CONCEPTUAL TRANSFER AND SECOND LANGUAGE VOCABULARY ACQUISITION: EVIDENCE FROM YOUNG ADULT CHINESE LEARNERS OF ENGLISH

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Conceptual Transfer and Second Language Vocabulary Acquisition:

Evidence from Young Adult Chinese Learners of English

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CERTIFICATE OF ORIGINALITY

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Abstract

This study focuses on conceptual transfer in L2 vocabulary acquisition and investigates the interactions between conceptual relationship and level of difficulty, between conceptual relationship and receptive and productive vocabulary knowledge, and between conceptual transfer and learning numeral meanings of nouns. By accessing L2 learners' mental lexicon, this study tries to reveal how conceptual differences between L1 and L2 could account for different outcomes of L2 vocabulary learning. One hundred and forty-two college freshmen majoring in English from mainland China participated in data collection and completed an elicited narrative task, a forced-choice task, and an adapted language history questionnaire. Their productive vocabulary knowledge, receptive vocabulary knowledge, and language background were assessed by these tasks respectively. Data from the elicited narrative task and the forced-choice task were analyzed quantitatively, and further analysis based on the qualitative data that had been quantified was conducted for the elicited narrative task.

Results show that for L2 words with lexicalized concepts, conceptual equivalence may pose the least difficulty for learning receptive and productive vocabulary knowledge. Partial equivalence may cause the greatest difficulty for learning receptive knowledge, while non-equivalence may be the most difficult for learning productive knowledge. For numeral meanings of L2 nouns, countability and plurality may be two major sources of conceptual transfer. Within these sources, words can be further divided into four groups: countable without *s* (CWS), uncountable as countable (UAC), plural without *s* (PWS), and with *s* but singular (WSS), with the

probability of conceptual transfer increasing from CWS, PWS, WSS, to UAC. Another form of conceptual transfer due to plurality can be the collocations between the classifier *pair* and L2 nouns: the collocations may be more likely to take place with words sharing the same plural status with its Chinese translation equivalents than words that do not.

Findings from this study support the Modified Hierarchical Model (Pavlenko, 2009) and can provide empirical evidence for its refinement and elaboration. Results also indicate that in the teaching and learning of L2 vocabulary, conceptual transfer should be taken into consideration and the focus of teaching and learning needs to be tailored. For words with partial equivalence, teachers and learners need to devote more efforts to making clear differentiations between L1 and L2 translation equivalents, and for words with non-equivalence, their main task is to establish L2-specific categories. When teaching numeral meanings of L2 nouns, teachers need to provide not only grammatical rules but also explicit comparisons of different treatments to numeral meanings of nouns between L1 and L2, so as to arouse learners' awareness of conceptual differences.

Publications Arising from This Thesis

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Chapter 1 Introduction

1.1 Rationale

Once neglected by researchers, the importance of the lexicon has now been established in second language acquisition (SLA) research (Gass, Behney, & Plonsky, 2013; Jiang, 2004a). The lexicon is significant because it accounts for most of the errors by second language (L2) learners, constitutes a central part in many linguistics theories (Gass et al., 2013), and lays the stepping-stone for grammar (Juffs, 2009). Actually, the lexicon is regarded by learners as "the most serious" of all errors, and is probably "the most important language component for learners" (Gass et al., 2013, p. 194).

Knowing a word involves three kinds of vocabulary knowledge: a) form, including the spoken form, written form, and word parts, b) meaning, including form and meaning, concept and referents, and associations, and c) use, including grammatical functions, collocations, and constraints of use (register, frequency, etc.) (Nation, 2013, p. 49). Concepts stored in a word is one of the aspects that make the lexicon central (Juffs, 2009), but vocabulary research dedicated to concepts has been scarce in the past several decades (Jiang, 2004a) and has just begun to accumulate in the last decade (Pavlenko, 2009). It is necessary to probe into the effects of concepts and conceptual transfer so as to illuminate the picture of L2 vocabulary acquisition. This study aims to investigate the effects of conceptual transfer on L2 vocabulary acquisition so as to provide guidelines for L2 vocabulary learning and teaching.

1.2 Significance

Conceptual transfer and L2 vocabulary acquisition falls within the research of SLA, psycholinguistics, and bilingualism, which are interconnected. L2 vocabulary acquisition is closely linked to psycholinguistics for the involvement of memory study, and to bilingualism research that is interested in how the first language (L1) and L2 vocabulary interact in the mind (Leowen & Reinders, 2011). In fact, both psycholinguistics and bilingualism enable the understanding of the mechanisms of learning an L2, thus allowing to test SLA hypotheses and guide L2 teaching and learning (Leowen & Reinders, 2011), and in turn, SLA can expand the knowledge of psycholinguistics and bilingualism. Findings from this study can reveal the interactions between conceptual transfer and L2 vocabulary acquisition, thus adding to the evidence for vocabulary acquisition in psycholinguistics, the bilingual mental lexicon models, especially the latest Modified Hierarchical Model (Pavlenko, 2009), and teaching and learning strategies of L2 vocabulary.

1.3 Terminologies

1.3.1 Acquisition and Learning

Krashen (1982) proposes the distinction between acquisition and learning: while the former is defined as the subconscious process of knowing the language, the latter as the conscious process of knowing the rules of the language. However, this study does not distinguish between acquisition and learning, and the two words are used interchangeably to refer to the process of knowing a language, following the common practice in current SLA research.

1.3.2 Second Language Acquisition

Whereas first language (L1), also called native language, refers to the language learned first, second language (L2) refers to any language learned after L1, including the third language and so on (Gass et al., 2013; Leowen & Reinders, 2011). Second language acquisition (SLA) is the learning of an L2 (Gass et al., 2013; Leowen & Reinders, 2011).

1.3.3 SLA and Foreign Language Learning

The difference between SLA and foreign language learning mainly lies in the fact that the former takes place in the environment where the L2 is spoken (Gass et al., 2013), e.g., Chinese students learning English in the United States, while the latter happens where the L1 is spoken (Gass et al., 2013), e.g., American students learning Chinese in the United States. The implication of such difference is that in L2 context, learners have many opportunities to interact with native speakers of L2, which can provide considerable facilitation, while in foreign language context, learners have little interaction with native speakers of L2 (Gass et al., 2013). In this study, SLA is used as an umbrella term for reference to both L2 context and foreign language context, unless with specification.

1.3.4 SLA and Bilingualism

Bilinguals can be defined according to fluency as individuals with native-like fluency of two or more languages (Gass et al., 2013), or according to language use as individuals who use "two or more languages (or dialects) in everyday life" (Grosjean, 2013). Based on the first definition, bilinguals are the end-point of SLA (Gass et al., 2013), whereas the second definition encompasses bilinguals with different extents of

fluency (Grosjean, 2013). Following the second definition, this study views bilinguals as including L2 learners with different levels of proficiency but not necessarily having native-like knowledge in both languages.

1.3.5 Explicit Knowledge and Implicit Knowledge

Explicit knowledge is conscious, declarative, mostly learnable, potentially verbalizable, and generally accessible by controlled processing. Learners often lack preciseness and accuracy in their declarative rules, and may rely on explicit knowledge when difficult language tasks appear. Explicit knowledge can be developed in both depth and breadth, and includes the knowledge of pronunciation, vocabulary, grammar, pragmatic and sociocritical features (Ellis, 2004). In contrast, implicit knowledge is tacit, intuitive and procedural. It is available in automatic processing but only evident in learners' verbal behavior. Learners may or may not have target-like procedural rules and employ implicit knowledge in default L2 production. Most learners have limits in learning implicit knowledge (Ellis, 2009). Explicit and implicit knowledge can be viewed as dichotomous (Ellis, 2004) and in distinct systems, and L2 performance utilizes their combination (Ellis, 2009).

1.3.6 Numeral Meanings

The phrase "numeral meanings" in this thesis is coined and used to include plurality, countability, number marking, and other aspects relating to expressing the number of a noun.

1.4 Organization of Remaining Chapters

Chapter Two first reviews background knowledge of conceptual transfer and L2

vocabulary learning, then introduces relevant studies, pinpoints unexplored issues, and at last forwards research questions. Chapter Three describes research methods, including overall design, instruments, participants, and procedure. Chapter Four presents the results, followed by in-depth discussions and a conclusion in Chapters Five and Six.

1.5 Summary

This chapter introduces the basic information of this study, including the rationale, significance, relevant terminologies, and the organization of remaining chapters. Terminologies that deserve our attention in this study involve acquisition and learning, second language acquisition, foreign language learning, and bilingualism.

Chapter 2 Literature Review

This chapter first provides definitions for *concept* and *conceptual transfer*, and then introduces L2 vocabulary acquisition by reviewing vocabulary research in applied linguistics, the relationship between L1 and L2 vocabulary acquisition, and three lines of research on L2 vocabulary acquisition, i.e., description, pedagogy, and acquisition. It continues to describe the relevant findings and unexplored issues, and ends with the research questions of this study.

2.1 Concept

2.1.1 Language-independent Concept and Language-mediated Concept

The essentiality of the lexicon results from its storage of concepts (Juffs, 2009). Drawing from the descriptions by Barsalou (2003), Lakoff (1987), Murphy (2002) and others, Jarvis (2011) defines concept as a mental representation of "multiple images, impressions or image schemas that are acquired through various senses" (p. 4).

