐ over

39.

Nathan: I can see pictures of this country song singer everywhere.

Grace: His popularity has spread _____ the northeastern part of Thailand.

- ☐ above
- ☐ on
- ☐ over
- ☐ with

40.

Reporter: How's the investigation on the murder so far?

Police: Three people who worked in this place are _____ suspicion.

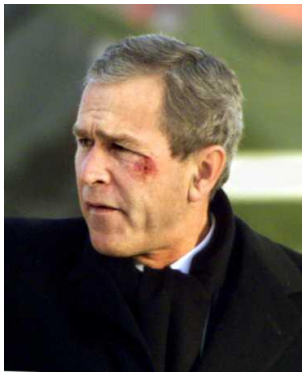
- ☐ at
- ☐ below
- ☐ in
- ☐ under

Part 3: Picture Description

41.

There is a bruise _____ his face.

- ☐ at
- ☐ in
- ☐ on
- ☐ with



42.

The dog is lying _____ the grass.

- ☐ at
- ☐ in
- ☐ on
- ☐ with

43.

The picture is hanging _____ the sofa.

- ☐ above
- ☐ at
- ☐ over
- ☐ with

44.

There are hill tribes _____ the mountains.

- ☐ at
- ☐ in
- ☐ on
- ☐ between

45.

The woman slaps the man _____ the face.

- ☐ at
- ☐ in
- ☐ on
- ☐ over

46.

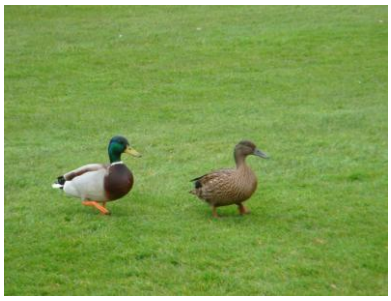
The airplane is flying _____ the sky.

- ☐ at
- ☐ in
- ☐ on
- ☐ through

47.

Two ducks are walking _____ the grass.

- ☐ at
- ☐ in
- ☐ on
- ☐ with



48.

The girl is holding the sign _____ her head.

- ☐ at
- ☐ above
- ☐ on
- ☐ over

49.

People are sitting _____ the shade.

- ☐ at
- ☐ in
- ☐ on
- ☐ with

50.

The bird is singing _____ the tree.

- ☐ at
- ☐ in
- ☐ on
- ☐ over

51.

The chandelier is hanging _____ the sofa.

- ☐ from
- ☐ on
- ☐ over
- ☐ under

52.

The dog is sitting _____ the chair.

- ☐ above
- ☐ at
- ☐ in
- ☐ on

53.

The players are _____ the court.

- ☐ at
- ☐ in
- ☐ on
- ☐ with

54.

The sheep is standing _____ the tree.

- ☐ below
- ☐ from
- ☐ on
- ☐ under

55.

Snoopy is sitting _____ the desk.

- ☐ at
- ☐ in
- ☐ on
- ☐ under

56.

The socket is installed _____ the wall.

- ☐ at
- ☐ from
- ☐ in
- ☐ on

57.

There is a hole _____ the tree.

- ☐ at
- ☐ in
- ☐ on
- ☐ with

58.

The bridge is _____ the river.

- ☐ at
- ☐ in
- ☐ on
- ☐ over

59.

The meat is _____ the cheese.

- ☐ below
- ☐ in
- ☐ on
- ☐ under

60.

The man is lying _____ the hammock.

- ☐ at
- ☐ from
- ☐ in
- ☐ on

Appendix F Pilot study results (Monologue)

	AK	NSE1	NSE2	NSM1	NSM2	NSM3	NSM4	NSM5	NSM6	NSM7	NSM8
1	**on**	on	on	in	on	in	in	on	in	in	at
2	**in**	in	in	in	in	in	in	in	in	under	in
3	**in**	in	in	in	in	in	in	in	in	in	in
4	**on**	on	on	on	on	on	on	on	on	on	between
5	**on**	on	on	at	under	on	on	under	on	on	under
6	**on**	on	on	on	with	in	with	with	on	with	on
7	**on**	on	on	on	on	on	on	in	on	on	below
8	**at**	at	at	on	in	on	at	under	at	on	under
9	**on**	on	on	on	on	at	on	at	on	on	above
10	**at**	at	at	at	at	at	at	under	at	at	on
11	**at**	at	at	at	with	at	at	at	at	at	at
12	**at**	at	at	at	at	in	at	at	at	in	at
13	**above**	above	above	over	above	on	on	above over	above	above	on
14	**above**	above	above at	above	from	above	at	above at	above	above	at
15	**over**	over	on	on	on	over	on	over	on	over	between
16	**over**	over	over	over	over	in	over	over	in	over	below
17	**below**	below	below	below under	below	under	below	under	below	below	at
18	**under**	under	under	under	under	under	on	under	on	under	on
19	**under**	below from under	under	with	under	under	under	under	under	under	below
20	**above**	above	above	above	above	above	above	above	above	above	from

Remarks: AK stands for answer key.

Appendix G Pilot study results (Dialogue)

	AK	NSE1	NSE2	NSM1	NSM2	NSM3	NSM4	NSM5	NSM6	NSM7	NSM8
21	**in**	in	in	in	in	in	in	in	in	in	in
22	**under**	under	under	under	under	under	in	under	under	under	in
23	**under**	under	under	under	under	under	under	under	under	under	through
24	**over**	over	over	over	above	over	over	over	over	over	under
25	**at**	at	at	at	with	with	at	at	with	at	under
26	**above**	above	above	at	above	above	above	above	above	above	from
27	**over**	over	over	over	over	over	over	over	at	over	between
28	**over**	over	over	in	on	over	in	at in	over	over	on
29	**below**	below	below	in	below	below under	below	under	below	below	under
30	**at**	at	at	at	at	at	at	at	at	at	on
31	**in**	in	in	under	on	on	in	at	in	at	at
32	**in**	in	in	on	in	on	on	on	in	on	at
33	**on**	on	on	on	on	on	on	on	on	on	over
34	**in**	in	in	in	in	in	in	in	in	in	under
35	**on**	on	on	on	on	on	on	on	on	on	in
36	**on**	on	on	on	on	on	on	in	on	on	on
37	**in**	in	in	in	with	in	in	in	in	in	with
38	**over**	over	over	in over	in	on	in	in	over	in	in
39	**over**	over	over	over	over	over	over	over	over	over	on
40	**under**	under	under	under	below	in	in	in	under	in	in

Remarks: AK stands for answerkey.