Judging from the relations to language, concepts can be divided into language-independent concepts and language-mediated concepts (Jarvis & Pavlenko, 2008). Language-independent concepts, also conceptual categories, "develop experientially and have no predetermined means of linguistic expression" (p. 114), while language-mediated concepts, also linguistic categories, "develop in the process of language socialization, sensitize speakers of particular languages to particular conceptual distinctions, and allow them to perform naming, identification, comprehension, and inferencing tasks along similar lines" (p. 115) (Jarvis & Pavlenko,

2008). To understand better, we can imagine that when an infant was born and before much influence from languages can be exerted on it, it will develop "neutral" concepts that do not show any characters of a particular language, but later when enough influence from languages have been exerted, its concepts will demonstrate the characters of a particular language. Summarizing Bowerman and Choi's work (Bowerman, 1996a, b; Bowerman & Choi, 2001, 2003; Choi & Bowerman, 1991; Choi et al., 1999), Jarvis and Pavlenko (2008) cite that 18-month children only manage to make spatial distinctions for one language, while 9-month infants could do it for both Korean and English. Since most people learn at least one language, we develop many language-mediated concepts in life.

2.1.2 Lexicalized Concept and Grammaticized Concept

Language-mediated concepts can be divided further into lexicalized concepts and grammaticized concepts (Jarvis, 2011; Jarvis & Pavlenko, 2008; Pavlenko, 1999, 2005). Lexicalized, or lexical, concepts, refer to linguistic categories connected to words (Jarvis, 2011; Jarvis & Pavlenko, 2008; Pavlenko, 2005, 2009), and grammaticized concepts refer to linguistic categories related to morphosyntactic aspects (Jarvis, 2011; Jarvis & Pavlenko, 2005, 2009). *Room* and *desk* are examples of lexicalized concepts. Grammaticized concepts include gender, number, and aspect (Slobin, 2001). For instance, every German noun is marked with masculine, feminine, or neuter, which does not exist in Chinese.

2.1.3 Summary

Based on the relations to language, concepts can be classified into two types: language-independent concepts, i.e., conceptual categories, and language-mediated

concepts, i.e., linguistic categories. Language-mediated concepts can be divided further into lexicalized/lexical concepts and grammaticized concepts.

2.2 Conceptual Transfer

2.2.1 Conceptual Representation and Semantic Representation

Falling within the research of SLA, bilingualism, and psycholinguistics, L2 vocabulary acquisition is studied by both psychologists and linguists, and their use of conceptual representation and semantic representation in the literature is inconsistent and sometimes even confusing and misleading (Francis, 1999, 2005). It has been debated among researchers whether conceptual representations and semantic representations are separable or not: some regard them as inseparable and referring to the same components (e.g., Francis, 1999, 2005), while others support the separable view that they refer to two distinct levels (e.g., Pavlenko, 1999, 2009). In the separable view, conceptual representations mainly involve knowledge of the linguistic category, including properties and scripts, prototypes and borderline members, inner structure and outer connections, whereas semantic representations are concerned mainly with two kinds of connections, i.e., those between words and concepts in the form of polysemy, and those between words in the form of collocation, word association, synonymy, and antonymy (Jarvis & Pavlenko, 2008; Pavlenko, 2009). Conceptual representations can also be multi-modal: visual, auditory, perceptual, and kinesthetic (Jarvis & Pavlenko, 2008; Pavlenko, 2009). Concisely, conceptual representations are about language-mediated concepts, semantic representations are about mappings and links.

In fact, the separable view is supported by research on aphasia and anomia (Jarvis

& Pavlenko, 2008; Pavlenko, 1999). It has been found that people with global or paroxysmal aphasia failed to perform comprehension and production tasks of language but still managed to complete tasks based on conceptual knowledge (e.g., Lecours & Joanette, 1980). Similarly, people with anomia failed to perform naming that required linguistic knowledge but could utilize conceptual knowledge to categorize and use the objects appropriately (e.g., Damasio & Damasio, 1992). These findings from neurolinguistics show that participants could maintain intact conceptual representations and apply their knowledge of the language-mediated concepts to non-linguistic tasks, although they lacked intact knowledge of the mappings associated with words and concepts (semantic representations) and were unable to perform linguistic tasks.

Researchers have incorporated the distinction between conceptual and semantic representations into their discussions and research. For example, when introducing and reviewing research on the bilingual memory, De Groot (2013) distinguishes conceptual representation from lexical/form representation, and uses the former for reference to concepts and the latter to the word-form representations. The differentiation between conceptual and semantic representations can help locate the source of errors: whether it is at the level of language-mediated concepts (conceptual transfer) or mappings associated with words and concepts (semantic transfer) (Pavlenko, 2009). Differentiating between the two representations, many studies focus on the influence of conceptual transfer and coalesce a particular line of research, which can be found in the special issue on conceptual transfer of *Bilingualism: Language and Cognition* (Jarvis, 2011).

2.2.2 Conceptual Transfer and Semantic Transfer

Based on the differentiation between conceptual and semantic representations, conceptual transfer refers to the crosslinguistic influence resulting from the differences in language-mediated concepts between L1 and L2, while semantic transfer, also meaning transfer, refers to the crosslinguistic influence resulting from the differences in the mappings associated with concepts and words between L1 and L2 (Jarvis, 2011; Jarvis & Pavlenko, 2008; Pavlenko, 2009). For conceptual transfer, the differences in language-mediated concepts, i.e., linguistic categories, include prototypes and borderline members, and category boundary and category members, whereas for semantic transfer, the differences in mappings associated with words and concepts include the concepts that are linked to a particular word and the connections between words such as collocation, antonymy, and synonymy (Jarvis, 2011; Jarvis & Pavlenko, 2008; Pavlenko, 2009). Conceptual transfer is also defined as crosslinguistic effects related to linguistic relativity, while semantic/meaning transfer is attributed to L1 semantic and pragmatic influence (Odlin, 2005, 2008, 2010). Conceptual transfer always involves semantic transfer, but not all semantic transfer can be classified as conceptual transfer (Odlin, 2005, 2008).

Examples of conceptual transfer and semantic transfer can be found among Chinese learners of English. For instance, a Chinese learner may make a sentence like this: *His answer to my problem is confusing*. In this sentence, what the Chinese learner wants to express is actually *His answer to my question is confusing*, and the misuse of *problem* and *question* is because both English words are linked to a Chinese translation equivalent *wenti (问题)*. This is semantic transfer in that L1 influence takes place at the level of mappings associated with words and concepts, which means

the learner assumes that since *problem* and *question* share the same Chinese translation equivalent *wenti*, in the situation where *wenti* can be used, *problem* and *question* are applicable. This does not involve conceptual transfer because in Chinese, similar to English, there exist two distinct sets of linguistic categories defining respectively the situations where the meaning of "problem" or "question" is used, and the only difference is that Chinese uses one word to refer to these categories, while English uses two. Demonstration of conceptual transfer can be seen from the English words *wallet* and *purse* and their Chinese translation equivalent *qianbao (钱包).* Although Chinese uses the attributive adjectives such as *nanshi (男士)* that means "men's", and *nvshi (女士)* that means "women's", to differentiate between the meanings of "wallet" and "purse", in Chinese learners' mind, both of the linguistic categories for "wallet" and "purse" are stored as a set and do not underscore the gender property. In English, in contrast, native speakers develop two distinct sets of linguistic categories to refer to "wallet" and "purse" respectively. Therefore, when Chinese learners do not pay attention to the gender properties of *wallet* and *purse*, crosslinguistic effects arise from the differences in language-mediated concepts between Chinese and English. The differentiation between conceptual and semantic transfer is crucial in understanding findings from conceptual transfer research (Jravis & Pavlenko, 2008; Odlin, 2005, 2008, 2010).

As a research topic, conceptual transfer has been studied by researchers in terms of a) objects, whose naming and categorization are different among learners from various language backgrounds (e.g., Graham & Belnap, 1986; Ameel et al., 2005), b) emotions, which are not coded in the same way among speakers of different languages (e.g., Pavlenko & Driagina, 2007), c) personhood, which relates to the

differences in grouping people and relationships in social activities by people from different language communities (e.g., Barron, 2006), d) grammatical gender, which involves the marking of grammatical gender in different languages (e.g., Hellinger & Bussman, 2003), e) number, which is concerned with the typological differences in treating grammatical numbers (e.g., Han, 2010), f) time, which includes the perception of time as lexical concepts and grammatical marks (e.g., Alloway & Corley, 2004), g) space, which is about denoting the directions and locations (e.g., Levinson, 2003), and h) motion, which is associated with the description of processes and outcomes of events (e.g., Jessen & Cadierno, 2013). Conceptual transfer is found from L1 to L2 in many studies, but findings of L2 influence on L1 have also accumulated (e.g., Pavlenko & Malt, 2011; Athanasopoulos, 2009; Athanasopoulos et al., 2011). Various evidences have shown that learning an L2 can be affected by previously learned L1, and meanwhile L1 is also under the influence of L2.

2.2.3 Relations to Linguistic Relativity and Sociocultural Theory

Linguistic relativity refers to Whorf's (1956) hypothesis that language may affect a person's cognitive development. It was widely believed that there was a "strong" and a "weak" version of Whorfianism: in the former, the influence of language on thought was determinative, whereas in the latter, the influence was limited. Although researchers studying the universals of languages cast skepticism on the Whorfian hypothesis, since last two decades, evidence about the influence of language on thought has begun to emerge from various studies (Odlin, 2008). Researchers has started to abandon the strong-weak misinterpretations and to acknowledge that languages may affect cognition to different extents from none to large (Pavlenko, 2005), and this revised interpretation is termed as "neo-Whorfian" theories (Levinson,

2003, p. 301).

Since mid-1990s, linguistic relativity has been incorporated into the research of language transfer, which is a conclusive field on the effects of L1 on L2 learning, and this intertwining field is now designated as conceptual transfer (Odlin, 2008). The idea of linguistic relativity that language influences thought is manifested in conceptual transfer in its distinction between language-independent concepts and language-mediated concepts (Jarvis & Pavlenko, 2008; Pavlenko, 2005). In turn, evidence from conceptual transfer studies can contribute to deepening the understanding of linguistic relativity.

Despite the close relations between linguistic relativity and conceptual transfer, they can never be regarded as sharing the same research domain (Jarvis, 2011; Jarvis & Pavlenko, 2008; Odlin, 2010). While conceptual transfer mainly focuses on linguistic behaviors, linguistic relativity is generally interested in non-linguistic behaviors (Jarvis, 2011). What conceptual transfer studies can be summarized as language-thought-language: in the process of learning an L1, people develop the L1-mediated concepts, and since L1-mediated concepts may differ from L2-mediated concepts, when people begin to learn an L2, they may be affected by the L1-mediated concepts, which may lead to conceptual transfer. For linguistic relativity, the phenomenon of interest can be summarized as language-thought: how people's perception of the world will be affected by learning different L1s or more than one language. Another difference between linguistic relativity and conceptual transfer lies in the direction of influence: when involving more than one language, linguistic relativity mainly investigates L1 effects on L2, while conceptual transfer is concerned

with the effects of L1 on L2 and those of L2 on L1 (Jarvis, 2011).

Sociocultural Theory (Vygotsky, 1978, 1986), also Vygotskian theories, proposes the idea that human thought is developed under the influence of "culturally organized and transmitted symbolic meaning" (Lantolf, 2012, p. 57), which involves language. Similar to Whorfian hypothesis, Vygotskian theories acknowledge the influence of language and culture on cognitive development, and emphasize that individual psychological entities develop with the improvement of linguistic competence (Lucy & Wertsch, 1987). Differently, Vygotsky focuses on the diachronic development of the individual in the socialization with culture and society: sociocultural theory often compares the linguistic performances of a learner of a particular language at different time slots (Lucy & Wertsch, 1987), but it neither intends to study how L1 and L2 in the learner's mind affect the conceptualization of the world (Jarvis & Pavlekno, 2008), nor to research how L1-mediated concepts in the individual's mind affect the learning of an L2, which is the focus of conceptual transfer. Although sharing the emphasis on the influence of language on thought, sociocultural theory is less directly connected to conceptual transfer than linguistic relativity does.

2.2.4 Summary

The differentiation between conceptual representations and semantic representations provides the theoretical foundation for the distinction between conceptual transfer and semantic transfer. Conceptual transfer is closely related to linguistic relativity but not completely equivalent and its connection to sociocultural theory is moderate rather than close.

2.3 L2 Vocabulary Acquisition

2.3.1 Vocabulary in Applied Linguistics

Since Meara's (1980) call for more attention to vocabulary acquisition, which was the "neglected aspect of language learning" (p. 221), many studies have been dedicated to lexicon research, and this area "is no longer a neglected aspect" (Nation, 2013, p. 5). Research on vocabulary in applied linguistics can be generally divided into three strands: description, pedagogy, and acquisition (Schmitt & McCarthy, 1997; Wolter, 2013). Description deals with the descriptive issues associated with vocabulary, including the definition of vocabulary and vocabulary knowledge, vocabulary breadth and depth, and word form and context. Pedagogy includes practical issues of vocabulary teaching, learning, and assessment, and helps develop strategies and materials to facilitate vocabulary learning. Acquisition mainly studies the processing and storage of vocabulary in the mind at a psychological level, and is often associated with psycholinguistics. These three strands are never isolated but mutually complementary, explicative and justifiable (Schmitt & McCarthy, 1997).

2.3.2 L1 Vocabulary Acquisition and L2 Vocabulary Acquisition

L2 acquisition research has a long tradition of drawing research ideas, techniques, and theories from L1 acquisition research, but there exist several differences between L1 acquisition and L2 acquisition: a) "the lack of another language in the L1 child's mind", b) "the comparative maturity of the L2 learner", c) "differences in situation, learner, and language input", d) "the alleged lack of success and its causes" in L2 learning and the pervasive success of L1 learning (Cook, 2010). These differences will surely lead to the difference in the acquisition of L1 and L2 vocabulary. When a child learns L1 vocabulary, he or she is meanwhile developing the conceptual system

and social skills, free of influence from another language in the mind, and the success in acquiring the vocabulary is often natural. In contrast, When an individual, often much older than a child who is learning the L1, learns L2 vocabulary, he or she already has the conceptual system and social skills at use, but often suffers from L1 influence, and the success in acquisition is often hard to reach. Given its difference from L1 vocabulary acquisition and the relative difficulty to succeed, L2 vocabulary acquisition deserves to be independently researched.

2.3.3 Describing L2 Vocabulary

2.3.3.1 Counting Words

Different ways of counting words in a spoken or written text can help understand what a word means on different criteria. Tokens, types, lemmas, and word families provide four ways to classify words.

Tokens and types. Tokens are words counted by calculating the total appearance times of every word form, while types refer to words counted by calculating the numbers of different word forms (Nation, 2013, p. 9). For example, in the sentence "The girl has gone to the library", there are seven tokens and six types.

Lemmas and word families. A lemma comprises "a headword and its inflected forms and reduced forms (n't)", while a word family is comprised of "a headword, its inflected forms and its closely related derived forms" (Nation, 2013, p. 10-11). For instance, "work", "worked", "works", and "workable" belong to the same word family but the last one does not belong to the lemma of "work".

2.3.3.2 Knowing a Word

Word knowledge has been defined in different ways by linguists and psycholinguists, including Cronbach (1942), Dale (1965), Faerch, Haastrup, and Phillipson (1984), Heinriksen (1999), Nation (1990, 2001, 2013), Richards (1976), and Ringbom (1987). According to Nation's (2013) latest version, knowing a word involves three kinds of vocabulary knowledge: a) form, including the spoken form, written form, and word parts, b) meaning, including form and meaning, concept and referents, and associations, and c) use, including grammatical functions, collocations, and constraints of use (register, frequency, etc.) (p. 49).

2.3.3.3 Receptive Knowledge and Productive knowledge

Receptive implies that learners "receive language input from others through listening or reading and try to comprehend it", whereas productive implies that learners "produce language forms by speaking and writing to convey messages to others" (Nation, 2013, p. 46-47). Receptive knowledge can be described as meaning recognition and meaning recall, and productive knowledge as form recognition and form recall (Nation, 2013; Schmitt, 2010). Receptive knowledge involves noticing the word form in the listening and reading materials and recalling its meaning, while productive knowledge involves recalling and producing the word form in writing or speaking so as to convey meanings (Nation, 2013).

Every aspect of word knowledge can be further divided into the receptive and productive scopes. Nation (2013, p. 49) provides the detailed explication of what kind of word knowledge can be classified as receptive or productive, as in Table 2.1. It is generally regarded that receptive knowledge is easier than productive knowledge

(Nation, 2013).

Table 2.1 What is involved in knowing a word. Adapted from *Learning Vocabulary in Another Language* (p. 49), by I. S. P. Nation, 2013, New York: Cambridge University Press. Copyright 2013 by Cambridge University Press.

Form	spoken	R	What does the word sound like?
		P	How is the word pronounced?
	written	R	What does the word look like?
		P	How is the word written and spelled?
	word parts	R	What parts are recognizable in this word?
		P	What word parts are needed to express the meaning?
Meaning	form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	concept and referents	R	What is included in the concept?
		P	What item can the concept refer to?
	associations	R	What other words does this make us think of?
		P	What other words could we use instead of this one?
Use	grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	collocations	R	What words or types of words occur with this one?
		P	What words or types of words must we use with this one?
	constraints on use	R	Where, when, and how often would we expect to meet this word?
	(register, frequency...)	P	Where, when, and how often can we use this word?

Note: R = receptive knowledge, P = productive knowledge

2.3.3.4 Breadth and Depth

Another important dichotomy in L2 vocabulary acquisition is the breadth and depth of vocabulary knowledge. Breadth of lexical knowledge, also vocabulary size, refers to an individual's total vocabulary, of which the form and meanings can be linked correctly (Laufer & Nation, 2012). Depth of lexical knowledge refers to the extent to which an individual knows about a particular word, including pronunciation and spelling, morphological properties, syntactic properties, meaning, register or discourse features, and frequency (Qian, 1999). These aspects of the depth of vocabulary knowledge can be divided into three types: a) precision of meaning, which refers to the more precise and specific knowledge of the word meaning, b) comprehensive vocabulary knowledge, which not only includes meaning but also

form and use in context, and c) network knowledge, which refers to the incorporation into a lexical network and the connections with other words (Read, 2004). In short, breadth is how many words an individual knows, and depth is how well an individual knows a word.

2.3.3.5 Summary

Different ways of counting words can help understand what a word means from different perspectives. Word knowledge includes several facets, and can be divided into different dichotomies including receptive knowledge and productive knowledge, and breadth and depth.