Appendix H Pilot study results (Picture description)

	AK	NSE1	NSE2	NSM 1	NSM 2	NSM 3	NSM 4	NSM 5	NSM6	NSM7	NSM8
41	**on**	on	on	on	on	on	on	on	on	on	with
42	**in**	in on	on	in	on	on	on	on	on	on	on
43	**above**	above	above	above	over	over	above over	above	above	above	with
44	**in**	between in on	in	in	in	on	in	in	on	in	in
45	**in**	on	at	in	in	on	on	over	on	in	in
46	**in**	in	in	in	in	in	throu gh	throu gh	in	in	on
47	**on**	on	on	on	on	on	on	on	on	on	on
48	**over**	above over	above	over	over	above	above	above over	above	on	over
49	**in**	in	in	in	in	in	in	in	in	in	on
50	**in**	in	in	in	on	on	in on	at	x	on	on
51	**over**	over	over	over	over	over	over	over	over	over	from
52	**in**	in	x	in	in	in	in	in	in	in	at
53	**on**	on	on	on	on	on	at	on	on	on	in
54	**unde r**	under	under	under	under	under	under	under	under	under	on
55	**at**	at	at	at	under	on	at	on	at	at	in
56	**in**	in on	in	on	in	on	in	on	on	on	in
57	**in**	in	in	in	in	on	in	at with	in	in	in
58	**over**	over	on	over	over	over	on	over	on	over	in
59	**below**	under	below	under	under	under	under	under	under	below	under
60	**in**	on	on	on	in	in	on	on	on	in	from

Remarks: AK stands for answer key.

Appendix I Instrument validation

Instrument Items		Item Objective	Comments		
			Disagree	Fair	Agree
Introduction		It aims to inform the test takers of the design of the TSR, the purpose of the TSR, and the use of the test result.			
Learning Background Questionnaire					
Directions		It aims to direct the test takers to choose the most appropriate response to each question. All the test takers will be guided to take the questionnaire together by the proctors in order to avoid any ambiguity.			
Question 1		The six questions are created to retrieve the basic personal information (Question 1 and 2) and the learning background of each test taker (Question 3 to 6). If one test taker's learning background does not meet the targeted population, then the test result of the test taker will be ignored or marked for data analysis.			
Question 2					
Question 3					
Question 4					
Question 5					
Question 6					
Test of Spatial Relations					
Directions		It aims to direct the test takers to choose the most appropriate response to each question.			
Item	Answer				
Question 1	on	The Test of Spatial Relations (TSR) as a whole is to find the answers to Research Question 1: *With which spatial prepositions in English do Mandarin learners of English have difficulties?* All the with test items were created with special reference to the spatial prepositions that can be associated with *lǐmiàn* (inside), *shangmiàn* (upside) and *shiamiàn* (downside) in Mandarin Chinese.			
Question 2	in				
Question 3	in				
Question 4	on				
Question 5	on				
Question 6	on				
Question 7	on				
Question 8	at				
Question 9	on				
Question 10	at				
Question 11	at				
Question 12	at				
Question 13	above				
Question 14	above				
Question 15	over				
Question 16	over				
Question 17	below				
Question 18	under				
Question 19	under				
Question 20	above				
Question 21	in				
Question 22	under				
Question 23	under				
Question 24	over				
Question 25	at				
Question 26	above				
Question 27	over				
Question 28	over				
Question 29	below				
Question 30	at				

Question 31	in				
Question 32	in				
Question 33	on				
Question 34	in				
Question 35	on				
Question 36	on				
Question 37	in				
Question 38	over				
Question 39	over				
Question 40	under				
Question 41	on				
Question 42	in				
Question 43	above				
Question 44	in				
Question 45	in				
Question 46	in				
Question 47	on				
Question 48	over				
Question 49	in				
Question 50	in				
Question 51	over				
Question 52	in				
Question 53	on				
Question 54	under				
Question 55	at				
Question 56	in				
Question 57	in				
Question 58	over				
Question 59	below				
Question 60	in				

Appendix J Raw scores of the TSR

Participant	Part 1	Part 2	Part 3	Total
1	6	10	12	28
2	10	8	8	26
3	10	7	7	24
4	7	8	7	22
5	6	5	8	19
6	9	8	8	25
7	8	5	8	21
8	6	6	8	20
9	9	11	5	25
10	7	11	6	24
11	11	8	10	29
12	10	7	9	26
13	6	6	10	22
14	12	14	8	34
15	10	5	8	23
16	6	4	6	16
17	12	13	11	36
18	8	4	4	16
19	10	9	6	25
20	12	9	9	30
21	9	9	8	26
22	11	9	10	30
23	8	4	5	17
24	8	4	5	17
25	9	8	6	23
26	9	8	4	21
27	8	6	8	22
28	8	8	7	23
29	11	12	9	32
30	6	8	8	22
31	9	8	6	23
32	9	7	8	24
33	10	9	10	29
34	5	5	5	15
35	9	9	9	27
36	5	8	6	19
37	6	8	4	18
38	10	7	10	27
39	8	8	9	25
40	8	7	12	27

Participant	Part 1	Part 2	Part 3	Total
41	11	4	6	21
42	5	7	10	22
43	11	13	12	36
44	8	7	4	19
45	8	4	5	17
46	6	7	6	19
47	8	6	9	23
48	1	7	5	13
49	4	10	7	21
50	7	8	9	24
51	6	6	10	22
52	3	6	7	16
53	8	7	10	25
54	7	7	10	24
55	5	7	11	23
56	6	6	5	17
57	4	6	6	16
58	5	4	5	14
59	8	6	12	26
60	10	5	8	23
61	11	9	5	25
62	13	16	13	42
63	6	8	9	23
64	5	7	8	20
65	1	2	6	9
66	7	6	6	19
67	3	5	4	12
68	5	5	7	17
69	4	0	7	11
70	9	8	8	25
71	4	6	11	21
72	4	3	8	15
73	4	6	9	19

Appendix K Percentages of answers chosen for Monologue

Part 1 Monologue					
Question	Type	Option 1	Option 2	Option 3	Option 4
Q1	SF	2	44	25	2
Q2	SF	6	39	13	15
Q3	SF	33	13	26	1
Q4	SP	12	5	46	10
Q5	SF	4	19	18	32
Q6	SF	3	31	7	32
Q7	SF	6	35	27	5
Q8	SF	20	17	28	8
Q9	SP	16	21	6	30
Q10	SP	48	15	3	7
Q11	SF	4	62	2	5
Q12	SF	26	21	16	10
Q13	SF	17	2	19	35
Q14	SP	33	27	7	6
Q15	SP	17	8	23	25
Q16	SF	4	3	49	17
Q17	SF	8	23	4	38
Q18	SP	0	21	37	15
Q19	SP	15	22	15	21
Q20	SF	41	9	15	8

Remarks:

1. The highlighted colums are the answer key.
2. SP stands for Spatial-physical scenes; SF stands for Spatial-functional scenes.