2.3.4 Teaching and Learning L2 Vocabulary

2.3.4.1 Intrinsic Difficulties in Learning L2 Vocabulary

The intrinsic difficulties of L2 vocabulary learning lie in three: a) quantity, which is related to vocabulary size or breadth, b) quality, which is associated with depth of vocabulary knowledge, and c) environmental or situational issue, which is about the learning context (Laufer & Nation, 2012). To tackle these difficulties in learning L2 vocabulary requires a) careful vocabulary selection, which means words to learn and teach should be carefully chosen to enable learners the maximum communicative fluency and understanding, b) discreet vocabulary measurement, which requires the development of well-designed tests of various aspects of vocabulary, and c) appropriate learning source, which is concerned with what kind of instruction can provide better facilitation for L2 vocabulary learning (Laufer & Nation, 2012).

2.3.4.2 Vocabulary Selection

There are two criteria to select which words to focus on: frequency and usefulness, and word learnability (Laufer & Nation, 2012). Frequent words are those appear most often and facilitate in all purposes of communication, while useful words are specifically helpful for a particular purpose, such as medical vocabulary (Laufer & Nation, 2012). Since frequency and usefulness often overlap, word lists are developed and include the most frequent words to facilitate L2 vocabulary learning (Laufer & Nation, 2012). For L2 English vocabulary learning, the influential word lists include West's (1953) *General Service List of English Words*, Coxhead's (2000) *Academic Word List* and others.

Word learnability is related to which aspects make a word difficult to learn, and can be affected by the incongruence in form and semantics between L1 and L2, such as false cognates (Lado, 1972), and by the interrelationship between new and already-existed words in the L2, such as semantic similarity (Higa, 1965). The findings from error analyses of written samples (e.g., Laforest, 1980), elicitation studies (e.g., Biskup, 1992), and large learner corpora (e.g., Nesselhauf, 2005), have revealed two major types of difficulty: interlingual, which arises from the relations between L1 and L2 translation equivalents, and intralingual, which results from the connections between new words and already-existed words in L2 (Laufer & Nation, 2012; for reviews and summaries, see Laufer, 1990, 1997; Swan, 1997). The previously mentioned English words *wallet* and *purse* and their Chinese translation equivalent *qianbao* are one example of interlingual difficulty: when Chinese learners want to express the meaning of *qianbao* in English, they need consider the gender issue and distinguish between *wallet* and *purse* for the proper context. For intralingual

difficulty, one example is synformy, which refers to the similarity between different L2 words in form, including sound, script, and morphology (Laufer & Nation, 2012; for definitions and classifications of synformy, see Laufer, 1988, 1991), such as *persecution* and *prosecution*.

2.3.4.3 Vocabulary Measurement

The measurement of vocabulary focuses on two major aspects of vocabulary knowledge: the breadth, i.e., the global vocabulary, and the depth, i.e., the knowledge of individual words. For the measurement of vocabulary size, one of the earliest tests is Meara and Jones's (1990) yes/no test format, which includes words and nonwords and asks learners to indicate whether they know the meaning of the word. In the recent vocabulary size tests, the multiple-choice format (Beglar, 2009; Nation & Beglar, 2007) has been developed with the items selected based on the *British National Corpus*, and asks learners to choose the most appropriate meaning for the word. There are also vocabulary levels tests to decide learners' vocabulary levels, including the *Vocabulary Levels Test* (Schmitt et al., 2001) that is developed from Nation's (1983) *Vocabulary Levels Test*, and the *Productive Levels Test* (Laufer & Nation, 1999). In the latest versions of vocabulary levels tests, *Computer Adaptive Test of Size and Strength (CATSS)* (Laufer & Goldstein, 2004; Laufer et al., 2004), receptive knowledge and productive knowledge are measured by assessing four degrees of form-meaning knowledge: a) active recall, the ability to provide the form for a particular meaning, b) passive recall, the ability to provide meaning for a particular form, c) active recognition, the ability to recognize the proper word form among others, and d) passive recognition, the ability to recognize the proper meaning among others (Laufer & Nation, 2012). Apart from active recall, productive

knowledge also includes the use of word in production, and the active recall of the word form does not guarantee its use in production, which is also affected by confidence, lexical preferences, and avoidance strategies (Laufer & Nation, 2012). The use of word in production is measured by lexical richness and lexical diversity of the text, with the former assessing the word frequency levels (Laufer & Nation, 2012) and the latter calculating the number of different words (Duran et al., 2004). For measurement of lexical richness, Laufer and Nation (1995) developed the computer-based *Lexical Frequency Profile*, and for lexical diversity, Duran and colleagues (2004) provided the detailed formulas and calculation based on computer programs.

To assess the depth of vocabulary knowledge, different kinds of measurement have been developed. One way is to use different test formats to assess the same words (e.g., Pulido, 2004). Another way is to allocate partial to full credit to indicate the depth knowledge of the word (e.g., Nurweni & Read, 1999). Comprehensively, depth can be measured receptively and productively in every aspect of vocabulary knowledge: orthography, paradigmatic association, syntagmatic associations, grammatical functions, and meaning and form (e.g., Webb, 2007).

Since meaning is the fundamental feature of words and can suffice the most basic comprehension, vocabulary researchers should at least focus on assessing the association between word form and its denoted concepts (Laufer & Nation, 2012).

2.3.4.4 Vocabulary Instruction

There are two major kinds of vocabulary instruction: input based and form

focused. Input-based instruction is based on the idea of incidental learning, which refers to learning a word or expression "without the conscious intention to commit the element to memory" (Hulstijn, 2012) and subordinating the teaching of vocabulary to the teaching of other language knowledge, including grammar, reading, etc. (Laufer & Nation, 2012). Input-based instruction assumes that the encounter with new words when learning other language knowledge can naturally result in vocabulary knowledge. Contrarily, word-focused instruction absorbs the idea of intentional learning, which refers to learning a word or expression with "a deliberate attempt to commit factual information to memory" and teaching vocabulary by combining attention to words with authentic communicative tasks and with practice of decontextualized vocabulary (Laufer & Nation, 2012). In word-focused instruction, for example, the communicative tasks can take the format of using dictionary and oral interaction to clarify word meanings, and the decontextualized practice can be learning with word cards and word matching. Research shows that word-focused instruction, both communicative tasks (e.g., De la Fuente, 2002) and decontextualized tasks (e.g., Cobb, 2007), gains more effects than input-based instruction.

Besides the guidance from the two instructional practices, teaching and learning activities can also draw from general theories. The Involvement Load Hypothesis provides three criteria for designing quality vocabulary learning tasks: a) need, which means the target vocabulary should be important for completing the task, b) search, which means learners have to search the form and meaning of the word, and c) evaluation, which requires learners to compare and choose the appropriate word in context (Hulstijn & Laufer, 2001). Vocabulary course designers should also take into consideration the balance between the breadth and depth of knowledge, and this

balance can be achieved by allocating roughly equal time and efforts to four strands: meaning-focused input, meaning-focused output, language-focused learning, and fluency development (Nation, 2007).

2.3.4.5 Summary

There are three intrinsic difficulties in learning L2 vocabulary: quantity, quality, and environmental or situational. To improve L2 vocabulary acquisition, teaching and learning should focus on providing careful vocabulary selection, discreet vocabulary measurement, and appropriate learning source.

2.3.5 Bilingual Mental Lexicon

2.3.5.1 Bilingual Mental Lexicon Research

The third strand of vocabulary research studies the mental lexicon, which refers to the internal dictionary that stores the information of words in the mind, including spelling, pronunciation, grammatical category, and meaning (Barcroft, Sunderman, & Schmitt, 2011). This psycholinguistic approach to L2 vocabulary acquisition mainly investigates how L1 and L2 words in the mind are stored, processed and affected in the processing by L1 and L2 proficiency (Sunderman & Campbell, 2012). The storage of bilingual mental lexicon is mainly about how L1 and L2 vocabulary are organized and connected, while processing is mainly concerned with when L1 or L2 vocabulary is in use, whether the other language is activated and to what extent.

The organization of bilingual mental lexicon is one of the fundamental and enduring questions (Francis, 2005; Kroll, 1993; Kroll & Tokowicz, 2005; Zhao & Li, 2010). In early decades around 1960s and 1970s, research on the bilingual mental

lexicon mainly focused on whether the conceptual store of bilinguals was shared or separate (Keatley, 1992; Francis, 2005). With empirical evidence accumulating, researchers began to adopt the mixed-representation view, that is, the conceptual store may be partly shared by two languages (De Groot, 1993; Keatley, 1992; Kroll, 1993). In recent decades, research has begun to shift its focus to what is actually shared and separate in the bilingual mind, taking the effects of linguistic relativity into consideration (Pavlenko, 2009). These developments have led to the emergence of bilingual mental lexicon models, which in turn reflect the increasingly elaborated views on L2 vocabulary acquisition.

Models on the organization of bilingual mental lexicon not only reveal how L1 and L2 vocabulary are stored and connected in the mind, but also provide predictions and explanations for the process of learning L2 vocabulary under the influence from L1. To track the development of views on L2 vocabulary acquisition in bilingual mental lexicon research, the following discussion will focus on six representative models on the organization of bilingual mental lexicon: three types of bilingualism (Weinreich, 1953), Conceptual Mediation Model and Word Association Model (Potter et al., 1984), Distributed Conceptual Feature Model (De Groot, 1992), Revised Hierarchical Model (Kroll & Stewart, 1994), Shared Distributed Asymmetrical Model (Dong et al., 2005), and Modified Hierarchical Model (Pavlenko, 2009). Jiang's (2000) three-stage model will be also included in discussion, because it explicates how L2 vocabulary is acquired with the existence of L1 vocabulary. All seven models will be discussed in chronological order so as to reflect the trend of bilingual mental lexicon research.

2.3.5.2 Three Types of Bilingualism

Weinreich (1953) is the first to provide a model for the organization of bilingual mental lexicon (see Figure 2.1). Based on the relationship between L1 and L2 vocabulary, the organization of bilingual mental lexicon can be divided into three types: a) coordinative, which means words in two languages are kept in separate conceptual stores, b) compound, which means words in two languages share the same conceptual store, and c) subordinative, which means the word in the weaker language has to rely on its translation equivalent in the stronger language to access the concept. Weinreich (1953) also adds that a bilingual may show a combination of these three types of bilingualism, and that when a new language is learned, the learner may rely heavily on L1 translation equivalents, showing the features of subordinative bilingualism. Weinreich's (1953) three types of bilingualism are seminal and the basic idea of this model has been incorporated by later models. Coordinative bilingualism provides the general frame of the idea of a separate store in the bilingual mental lexicon, compound bilingualism offers another potential of a shared bilingual mental lexicon, and subordinative bilingualism reveals the development and growth of the bilingual mental lexicon. The questions of whether the conceptual store is shared or not and how the L1 and L2 stores interact remains the main issues in the field of bilingual mental lexicon.

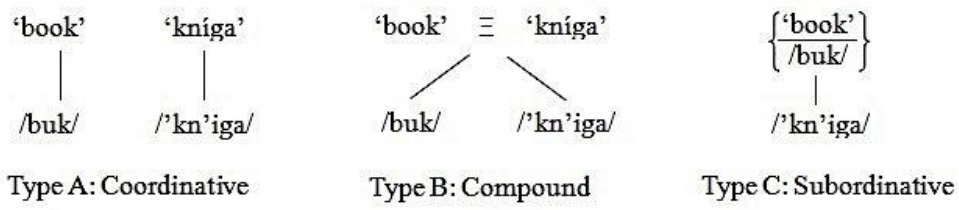


Figure 2.1 Three Types of Bilingualism. Adapted from *Languages in Contact: Findings and Problems* (pp. 9-10), by U. Weinreich, 1953, The Hague: Mouton Publishers. Copyright 1953 by Mouton Publishers.

2.3.5.3 Conceptual Mediation Model and Word Association Model

In 1984, Potter and her colleagues proposed the Word Association Model and the Concept Mediation Model (see Figure 2.2). They assumed that at the early stage of learning, the bilingual mental lexicon is organized as in the Word Association Model, i.e., L2 lexicon mainly relies on L1 translations to access concepts, which simulates Weinreich's (1953) subordinative bilingualism. As learning experience accumulates, learners will develop the direct links between concepts and L2 lexicon, which is similar to Weinreich's (1953) compound bilingualism. Both Weinreich's (1953) and Potter et al.'s (1984) models suppose that L2 learning first relies on L1 translation equivalents to access concepts, and in later development, constructs direct links between L2 lexicon and concepts. One feature of Potter et al.'s (1984) two models is the description of the comparative sizes of L1 and L2 lexicon: normally for unbalanced bilinguals, L1 lexicon is larger than L2 lexicon (De Groot, 2013). Another feature is that the links between L1 lexicon and concepts are hypothesized to be stronger than those connecting L2 lexicon to L1 lexicon or to concepts. However, they do not mention the connections between L1 lexicon and L2 lexicon in the Concept Mediation Model, which may still exist in later development of L2 vocabulary learning because learners still have access to L1 translation equivalents. It is not likely that the links between L1 and L2 lexicon will be removed or disappear.

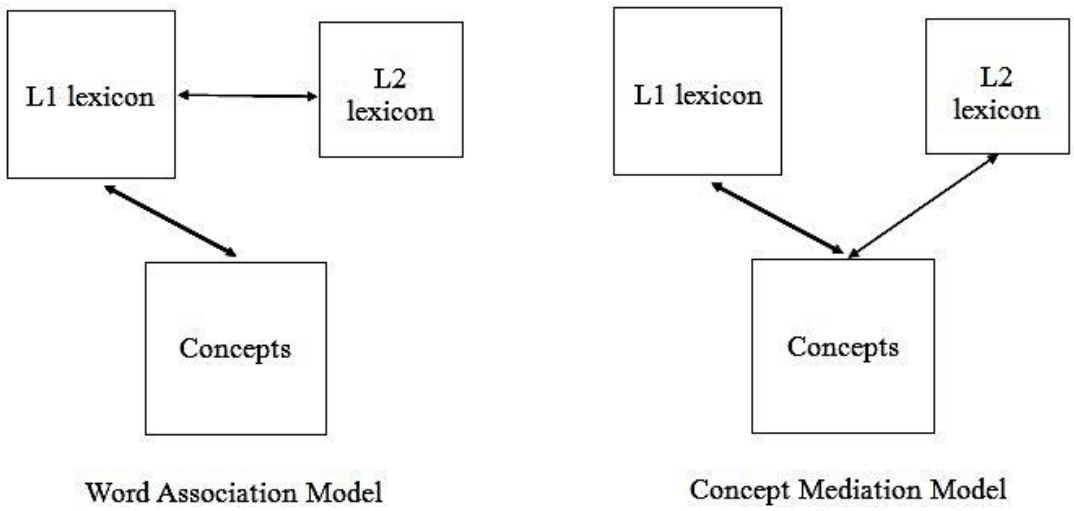


Figure 2.2 Word Association Model and Concept Mediation Model. Adapted from "Lexical and Conceptual Representation in Beginning and More Proficient Bilinguals," by M. C. Potter et al., 1984, *Journal of Verbal Learning and Verbal Behavior*, 23, p. 25. Copyright 1984 by Academic Press Inc.

2.3.5.4 Distributed Conceptual Feature Model

In 1992, based on findings of word-type effects on bilingual processing, e.g., word cognateness and concreteness, De Groot proposed the Distributed Conceptual Feature Model (see Figure 2.3). This model describes two possible situations for a pair of translation equivalents. One is that both translation equivalents share all the conceptual units, that is, the translation equivalent pair shares exactly the same meanings. The other is that the translation equivalent pair shares several of the conceptual units, but meanwhile contains some conceptual units that are specific to each language. This model starts from word types to depict the relationship between translation equivalents, and most importantly, it introduces and incorporates the ideas that translation equivalents in two languages do not necessarily share the same concepts, and that there are some language-specific concepts for each language. These ideas somehow reflect that research on the bilingual mental lexicon not only asked whether the conceptual store was shared or separate but began to probe into what was

actually shared and separate. The conceptual inequivalence of words in two languages becomes an important feature of later models.

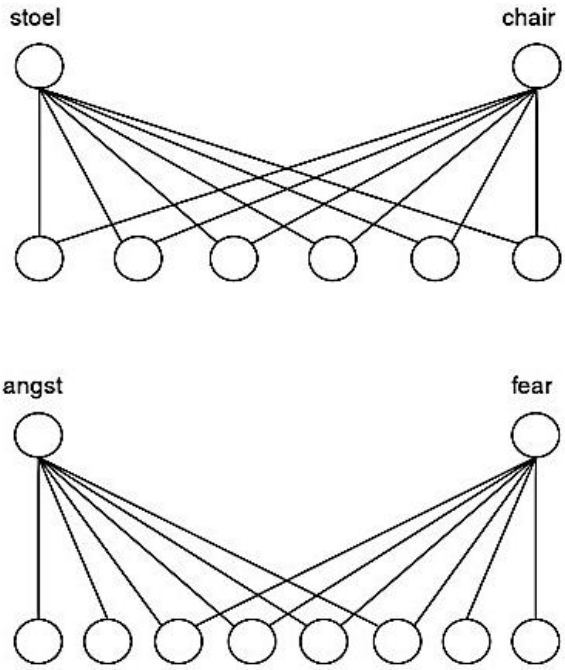


Figure 2.3 Distributed Conceptual Feature Model. Adapted from "Bilingual Lexical Representation: A Closer Look at Conceptual Representations" (p. 394), by A. De Groot, 1992. In R. Frost and L. Katz (Eds), *Orthography, Phonology, Morphology, and Meaning*, Amsterdam: Elsevier. Copyright 1992 by Elsevier Science Publishers.

2.3.5.5 Revised Hierarchical Model

In 1994, Kroll and Stewart proposed probably the most influential model for the bilingual mental lexicon, the Revised Hierarchical Model (see Figure 2.4). Integrating Potter et al.'s (1984) Word Association Model and Concept Mediation Model, this model proposes that at the early stage of L2 vocabulary learning, learners rely heavily on the lexical links from L2 to L1 to access concepts, and as time goes by, the lexical links from L1 to L2 and the conceptual links between L2 and concepts develop (Kroll & Tokowicz, 2005). This model adopts the developmental view on L2 vocabulary learning, and different from previous models, it hypothesizes that with the construction of the links between L2 and concepts and those from L1 to L2, the links

from L2 to L1 will reduce but be far from completely disappeared, which is not mentioned in Potter et al.'s (1984) models. Most strikingly, this model highlights the asymmetric strength of connections, namely, the L2-L1 links are stronger than the reverse, and the links between L1 and concepts are stronger than those between L2 and concepts (Kroll & Tokowicz, 2005). The developmental and asymmetric assumptions of this model have stimulated considerable empirical studies (Kroll & Tokowicz, 2005), and become important features of later models.