Appendix L Percentages of answers chosen for Dialogue

Part 2 Dialogue					
Question	Type	Option 1	Option 2	Option 3	Option 4
Q21	SF	3	63	3	4
Q22	SF	15	9	29	20
Q23	SF	16	16	31	10
Q24	SF	34	11	9	19
Q25	SF	14	23	6	30
Q26	SP	25	28	17	3
Q27	SP	8	5	31	29
Q28	SF	15	32	17	9
Q29	SF	9	42	11	11
Q30	SF	38	24	7	4
Q31	SP	17	34	15	7
Q32	SF	16	3	13	41
Q33	SF	12	38	19	4
Q34	SF	54	12	2	5
Q35	SF	31	19	3	20
Q36	SF	10	15	41	7
Q37	SF	10	17	8	38
Q38	SF	15	28	8	22
Q39	SF	7	16	42	8
Q40	SF	8	10	46	9

Remarks:

1. The highlighted colums are the answer key.
2. SP stands for Spatial-physical scenes; SF stands for Spatial-functional scenes.

Appendix M Percentages of answers chosen for picture description

Part 3 Picture Description					
Question	Type	Option 1	Option 2	Option 3	Option 4
Q41	SP	4	8	57	4
Q42	SP	9	15	47	2
Q43	SP	44	10	15	4
Q44	SP	14	15	29	15
Q45	SP	11	8	47	7
Q46	SP	4	43	6	20
Q47	SP	8	4	57	4
Q48	SP	3	24	23	23
Q49	SP	18	30	19	6
Q50	SP	8	32	30	3
Q51	SP	3	35	33	2
Q52	SP	5	8	4	56
Q53	SP	22	29	17	4
Q54	SP	9	7	8	49
Q55	SP	26	5	32	10
Q56	SP	9	7	15	42
Q57	SP	5	44	13	11
Q58	SP	6	8	24	35
Q59	SP	14	12	6	41
Q60	SP	12	4	5	52

Remarks:

1. The highlighted colums are the answer key.
2. SP stands for Spatial-physical scenes; SF stands for Spatial-functional scenes.
3. The total number of responses to Q53 is 72, for one participant left it blank.

Appendix N Numbers of correctly answered test items in SP and SF

Participants	SP	SF	Participants	SP	SF
1	16	12	38	13	14
2	13	13	39	14	11
3	12	12	40	17	10
4	12	10	41	11	10
5	10	9	42	13	9
6	15	10	43	21	15
7	10	11	44	7	12
8	10	10	45	11	6
9	11	14	46	12	7
10	9	15	47	13	10
11	14	15	48	8	5
12	12	14	49	11	10
13	13	9	50	15	9
14	14	20	51	15	7
15	13	10	52	9	7
16	9	7	53	15	10
17	18	18	54	13	11
18	9	7	55	15	8
19	12	13	56	9	8
20	16	14	57	10	6
21	14	12	58	6	8
22	16	14	59	16	10
23	7	10	60	14	9
24	10	7	61	10	15
25	10	13	62	20	22
26	7	14	63	16	7
27	12	10	64	12	8
28	10	13	65	7	2
29	15	17	66	10	9
30	12	10	67	6	6
31	10	13	68	9	8
32	12	12	69	7	4
33	14	15	70	13	12
34	6	9	71	12	9
35	14	13	72	11	4
36	10	9	73	11	8
37	8	10			

Appendix O Sinica corpus data of *lǐmiàn* ‘inside’

Remarks:
zài ‘at’ and *lǐmiàn* ‘inside’ were marked in bold. The noun phrases and the suggested translations were underlined. The suggested translations were provided based on the literal meanings.

The proto-scene

1. 立志將他的小力量變成大力量，並**在**信(letter)**裡面**附寄了一張五百元禮券，他說：「這是
2. 他安心。然後周公把那分禱詞封藏**在**金(gold)**裡面**，不許守金的人說出去。第二天，武王
3. 終於發現了從前武王生病時封藏**在**金(gold)**裡面**的祝禱詞，才了解周公用心之苦。他哭
4. 這，到底怎麼回事啊？啊？玉：他**在**店(store)**裡面**跟同學打架被推倒了，頭在機器上被
5. 格瑞那達。把巴拿馬總統抓去關**在**監獄(jail)**裡面**，難道就不是侵略行為嗎？帝國主義的
6. 活生生的青春壓成長城，他們就**在**長城(the great wall)**裡面**，從生到死，不見天日。大家帶著幾
7. 。據說臀位的孩子是因為頑皮，**在**肚子(the belly)**裡面**翻轉。他忘記了自己長得很快，終於翻
8. 禁不住問他：鑰匙怎麼會**在**冰庫(refrigerator)**裡面**！本來要下樓去買幾包速食麵，後來一
9. 以備不時之需，錢就擺**在**房間某件東西(something of the room)**裡面**，自己找找看
10. 的根是紮**在**猶太教和俄羅斯的國土(territories of Judaism and Russia)**裡面**。
11. 我就把它絞碎，像包水餃或放**在**蒸蛋(steamed egg)**裡面**，加在青菜裡面，就是加工處理以後，
12. 像包水餃或放在蒸蛋裡面，加**在**青菜(vegetable)**裡面**，就是加工處理以後，讓他看起來，
13. 就知道怎麼樣去做果凍，然後他**在**果凍(jelly)**裡面**加很多水果，加了水果以後，我就覺得
14. 炒飯，不然就做海鮮粥，或是包**在**水餃(dumpling)**裡面**也可以，就把它剝一剝，就是比較麻煩
15. 你談生意的時間，你可以撥離開**在**家(home)**裡面**進餐的時間。我相信這個整個社會應該
16. 是怎麼樣。關於我的小孩他**在**學校(school)**裡面**，他有一些機會要表現，比如說他可能
17. 能夠給我一個空間，不要只侷限**在**書房(study room)**裡面**。我從小在鄉下生長，那我就是屬於
18. 以為上帝是多麼的可愛！**在**我們每一家(each of our houses)**裡面**擺了電視，擺了冷氣、擺了冰箱
19. ，我們認為你需要用的錢，擺**在**這盒子(this box)**裡面**，可是你們誰拿了，這盒子裡面的錢
20. 會學習壞的習慣，給少了，他**在**學校(school)**裡面**抬不起頭來，但是給多少跟家庭的經濟
21. 很難讓孩子進步。有些父母親像**在**雞蛋(egg)**裡面**挑骨頭專家，你怎麼只考到九十九分，
22. 甚至我常常建議，很多的父母親，**在**家(home)**裡面**可以設立一個，小小的一個白板，我
23. 我會沒收。沒收了以後我就放**在**我房間(my room)**裡面**藏起來。自己看？我沒有看，也不
24. 那那個東西我已經沒收放**在**我的房間(my room)**裡面**，你們就不可以不尊重我而自己去
25. 搭飛機回來，那他每天就坐**在**麥當勞(McDonald’s)**裡面**，兩個月的時間都**在**問人家，你的人生
26. 我想第一次性行為**在**女生的結構(female body structure)**裡面**有處女膜，那處女膜它是一層薄膜；
27. 學校常常在聯絡說，我孩子最近**在**學校(school)**裡面**發生什麼事情？或功課怎麼樣？我覺得
28. 我回想一下那個情況就是，我**在**學校(school)**裡面**大概…，台北市只有我一個人在這裡，
29. 中可以發現出來，譬如說，你**在**球場(sports court)**裡面**，表現的很積極，一直要爭著要投球的
30. 像剛剛李麗芬有說的，你如果是**在**暗巷(dark lane)**裡面**被恐嚇、勒索，或是你常常是一個
31. 的去關心我們。因為有時候我們**在**學校(school)**裡面**老師很忙，訓導處才二、三個人，然後
32. 希望大家小心。其實我打工是**在**家(home)**裡面**打，那也沒有人找我去坐檯對不對？
33. 時代，寶貴的寒暑假時間，**在**你的家(your home)**裡面**，或者是在人際關係做多一點的接觸，
34. **在**作文簿(exercise book for writing)**裡面**寫什麼，我的志願，我要當什麼，我當
35. 鐵啦！都是可以換錢的東西。只要**在**那(that)**裡面**淘掏撿撿一下午，我們就可以過好幾天
36. 或許未來考古學家，可以**在**那(that)**裡面**發現真正的古幣也說不定！！童年趣事
37. 您買了一包花生，我和您就坐**在**房間(room)**裡面**吃著，您把花生丟得高高的，再用嘴巴
38. 老師教我們排各種隊形。蒙**在**獅頭(lion head)**裡面**，根本看不到東西南北，還要走隊形。
39. 群眾的騷動，使個人完全埋沒**在**群眾(crowd)**裡面**，那時群眾一走，你就跟著走，根本
40. 的部分，你盡量去選擇。但是**在**人群(crowd)**裡面**，你就沒有完全自由的可能，你個人的
41. 重要。那麼另外一種，我覺得說，**在**家(home)**裡面**，儘量自己父母也少講謊話，雖然我們

42. 生而有，長而宰。」譬如，在這個團體(this group)裡面我是領袖，我就要主宰，這不需要。
43. 有個現象，就是大家都希望，在群體(group)裡面成為其中的一份子；或者是講突顯自己
44. 的時候，我們是不是能夠幫忙他在團隊(group)裡面怎麼去超越自己。在不斷的超越裡面，
45. 日本漫畫的流行。所以我處在那個團體(that group)裡面，如果我跟不上流行那怎麼辦呢？
46. 不一樣，辛隆呢，辛隆比較…，在歌迷(fans)裡面比較喜歡那一種，來接近你的方式；
47. 市區的道路封閉成一個環形區域，在這(this)裡面比賽，因而提高了危險性。那就是選手

State: State

48. 人之所以有時候會活在灰色甚至黑色(gray or even black)裡面，乃因為我們不曾經過挑戰；
49. 疲憊移動，不論是誰，都會是在那流動(that floating)裡面，沒有人能有什麼不同。在流動裡
50. 歷史中的大屠殺事件，卻像是在一場夢(dream)裡面進行的，不用血腥的照片和文字的控訴
51. 都不請我吃東西？那像在這樣的關係(this kind of relationship)裡面，我們的孩子他慢慢會發現，
52. 而是在你們健康的吵架方式(your healthy argument)裡面，是一個很好的一個潤滑劑。
53. 這種人比較容易隨和在我們的情境(our situation)裡面，譬如說別人叫你做什麼你就做什麼？
54. 在不斷的超越(continuously surpassing)裡面，他可以在這個裡面，逐漸地從他的
55. 其實孩子也是花朵一樣，如果在溫室(green house)裡面成長的話，碰到真正的風風雨雨的話，
56. 說，你最好都不要出去，好像你在溫室(greenhouse)裡面就不會受到外面的，好像有一點，就是
57. 就繼續留在半調子的民主(immature democracy)裡面不求進步吧！至於另一些非進步不可的
58. 不是這樣，大家都只是在自己的想法(self thoughts)裡面打轉，永遠也不可能有所改變的。下面