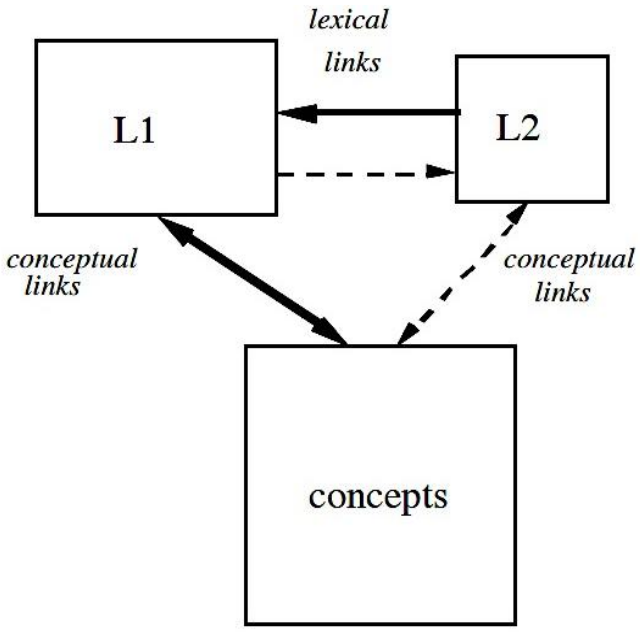


Figure 2.4 The Revised Hierarchical Model. Adapted from "Category Interference in Translation and Picture Naming: Evidence for Asymmetric Connections between Bilingual Memory Representations," by J. F. Kroll and E. Stewart, 1994, *Journal of Memory and Language*, 33, p. 158. Copyright 1994 by Academic Press Inc.

2.3.5.6 Three-stage Model

Different from models on the organization of bilingual mental lexicon, Jiang's (2000) three-stage model of L2 vocabulary acquisition (see Figure 2.5 for the lexical representations in this model) is neither concerned with how L1 and L2 words are organized or connected, nor assumes the hierarchy between lexical and conceptual representations or the absence of semantic component in lexical representations (Jiang,

2002). Based on Levelt's (1989) model of lexical entry (see Figure 2.6), the three-stage model divides each lexical entry into lemma and lexeme, with semantics and syntax inside the lemma, and morphology, phonology and orthography inside the lexeme. At the first stage of L2 vocabulary learning, also defined as the formal stage, only the form specifications are established in the L2 lexical entry, and the other three parts are empty but have strong links to the counterparts in L1 translation equivalents (Jiang, 2000). With increasing activation of the links between the empty parts and their counterparts in L1 translation equivalents, L1 semantics and syntax are copied into the L2 lexical entry, with only the morphology part empty and connected to the L1 counterpart, which signifies the second stage of L1 lemma mediation (Jiang, 2000). As the experience with the L2 word accumulates, semantics, syntax, and morphology of the L2 word become integrated into the L2 lexical entry, and the L2 word becomes fully established in the bilingual mind, which is the L2 integration stage (Jiang, 2000). Although this model does not specify whether L1 and L2 vocabulary share the conceptual store, at least at the L1 lemma mediation stage, L2 words share the same concepts with L1 words.

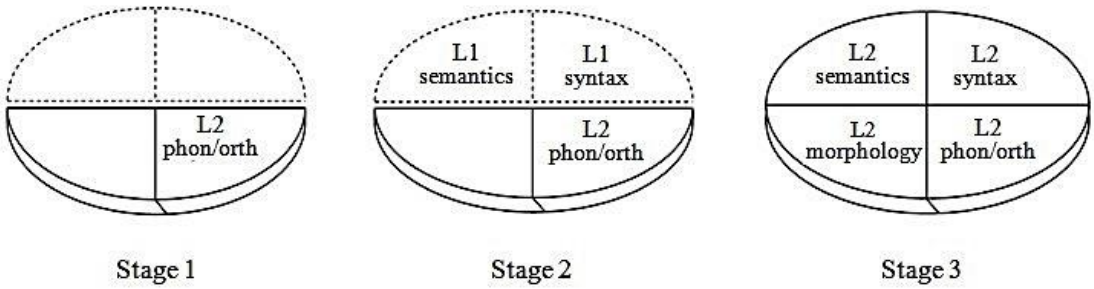


Figure 2.5 Three-stage Model of L2 Vocabulary Acquisition. Adapted from "Lexical Representation and Development in a Second Language," by N. Jiang, 2000, *Applied Linguistics*, 21(1), pp. 51-54. Copyright 2000 by Oxford University Press.

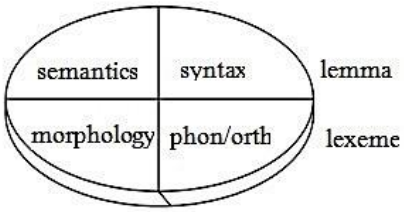


Figure 2.6 The Internal Structure of a Lexical Entry. Adapted from S*peaking: From Intention to Articulation* (p.182), by J. M. Levelt, 1989, USA: MIT Press. Copyright 1989 by MIT Press.

2.3.5.7 Shared Distributed Asymmetrical Model

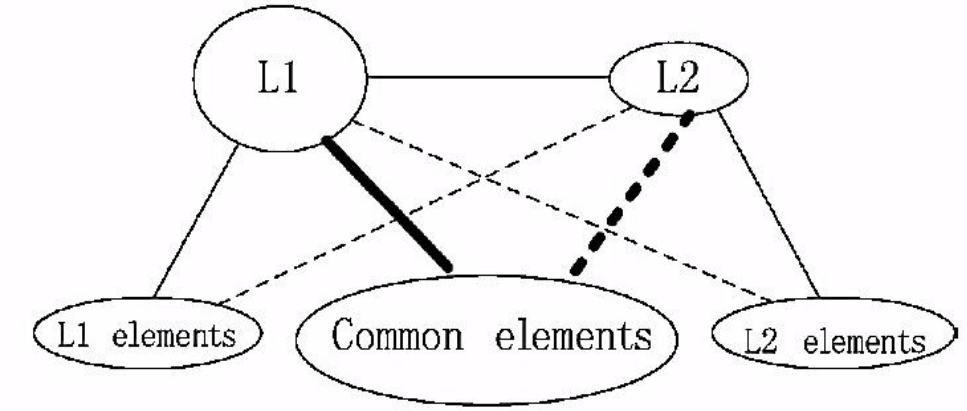


Figure 2.7 The Shared Distributed Asymmetrical Model. Adapted from "Shared and separate meanings in the bilingual mental lexicon," by Y. Dong, S. Gui, and B. MacWhinney, 2005, *Bilingualism: Language and Cognition*, 8, p. 233. Copyright 2005 by Cambridge University Press.

Developing De Groot's (1992) distributed features and Kroll and Stewart's (1994) asymmetric and developmental views, Dong, Gui and MacWhinney (2005) proposed the Shared Distributed Asymmetrical Model (see Figure 2.7). According to this model, L1 and L2 lexicon share some elements and meanwhile keep their specific elements. At the early stage of learning, L2 words are not only connected to the shared elements and L2-specific elements, but also to L1-specific elements, and with advancement, the links between L2 words and each of the other two elements, i.e., shared elements and L2-specific elements, become stronger, with the connections between L2 words and

L1-specific elements decreasing. Similar to the Revised Hierarchical Model (Kroll & Stewart, 1994), this model assumes stronger links between L1 words and shared elements than those between L2 words and shared elements, but specifically, it points out what is shared and separate in the conceptual store, and assumes that both L1 and L2 can be linked to the specific elements in the other language.

2.3.5.8 Modified Hierarchical Model

Another model that further develops the asymmetrical and distributed assumptions is Pavlenko's (2009) Modified Hierarchical Model (see Figure 2.8). Based on Kroll and Stewart's (1994) Revised Hierarchical Model, this model adopts the developmental view that L2 learning goes from relying on L1 translation equivalents to developing direct links between L2 words and concepts. Although the division of the conceptual store in this model simulates De Groot's (1992) and Dong et al.'s (2005) models, it explicitly acknowledges that conceptual representation is not necessarily fully shared between translation equivalents (De Groot, 2013), and incorporates the distinctions between conceptual categories, i.e., language -independent concepts, and linguistic categories, i.e., language-mediated concepts from linguistic relativity research. Acknowledging the differences between lexicalized concepts and grammaticized concepts, this model attempts to account for L2 vocabulary learning in terms of lexicalized concepts (Pavlenko, 2009). One feature of this model is that it proposes that L2 vocabulary learning is about reconstructing the conceptual store (De Groot, 2013), namely, developing and relinking connections between L2 words and linguistic categories, and building up L2-specific linguistic categories into the original conceptual store. Another feature of this model is that by pointing out translation equivalents do not always share all linguistic categories, it

tries to account for conceptual transfer (De Groot, 2013). This model provides the theoretical framework for this study. Following the distinctions between grammaticized and lexicalized concepts, this study investigates words with these concepts, and within the context of L1 Chinese and L2 English, tests the predictions of this model on learning L2 words with lexicalized concepts.