Location: Activity

59. 專家們經過深入的討論之後，在研究所(graduate school)裡面建立了很強的共識
60. 把絕大部份的時間與精力投入在西洋棋(chess)裡面，而不再有任何重要的作品。表面上
61. 他刻意在避免西方傳統繪畫(avoiding traditional western paintings)裡面，通過對於顏色與線條
62. 想，不要只看現在。很多時候，在生活(life)裡面給你難過，使你覺得不愉快的人，正是
63. 在我們的環境我們的社會(our environment and society)裡面，做一個真正的純淨社會的運動，我
64. 上。所以我想對父母來說，特別在生活(life)裡面，隨時注意到是不是他好像突然焦躁
65. 跟道合而為一。你跟外在事物全都在道(the doctrine)裡面，這個時候就沒有什麼得失、成敗的
66. 一般只有在大的宗教傳統(the major religious tradition)裡面才敢談的，在莊子裡很輕鬆幾句話拿
67. 是完全超越的，所以自我超越放在宗教(the religion)裡面，可以達到最圓滿的境界。我平常避免
68. 然後他們也可以在這樣子的過程(this kind of process)裡面，問他們想問的問題
69. 在點滴的社會改造過程(process of developing the society)裡面，人與環境的互動才可能全然
70. 這個社會是男女共處的，我們在家庭(family)裡面，就沒有告訴他，就是說，男性跟女性
71. 做補救的工作，不要讓在我們的家庭(our families)裡面的下一代，又有手足之情的問題。
72. 所以也許在整個友伴關係(the whole friendship)裡面，都是要培養孩子的我，讓孩子的我
73. 但是我從以前在學習的過程(learning process)裡面，我覺得我的理科相當地好，那在最近
74. 那你為什麼會這樣子？所以在這個過程(this process)裡面，像每次就是要第二天要考數學的時候
75. 在我自己的這個成長的過程(my own past experience)裡面，我一直也是在學習中，但是在這個
76. 通過愛心顯示出來。而在愛心的活動(charity activities)裡面還要通過藝，這是「游於藝」，不然
77. 他討論了。隨機的教育，我覺得在家庭(family)裡面，這個性教育實施的態度是非常重要的
78. 在過去的整個發展策略(the past development strategy)裡面也很少獎勵。尤其服務業是無形的，
79. 他說在華人圈子(Pan-Chinese circle)裡面，香港、新加坡與中國大陸的華人，都
80. 的要求與期望，也是不一樣的。在研究(research)裡面發現，我們過度地苛責小孩子，會養成
81. 是不是在這種不同的圈子(this different kind of group)裡面，那麼孩子的行為的類化的這
82. 覺得幽默是一個很好的潤滑劑。在生活(life)裡面，尤其是親子關係中，有時候，你一句
83. 老師！好，這個在進行生涯規劃(making career plans)裡面時，是我要，而不是爸爸、媽媽要，
84. 裡好痛苦，那還不如蹺家就出去，在家(home)裡面好像感覺已經都沒有什麼份量了。還有
85. 不論你念了多少年的書，它在你的人生(your life)裡面，如果不發生大意外的話；在你的人生
86. 如果不發生大意外的話；在你的人生(your life)裡面只佔一小部分而已，所以說的話其實是

87. 有平常在上學的時候，可以在這個路程(this path)裡面，或是平常自己的攜帶的物品啦！還有
88. 然後也在公家機關的合作社(governmental cooperative store)裡面做過，然後，補習班的抄寫員
89. 我們自己在這個時代的社會運作關係(the modern social interaction)裡面
90. 就是在童年時代的這個良好環境(good environment of childhood)裡面奠定的。
91. 「在這樣的論壇(such a forum)裡面，三黨以外的聲音經常是聽不到的，
92. 一樣，但是我很沈浸在這個遊戲的過程(process of this game)裡面，那這個我們叫好玩

Location: Temporal

93. 女生又比男生還高。在一九八三(year of 1983)年裡面，成人識字的百分比是：男性 55、女性
94. 當時，我與一位朋友叢林鴨坐在未來(future)裡面，正打算要按下啟動鈕的時候，妹妹把
95. 那個實質的關係，都可以在未來的時間(future)裡面，對我們提供很大的幫助。謝謝三位
96. ？這樣就把人放在過去、現在、未來(past, present, and future)裡面去了解。「視其所以」
97. 或艱辛。所以我想這三個是在青春期(puberty)裡面，我們可以幫助孩子一起去度過，很
98. 現在台灣的社會上，好像在這個年紀(this age)裡面，是拚命在念書的，開夜車開得非常晚
99. 現在、未來，把人放在時間的過程(process of time)裡面來思考，如此一來，一個人怎麼能藏得
100. 時間藝術、空間藝術。凡是在時間歷程(course of time)裡面表現出來的藝術，都叫時間藝術
101. 人的生命有何特色呢？第一，人在時間(time)裡面存在。第二，人有自由選擇的可能性。
102. ，人生很多的關卡，那一定在那個關卡(that obstacle)裡面，就會有很多的挫折；那你就要去
103. 的挫折；那你就要去，在每一個關卡(each obstacle)裡面去學會，怎麼去承受那個挫折。那當然
104. 在這個階段(this period of time)裡面我們來看看，我們是什麼樣一個人？

Location: Visibility

105. 現象。剛才電視所呈現的，能夠在電視(TV)裡面，呈現的小朋友，即使就照他講說，他
106. 偶像。但是一旦，你覺得說，在螢光幕(TV screen)裡面，你這樣看，譬如說看到主持人，看到

Constrain: Theme

107. 城市的意象，卻反映了已銘刻在他靈魂(his soul)裡面的俄國。
108. 一個文生，也不像一個武丁。那在我心(my mind)裡面我覺得說，各人頭上有一片天，不論你
109. 在我自己的個人觀念(my personal concepts)裡面，我總是覺得說，在孩子還小的時候，
110. 學生打球、郊遊，所有的愛心都在情意(goodwill)裡面，千萬不要變成愛心獨立，變成抽象的
111. ，如果我覺得父親，如果他在他的觀念(his thought)裡面就是我願意，把我自己很溫柔的一面，
112. 是無價或高價的尊貴。所以在傳統(the tradition)裡面，古典受到了非常的尊重，更由於政府
113. 人生如何像駱駝呢？人一定生在傳統(the tradition)裡面，每個人生下來都背負著傳統的包袱，
114. 的形式演奏的古老音樂，在樸素的形式(plain style)裡面，包含著音樂不朽的生命，顯示出它的
115. 揚琴揚琴的改革，在彈撥樂器(plucked string instruments)裡面算是相當大的，現在的大揚琴
116. 應該怎麼樣？很好，在具體的方面(concrete suggestions)裡面，我想應該要讓孩子去培養一些
117. 我想那份溫柔，是表示是我們在人性(human nature)裡面，很自然的一個成分在裡頭，如果我
118. 都大約是五、六百，包括在飯錢(budget for dinning)裡面，然後一天一百塊。一個禮拜是一百
119. 在不斷的超越裡面，他可以在這個(this)裡面，逐漸地從他的挫折感，能夠跑出來
120. 這是一個基本的信念。那麼在溝通分析(communicative analysis)裡面，它有提到
121. 一種能量－動量守恆的說法是說在體積 V(the volume V)裡面的能量－動量不會改變除非有能量
122. 簡介陳俊賢・一、前言・在 Emacs(Emacs)裡面有一功能稱作 Dired，它的全名為
123. 那在我們的傳統教育(our traditional education)裡面，大部分都是蠻權威的父母，所以說
124. 父母親都太保守了，在台北市的調查(Taipei's survey)裡面，我們的國中生有百分之十點八的，
125. 資料行事，你必要把自己黏在這些資料(these data)裡面而作決策，這叫尊重群意。個人創造力

Appendix P Sinica Corpus data of *shàngmiàn* ‘upside’

Remarks:
zài ‘at’ and *shàngmiàn* ‘upside’ were marked in bold. The noun phrases and the suggested translations were underlined. The suggested translations were provided based on the literal meanings.

Proto-scene

1. 並**在**探針(a scientific device for experiments)**上面**接了一 EDTA 作用基。
2. 裝龕時，要帶四隻小碗準備墊**在**龕的(shrine)**上面**，裝水別讓螞蟻、昆蟲爬上來。過了兩
3. 在竹子上加很多鍵，不能直接裝**在**竹子(bamboo)**上面**，會裂開，並影響震動。所以必須採用
4. 也就無法成功了。但是**在**革胡(a musical instrument)**上面**，我覺得有可能成功。因為革胡的
5. 人造皮膜縱使無法用**在**二胡(a musical instrument)**上面**，應該還是可以用在革胡以及倍革胡上
6. 的學生唐凱爾。新裝的特色是**在**硬帽(hard hats)**上面**拉上一根鐵絲，上面有個寫挖這裡字樣
7. 水瓢、茶具之外，還可以親自**在**葫蘆(calabash)**上面**彩繪呢！本校為慶祝母親節，輔導室特
8. 對以色列發射飛彈，為何不**在**這些飛彈(these missiles)**上面**裝置毒氣彈頭。去年四月，
9. 你處理事情不公平，比方老師**在**聯絡簿(contact books)**上面**寫了一些話，然後會覺得那些話好像
10. 的社會上爆發。像現在我常常**在**馬路(road)**上面**，我都不敢相信，外匯存底最高的，
11. 時候，他們會翹腳，把腳翹**在**那個茶几(that tea table)**上面**，看報紙，他爸爸一回來看到說，你
12. 可以拿來做參考，貼**在**這個冰箱或廚房(this refrigerator or kitchen)**上面**。現在到了金玉良言
13. 還沒有發耶！然後就自己**在**成績單(transcript)**上面**簽名。本身家裡管得比較嚴，而我又
14. 孩子的，就寫**在**黑板(blackboard)**上面**，那麼在黑板上面，多用一些正向，積極的、鼓勵的、
15. 前幾次，那就知道是用熱水袋用**在**腹部(abdomen)**上面**，所以我覺得月經不會很恐怖只是覺得
16. 時候，哥哥把我的玩具船放**在**他的老二(his penis)**上面**，我伸手去拿，不小心碰到他，哥哥就
17. 摸玩具熊，有時還會整個人撲**在**玩具熊(teddy bear)**上面**。對我們來說，這些東西都是很平常的
18. 的，好像在為我搧風。我睡**在**弔床(hammock)**上面**搖啊搖，柔和的風，撫摸了我的臉頰，
19. 分開問話。嗯。就站**在**那個大馬路(that avenue)**上面**。問這個問題了。好。你們跟我一起，
20. 遵循，尚無疑義，比較困難的是**在**農田(farm)**上面**挖取砂石的行為最近曾造成湖口鄉兩名
21. 其實哦，我…**在**你房間門口(the door to your room)**上面**放了這個符，所以你才會得到回信
22. 就是說，**在**蘇花公路(a proper name of a road)**上面**賣茶葉蛋，達三十年的一位退伍老榮
23. 這是為什麼呢？因為**在**蘇花公路(a proper name of a road)**上面**九拐十八彎，相當的危險。
24. 席與否，或是登記**在**背面的會員卡(the back of the membership card)**上面**。
25. 對，那為什麼有這個緣份**在**這個島(this island)**上面**？大家有這個緣份從不一樣的地方過來
26. 也不知道為什麼，雖然她就**在**我家(my house)**上面**，但每次回家總是匆匆而過，就像
27. 「錯了，我才是最高的，因為我**在**你(you)**上面**，你才沒看到！」平等的天空。說話的
28. 你們在體育館下面，我們**在**體育館(gymnasium)**上面**。哈！體育館，上面！不對！
29. 的球，好鬱悶喔！我就**在**你們的(you)**上面**打排球。樓上？對啊！你修
30. 他們有好處。假如有人說，**在**一堆沙的(pile of sand)**上面**蓋個遮棚，下雨時沙不會淋濕，這樣
31. 耐性地花很長的時間聽。一面**在**火爐((stove)**上面**熟煮食物，一面「哦、哦」地聽著。這

The Support Cluster: The Means of Conveyance Sense

32. 警察。我就跟他說。我說我的錢包**在**車(car)**上面**。我現在，什麼都沒有了。麻煩你，是
33. 裝了個錢包在裏面了，結果，坐**在**巴士(bus)**上面**。就是這個二十三號巴士。對。

The State Cluster: The Theme/Topic Sense

34. 想跟他接近。因為覺得他已經**在**外表(appearance)**上面**，已經沒有一個距離了，那就很想跟他
35. ，因為呢，我覺得也許他們在，**在**心理(mentality)**上面**有一些偏差的話，那我覺得經過正當的
36. 又不是那麼多，因為可能**在**演藝工作(entertainment field)**上面**，他時間上不是那麼的一定
37. 準備的時間並不算充裕，**在**曲目(tracks for concerts)**上面**則有不少難度高的曲目，而且並不是都