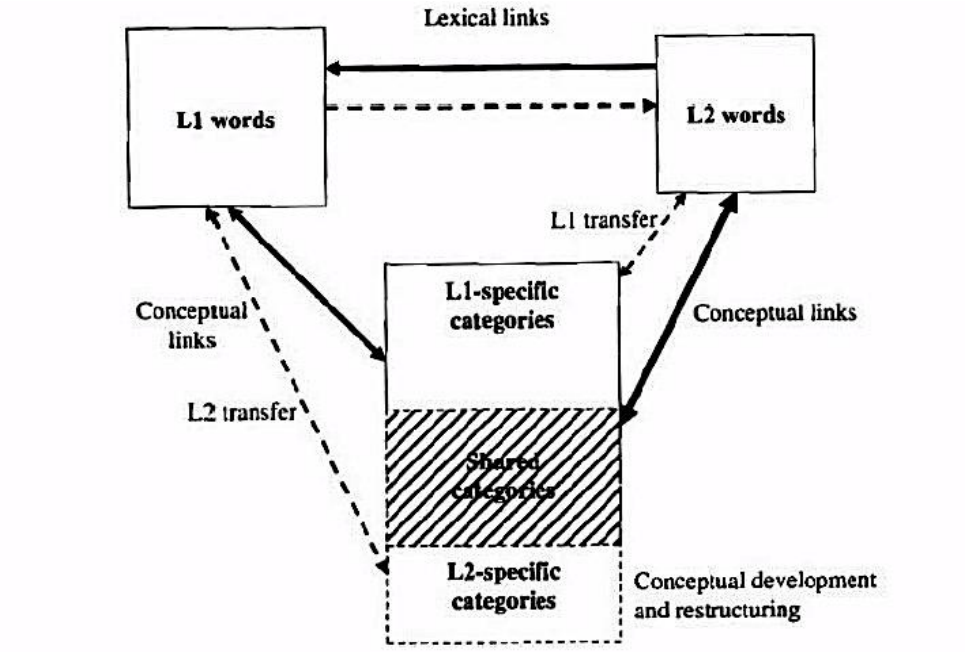


Figure 2.8 The Modified Hierarchical Model. Adapted from "Conceptual Representation in the Bilingual Lexicon and Second Language Vocabulary Learning" (p. 147), by A. Pavlenko, 2009. In A. Pavlenko (Eds.), *The Bilingual Mental Lexicon: Interdisciplinary Approaches*, UK: Multilingual Matters. Copyright 2009 by Aneta Pavlenko and the authors of individual chapters.

2.3.5.9 Summary

In the past six decades, bilingual mental lexicon research witnessed fruitful development in understanding the nature of L2 vocabulary acquisition, with the emergence of new models that are increasingly elaborated and insightful. New models do not replace the old ones, which continue to provide inspiration for development as seen in Weinreich's (1953) model, but serves to summarize the previous gains and incorporate the latest findings in related fields so as to provide new directions for

research advancement. Research on bilingual mental lexicon has explored substantially the links between word forms and meanings in terms of strength and factors, and now should turn to the nature of the mental representations, i.e., what is actually shared and separate in the bilingual mind (Pavlenko, 2009).

2.4 Relevant Findings

2.4.1 Conceptual Relationship

In L2 vocabulary learning, one of the major types of difficulty is interlingual difficulty, which results from the relationship between translation equivalents (Laufer & Nation, 2012). Translation equivalents refer to word pairs in two languages that are used by dictionaries and glossaries for explanation (Pavlenko, 2008). Research has not only shown that a word in one language may have more than one translation equivalent in the other (e.g., Prior, MacWhinney & Kroll, 2007), but also found that translation equivalents do not necessarily share the same linguistic categories, which may differ in terms of properties and scripts, prototypes and borderline members, inner structure and outer connections (e.g., Malt et al., 1999). One example is the Hebrew word *shir* and its English translation equivalents *song* and *poem*: in English, *song* is distinguished from *poem* because of the involvement of music, while in Hebrew, rhyming words with or without music are not distinguished and represented by *shir* (Laufer & Nation, 2012). Another example is the Chinese word *dang (党)* and its English translation equivalent *party*: the meaning of *dang* to a member of the Chinese Communist Party is dramatically different from the meaning of *party* to a member of the Democratic Party in the United States (Juffs, 2009). Research findings from error analyses of written samples (e.g., Laforest, 1980), elicitation studies (e.g., Biskup, 1992), and learner language corpora (e.g., Granger, 1998) have indicated that

L2 translation equivalents not fully sharing linguistic categories with L1 contribute to interlingual difficulty (Laufer & Nation, 2012).

Within the discussion of lexicalized concepts, according to the Modified Hierarchical Model (Pavlekno, 2009), the relationship between the linguistic categories in L1 and L2 translation equivalents, i.e., the conceptual relationship between L1 and L2 translation equivalents, can be classified into three types, i.e., conceptual equivalence, partial equivalence, and non-equivalence (Pavlenko, 2008, 2009). Correspondingly, L1 and L2 translation equivalents can be categorized into three groups: conceptual equivalents, partial equivalents, and non-equivalents. Conceptual equivalents are words that share the same linguistic categories with only subtle differences (Pavlenko, 2008, 2009). In the naming tasks used by Ameel and colleagues (2005), among the dish-like objects that were named *bol* by French monolinguals, almost all were named *kom* by Dutch monolinguals, except one, named *schaal*. In Russian, the word *rasstroennaia* also shares similar linguistic categories with its English translation equivalent *upset*; these words were used for reference to the same range of emotions in the narratives of a video by English and Russian monolinguals respectively (Pavlenko & Driagina, 2007). Partial equivalents share some of the linguistic categories but also contain language-specific categories (Pavlenko, 2008, 2009). For instance, both Chinese words *jia (嫁)* and *qu (娶)* can be translated into *marry*, but *jia* can only be used in relation to the bride, meaning the bride's family "gives" their daughter out, while *qu* is for the bridegroom's family to "receive" her; the Engish *marry* does not contain these distinctions (Juffs, 2009). Another example is the French word *plat* and the Dutch words *schaal* and *kom*: the dish-like objects named *plat* by French monolinguals can be generally divided into the

schaal and *kom* categories according to the naming by Dutch monolinguals (Ameel et al., 2005). As for non-equivalents, the linguistic categories in one language cannot be found in the other (Pavlenko, 2009). For example, the English word *pudding*, which refers to a kind of western dissert that does not have an exact counterpart in Chinese, can only be translated phonologically as *buding (布丁)*. Another example is the Dutch word *bus*: the can-like objects that were named *bus* by Dutch monolinguals fell into six different naming categories by French monolinguals, indicating that a French counterpart may not exist (Ameel et al., 2005).

Conceptual equivalence, partial equivalence, and non-equivalence may have different effects on L2 vocabulary acquisition. When learning conceptual equivalents, learners may not encounter much difficulty because the main task may be to construct the links between L2 words and linguistic categories (Pavlenko, 2009). As for partial equivalents, the existence of partially shared linguistic categories may facilitate learners in constructing the links between L2 words and linguistic categories, but may meanwhile lead to negative transfer if learners assume the complete equivalence between L1 and L2 linguistic categories, and the main task may be to restructure the linguistic categories in terms of internal structure and outer connections (Pavlenko, 2009). When learning non-equivalents, learners may also experience negative transfer because of the lack of corresponding linguistic categories, and the main task may be to build up the new L2-specific categories (Pavlenko, 2009).

Research has found that conceptual equivalence may generally facilitate L2 vocabulary acquisition. In the study reported by Pavlenko and Driagina (2007), when describing a heroine's upset in the video, American learners of Russian managed to

use the Russian word *rasstroennaia* in the narratives as Russian monolinguals did, which means the conceptual equivalents *rasstroennaia* and *upset* may not pose much difficulty for L2 learners. Another study (Pavlenko, 2008) on emotion words also shows that the Russian words *ispugat'sia* and *boiat'sia*, which are in conceptual equivalence with English translation equivalents including *afraid*, *frightened*, and *terrified*, were used by American L2 learners in the same manner as Russian monolinguals did in describing the protagonist's fear in the video. Similarly, in a study by Ameel and colleagues' (2005), the dish-like objects that were named *tas* by Dutch monolinguals posed no difficulty for Dutch-French bilinguals in French naming, as all bilinguals used the same word *tasse* as French monolinguals did, which means with the Dutch conceptual equivalent *tas*, the French word *tasse* may be not difficult to learn. These findings are in accordance with the anticipation that learning conceptual equivalents, of which the main task may be to link L2 words to extant linguistic categories, can be relatively easy in L2 vocabulary acquisition.