38. 解決音域音階等等的問題，所以在性能(performance)上面，一直有所進步。對於樂團來說
39. 以樂團發展的要求來看，在樂器的種類(varieties of musical instruments)上面
40. 可能成為標準的編制。只要在樂器製作(the making of musical instruments)上面能夠解決質與量
41. 一個是拉大提琴的。在曲目的安排(the arrangement of tracks for concerts)上面，大提琴的曲子多
42. 可以說是變化很少的，通常只有在材料(materials)上面的變化較大，基本設計則差不多。
43. 具有相當好的音響性能。在演奏(performance)上面，除了最左邊以外，轉調是沒有問題的
44. 也可以透過踏板整體控制。但是在揚琴(a musical instrument)上面這是不可能的事情。
45. 而且在維修(maintenance)上面，也比較容易。品的上端，應該用金屬
46. 標竿。為了避免市場銷售者在性能標竿(performance of a machine, function)上面做文章
47. 這一點表現在發揚傳統文化(enhancing traditions and cultures)上面，例證俯拾皆是，久而
48. 透過這個會議，希望婦女能夠在方針(guiding principles)上面有更多的決策權，婦女此後可以對
49. 先進國家（開發中國家）在經濟開發(economical development)上面受到先進國家的援助
50. 所以各國在經濟制度以及產業習慣(economical system and industrial custom)上面都不得不因應彼
51. 不同的角度，在製造事業或者共同事業(manufacture and cooperative business)上面都做了很多的
52. 這個地區在經濟發展(economical development)上面，可以說是大家都最具共識的
53. 成為自由市場經濟將是未來在經濟發展(economical development)上面共同的一項認識。
54. 婦女應該在資訊交換的經驗交流(interchanging experience in exchanging information)上面採取
55. 將來在產業公害、核爆等等的公害問題(negative social effect)上面應該進一步彼此交換經驗和資
56. 必需要在以男性為主的社會意識和制度(the male-driven social consciousness and system)上面加以
57. 那種旺盛的企業家精神，以及在經濟(economics)上面所扮演的角色都是舉足輕重的。如今
58. 統稱為華南經濟圈。在經濟的高度成長(rapid development in economics)上面，受到很大的肯定
59. 做了七種分類，同時在各個細目(each item)上面也制定了標準用詞。這七種是：第一種
60. 注重到我們人身，就是說在日常生活(daily life)上面，能夠注重到他日常的營養五大元素
61. 方我就比較差一點。那常常在數理(mathematics and physics)上面成績並不是很好，就遭受到很
62. 的答案。因為也許我們做父母的在要求(requirements)上面，或在平常孩子的這種心理上，他會
63. 自己當一個家長，有時候在口氣(manner of speaking)上面，總是覺得我是家長，我就應該怎麼
64. 在整個人生的修養(self-cultivation)上面，在整個人格，在整個那個自我觀念
65. 在整個人格，在整個那個自我觀念(the whole self-concept)上面，一個很大的一個發展階段。
66. 他的特點。如果我們能夠給予他在特點(characteristics)上面，他的優點上面，他的長處上面，這
67. 會讓我們覺得太嚴厲? 在什麼問題(which problems)上面比較容易，讓父母親為我們操心呢
68. 在自我超越與改善心智模式這兩項修練(self-exceeding and inner improving)上面。為什麼？因為
69. 還有如資策會等機關）在專利侵害鑑定(examination for violating pattent laws)上面，早已建立
70. 就能走下去。對啊，都在這鴻溝(this gap)上面。掉下去了。什麼東西？不一定
71. 釣魚台的情結中他們是免疫的，在這(this)上面他們沒有發言權，他們也不關心，他們

The State Cluster: The Constrained Sense

72. 時間把資料整個收集完成而運用在會議(conference)上面。現在我們看看他們開會的情形，開會
73. 的可能成果將會反映在移民潮的變化(the change of emigration)上面。除了移出的現象之外，
74. 時光，我最年輕、最熱情的日子都在那(that)上面度過了。可不是虛耗殆盡了，對嗎？你
75. 電影，主持很多電視節目，或是在媒體(media)上面有很大的控制的權力，或是做一個很有
76. 造成變動，所以還是先用在獨奏樂器(musical instruments for solos)上面吧。最後一點，也是最
77. 必須建築在重新架構市政府這件事情(re-constructuring municipal government)上面，精簡人事
78. 「怎麼可以這樣？我花了多少心血在那(that)上面，怎麼可以把它弄壞？怎麼可以撒得
79. 他們把情投注在財、名、利(wealth, fame, profit)上面，互相爭執，這就是迷情。本來兄弟
80. 這句話。很多人把重點放在「淡」字(the word, dan)上面，我喜歡放在「水」字上面。水是動態
81. 在「淡」字上面，我喜歡放在「水」字(the word, shui)上面。水是動態、活潑的，不斷在流。
82. 負擔不小。「但是我們願意把錢花在這(this)上面，」她說。家中三個孩子都在毛毛蟲
83. 注重這方面，不是…不完全注重在分數(score)上面。我小孩是…我的小孩子，以前我是
84. 也反映在當時的文學、藝術及哲學(contemporary literature, arts, and pholosophy)上面，像浪漫作

85. 事實上，我花很多的心血，在我孩子(my kid)上面，我可能用鼓勵的方式，代替責罰，
86. 自然的態度將表現在他們的品性和行為(their morality and behavior)上面。（Taylor, 1986）
87. doduc 其程式碼分散在許多函數(functions in mathematics)上面。它需要大約 40 種函數才能累積
88. 不要把交通事故啊，歸咎在亡魂作怪(supernatural influence)上面，應該找出車禍出事的原因
89. 的金額都是分配在兩國之間的援助(assistance between two nations)上面，而這其中又有六成是針
90. 這念心上來改變。把心安住在定和慧(stability and wisdom)上面，我們的身體就可以得解脫
91. 人，也可以讓大家把注意力放在可行性(feasibility)上面，而非擔心失敗。台灣有好條件。問：
92. 取得優勢。「最後的決戰會是在加油站(gas station)上面，」規劃中油應變策略，忙了一年多的
93. 六０年代每年國家預算八成投在國防(national defense)上面，買武器、訓練大軍要打中共。但是
94. 將來勢必也發生在 NII(an abbreviation for a term)上面。如果現在小規模的網路應用，
95. 去花在一個複雜的人際關係(a complicated interpersonal network)上面，好像沒有那麼多人願意

The State Cluster: The Availability and Visibility Sense

96. 有時候會在報章雜誌(newspaper and magazine)上面看到，有些歌迷呀或是影迷之類的，
97. 在中國流行歌壇(pop music industry in China)上面，素有黑色精靈之稱的厚薄等條件的合而為一
98. 在二胡(a musical instrument)上面，音色定然不佳，也就無法成功了。
99. 那偶像如果就是…他最多也是在媒體(media)上面說，非常抱歉呀致歉這樣子；他也不會
100. 這個如果收視率那麼高，觀眾在電視機(TV)上面，能夠看到很多小朋友在詢問到他
101. 比如說香港腳，怎麼可能自己在螢光幕(screen)上面說自己有香港腳。這個推測的相當好。
102. 負荷上比較正確，尤其當你在伺服器(server)上面提供檔案與資訊給客戶檢索時更是如此
103. 才使用 T1。有些供應商在同一條 T1(the same T1 cable)上面支援數十位 64—Kbps 速度的
104. 格，你這一個月交的錢和什麼都在這個(this)上面，你就不用拿飯票一個一個去買，你就

The State Cluster: The Activity on the Landmark Sense

105. 聚一聚，說這種話，你還不是想在牌桌(table)上面贏錢嘛，對不對？好說。拿去！
106. 像我每天上學，放學一回家坐在飯桌(dining table)上面，我就開始吃飯，然後我媽就對我講一

Appendix Q Sinica Corpus Data of *xiàmiàn* ‘downside’

Remarks:
zài ‘at’ and *xiàmiàn* ‘downside’ were marked in bold. The noun phrases and the suggested translations were underlined. The suggested translations were provided based on the literal meanings.

Proto-scene

1. 右邊山坡的一個樹林裡跑去，**在**一棵樹(tree)**下面**的空地上，用腳挖開泥土。他跑過去
2. 三聖母被二郎神壓**在**華山(name of a mountain)**下面**。劉彥昌又囑咐他長大以後，要想法子
3. 遇到有窗戶的地方，**在**窗框(window frame)**下面**加釘；沒有窗戶的地方，就**在**適當的
4. 的水浪的睡衣，一雙白皙**在**蕾絲邊(lace)**下面**划動的赤腳，在一角的燈影裡顯得很
5. 我不吃你的飯。沒有打滾，我窩**在**茶桌(table)**下面**，聽他打鼾，動也沒敢動，就怕把茶桌
6. 方勵之最近都不出面，**在**塞萬提斯像(name of a statue)**下面**拿主張的都是他愛人李淑嫻，李淑嫻
7. 最高大的冷杉。『珍珍』的巢穴就**在**那(that)**下面**。」難怪剛上這個階地，他就要我們
8. 有趣，便把蛋拿得高高的，把頭湊**在**蛋(egg)**下面**，想看看這世界奇景，沒想到，蛋黃和
9. 且地下停車場得以連通，希望**在**基地(base)**下面**的開挖能予以合理停車場整體連通之
10. 的側面，如此一來水槽就不容易**在**窗口(window)**下面**。周美惠：在此條件下只要嚴避將爐台
11. 動作。王秋華：爐台不僅不要擺**在**窗口(window)**下面**，也最好不要放置在角落，爐台兩邊
12. 儲存這些垃圾呢? 有一個案子是**在**水槽(sink)**下面**分可攪碎的及可回收與丟棄紙張等各類
13. ，比如說，它們比，上面兩公分，**在**底(bottom)**下面**五公分，再底下的十公分…哦。會
14. 範圍內，治療時屏蔽得法，舌**在**屏蔽的(shield)**下面**傷害不大，這和患者的合作有關。治療
15. 一直沒帶她去坐，現在她的墳就**在**纜線(cable)**下面**，每天都可以看見纜車從上面經過…
16. 為其產卵季節，產卵後會把卵埋**在**巢穴(nest)**下面**的沙層底下，使其自然孵出。幼小時的
17. 使那些「板書」被掩**在**一層薄薄的灰土(a layer of dirt)**下面**。考試時，可精彩極了。考哪一段他
18. 手裡拿著一個很厚的簿子，正**在**月光(moonlight)**下面**很仔細地看那個簿子上面的文字。老人
19. 虐待，竟然被活活地打死，埋**在**那牆角(that wall)**下面**了！晴天霹靂，孟姜女幾乎昏倒了。
20. 他終於**在**一個荒僻的大山(a rural mountain)**下面**，發現了一個山洞。王質把斧頭放在洞
21. 移動滑鼠按回信，就可以**在**這封信的(this letter)**下面**開始打入要回覆的訊息，打完祇要按
22. 一張沒寫完的紙條，和一隻倒插**在**滑坡(ramp)**下面**的女人的腿，他們循跡挖出四具屍體，
23. 我們在體育館裡面，你們**在**體育館(gymnasium)**下面**。欸欸欸！所以我上次不是遇到
24. 我們在體育館裡面，你們**在**體育館(gymnasium)**下面**。你們在體育館下面，我們在體育館
25. 你們在體育館下面。你們**在**體育館(gymnasium)**下面**，我們在體育館上面。哈！體育館，
26. 那條敕勒川大河，就**在**陰山(name of a mountain)**下面**；滾滾滔滔的水，日夜不停的流著。
27. 印象中有一次，我到外婆家去，**在**戲台(stage)**下面**去抽魷魚，它有賣很多東西，好高興，

The Down Cluster: The Descendant Sense

28. 罪惡的深淵。所以我也不希望說，**在**我(me)**下面**那幾代，也都跟著這樣陷下去呀！我是

The State Cluster: The State Sense

29. 非常大的危機呀！李先生，**在**那個壓力(that pressure)**下面**，他要選總統。對。那在這個時候
30. 今天，李總統能夠**在**這麼大的壓力(such big pressure)**下面**，他還能夠脫穎而出得到第一高票

BIOGRAPHY

Mr. Chuan-Chi Chang is a Mandarin Chinese learner of English from Taiwan. He received his Bachelor of Science in Marketing from the University of Tennessee, USA and Master of Arts in Teaching English to Speakers of Other Languages from Murray State University, USA. During his PhD study at Chulalongkorn University, Thailand, he became a learner of Thai. Currently, he uses Taiwanese Hokkien, Mandarin Chinese, English, and Thai at different proficiency levels. His research interests include cognitive approach-based analyses toward language acquisition and cultural diversity in language.