As for partial equivalence, the research findings haven been mixed. Several studies have found that partial equivalence may complicate L2 vocabulary acquisition. Graham and Belnap (1986) found a strong L1 influence on the boundary of L2 linguistic categories of Spanish learners of English; when learners chose the names for the objects that belong to the English categories of *chairs*, *stools*, and *benches*, their naming patterns obviously simulated the Spanish categories of *banco* and *silla* but differed from the English categories, which indicates that L2 category boundary may be difficult for learners to restructure. A similar phenomenon was observed by Ameel and colleagues (2005). The bottle-like objects named *fles* by Dutch monolinguals were distributed almost equally into two categories, named *bouteille*

and *flacon* respectively, by French monolinguals. In the naming by Dutch-French bilinguals, however, the *fles* category was distributed in the proportion of 3:1 between the *bouteille* and *flacon* categories, which means that distinguishing the L2 category boundary that does not exist in L1 linguistic categories may pose some difficulty for L2 learners. Partial equivalents of emotion words, such as *angry* in English and *serdit'sia* and *zlit'sia* in Russian, also led to negative transfer in L2 narratives: American learners of Russian used *serdit'sia* and *zlit'sia* without differentiating between specific situations as they would do in an English context, whereas Russian monolinguals chose the word based on causal antecedents (Pavlekno, 2008; Pavlenko & Driagina, 2007). Gathercole and Moawad's (2010) study focused on partial equivalents with wider or narrower category boundaries than the L1 translation equivalents, such as *cap* in English and *qubaeah* and *gata* in Arabic. They reported that Arabic-English bilinguals made more mistakes in choosing the appropriate pictures for partial equivalents than for homophones that only share L1 and L2 forms but not L1 and L2 linguistic categories. Nevertheless, research has also found that partial equivalence may facilitate L2 vocabulary acquisition. Stepanova and Coley (2006) found that Russian-English bilinguals were able to use two pairs of partial equivalents, i.e., *revnost'* in Russian and *jealousy* in English, and *zavist'* in Russian and *envy* in English, in a similar manner as English monolinguals and Russian monolinguals did. When naming the scripts in Russian, they differentiated between the specific scenes that can be applied to either *revnost'* or *zavist'*, whereas they did not differentiate between *jealousy* and *envy* when naming the same scripts in English. This finding indicates that partial equivalence may facilitate L2 vocabulary acquisition, though more often it may pose a difficulty for L2 learners.

It has been found that non-equivalence may complicate L2 vocabulary acquisition. Graham and Belnap's (1986) provided an exemplification: when choosing the names for the objects that were depicted as small, round or square seats with no backs, i.e., *stools* in English, Spanish learners of English differed substantially from English native speakers, which may have resulted from the lack of an exact Spanish counterpart to *stools* and the difficulty of constructing the new linguistic categories. Similarly, in studies on emotion words (Pavlenko, 2008; Pavlenko & Driagina, 2007), Russian learners of English used neither the English word *frustration* nor *privacy* in narrating the video clips, probably because these words do not have exact counterparts in Russian and L2 learners were uncertain about their usages.

In summary, research on lexical concepts has found that translation equivalents do not necessarily share all linguistic categories and can be categorized in to conceptual equivalents, partial equivalents, and non-equivalents. Studies have shown that conceptual equivalence may facilitate L2 vocabulary learning, partial equivalence may lead to both facilitation and difficulty, and that non-equivalence may complicate acquisition.

2.4.2 Grammatical Number

Number is one kind of grammaticized concepts, and can serve as a criterion for dividing different languages into two major categories: classifier languages, which do not distinguish between count and mass nouns morphosyntactically, and noun class languages, which encode a morphosyntactic distinction between count and mass nouns (Lucy, 1992). Count nouns refer to entities that are viewed as individuals and boundary-discrete, with the properties of shape and countability prominent in

conceptual representations (Wisniewski, Lamb & Middleton, 2003), such as *apple*, and *banana* in English. Mass nouns refer to substances that are viewed as non-individual, with the properties of material and uncountability prominent in conceptual representations (Wisniewski et al., 2003), such as *water* and *coffee* in English. Notably, the count/mass status of a word can change with context (Wisniewski et al., 2003): when the English word *fish* refers to the creatures that live in the water, it is a count noun, whereas when it refers to the meat of a fish, it becomes a mass noun. Generally, in classifier languages, including Chinese, Japanese, and Yucatec, nouns are regard as substances and require numeral classifiers to express the count/mass status, while in noun class languages, including English, French, and Spanish, the count/mass status of a noun is expressed with morphosyntax (Lucy, 1992). Classifiers are defined as morphemes that denote the "salient perceived or imputed characteristic of the entity", and are also often used in noun class languages though this use is not mandatory (Allan, 1977). For example, in English it is fine to say *some coffee* or, more specifically, *a cup of coffee*, and it is also reasonable to provide more details by saying *a basket of apples* even though the word *apples* is already acceptable. In contrast, to express the meaning of "one month" in Chinese, it is unacceptable and confusing to omit the classifier of *ge(个)* in *yigeyue (一个月)* (*yi = one*, *yue = month*), because *yiyue (一月)* actually refers to *January*. Differences in the treatment of count/mass distinction exist not only between classifier languages and noun class languages, but also within noun class languages. Even though two languages may both encode the count/mass distinction, countable entities in one language may become uncountable substances in the other, such as the English-French translation equivalents *news-nouvelle(s)* and *knowledge-connaissance(s)* (Jarvis & Pavlekno, 2008).

The different treatments of grammatical number in different languages can affect different language speakers' perceptions of object properties. Noun class languages may sensitize speakers to the number and shape of objects while classifier languages may not (Lucy, 1992). In Lucy's (1992) case study, when talking about the pictures of objects, speakers of Yucatec (classifier language) rarely mentioned number in their narratives, while all speakers of English (noun class language) referred to it. With experimental designs measuring reaction time, Jiang (2004b) found that Chinese learners of English showed no sensitivity to number disagreement in L2 sentences, but were sensitive to other idiosyncrasies, while English native speakers' sentence processing was substantially affected by number disagreement. Studies comparing object categorization between speakers of noun class languages and classifier languages have found that English children and adults preferred to base their classification on shapes, while Japanese and Yucatec children and adults preferred to base it on materials (e.g., Imai & Gentner, 1997; Lucy & Gaskins, 2001). These differences are not because speakers of classifier languages cannot distinguish between objects and substances, but because they do no habitually highlight the noun properties of number and shape (Jarvis & Pavlenko, 2008). Different encodings of count/mass distinction within noun class languages may also affect speakers' perceptions of entities and substances. For instance, both Spanish and English encode count/mass distinction, but in the object-naming task with Spanish and English children and adults, the Spanish children and adults displayed a wider boundary for count nouns than did the English children and adults, who were more limited in judging count nouns (Sera & Goodrich, 2010).

The different perceptions of object properties can lead to conceptual transfer in L2 learners whose L1 and L2 belong to different categories of languages. The common difficulty related to grammatical number in L2 acquisition is number marking and countability, which is often linked to syntax, but also has a conceptual basis (Jarvis & Pavlekno, 2008). Since noun class languages have incorporated the count/mass status into basic word meaning as countability while classifier languages have not, when learning L2 vocabulary, learners may have to restructure the linguistic categories if L1 and L2 are not in the same category of languages. If the learner's L1 does not encode countability for nouns, he or she may need to incorporate this property in the linguistic categories when learning L2 vocabulary that encodes this property. Such restructuring may be demanding and lead to negative conceptual transfer. In Yoon's (1993) study, Japanese learners of English were found to differ substantially from English native speakers in judging the countability of individual nouns and the use of articles. Another study of noun countability, conducted by Hiki (1991), found that Japanese learners made the most mistakes in countability judgment when the English nouns were in a plural environment (as cited in Jarvis & Pavlekno, 2008, p. 138), indicating the difficulty for speakers of classifier languages to incorporate the countability property of L2 vocabulary. In Han's (2010) longitudinal case study with a Chinese native speaker called Geng, it was found that, after living and working in an English-speaking country for 12 years, Geng still displayed a strong L1 influence on the plural marking of nouns in English, as he tended to plural-mark quantified nouns more often than non-quantified nouns; this is in accordance with the reliance in Chinese on quantifiers and classifiers to express numeral meanings for nouns. Geng's case shows that even highly advanced learners can experience conceptual transfer of grammatical number.

In summary, languages may differ in encoding count/mass distinction for nouns. While classifier languages lack such distinction, noun class languages incorporate it into basic word meaning as countability. It has been found that such different treatments of grammatical number can influence speakers' perceptions of object properties and lead to conceptual transfer in L2 vocabulary learning. Common difficulties related to grammatical number include number marking and the countability of L2 nouns.

2.5 Unexplored Issues

L2 vocabulary acquisition requires not only the learning of phonological and orthographical forms, but also the constructing of links between word forms and linguistic categories and the restructuring of linguistic categories. For words with lexicalized concepts, it has been found that conceptual equivalence may facilitate L2 vocabulary acquisition, partial equivalence may lead to both facilitation and complication, and non-equivalence may complicate L2 vocabulary learning. Still, it is unclear whether these effects are the same for receptive and productive knowledge, and between partial equivalence and non-equivalence, which poses more difficulty for L2 vocabulary acquisition. Studies of learning L2 words with lexicalized concepts have rarely tackled receptive and productive knowledge at the same time, but have often assessed either receptive knowledge (Gathercole & Moawad, 2010; Graham & Belnap, 1986) or productive knowledge (Ameel et al., 2005; Pavlenko, 2008; Pavlenko & Driagina, 2007; Stepanova & Coley, 2006). Since receptive knowledge and productive knowledge account for different scopes of vocabulary knowledge and differ in learning difficulty and learning strategies (Nation, 2013), it is necessary to

investigate how conceptual relationship of translation equivalents affects the two types of vocabulary knowledge respectively. Although research has found that both partial equivalence and non-equivalence may lead to negative conceptual transfer in L2 vocabulary learning (Ameel et al., 2005; Gathercole & Moawad, 2010; Graham & Belnap, 1986; Pavlenko, 2008; Pavlenko & Driagina, 2009; Stepanova & Coley, 2006), there has not been sufficient evidence to judge which is more difficult for learning. Partial equivalence may facilitate L2 vocabulary learning, as it has been argued that positive transfer can be provided by drawing on the shared linguistic categories through the links to L1 translation equivalents (Kroll & Tokowicz, 2005; Pavlenko, 2009). L2 vocabulary learning of partial equivalents is also likely to be complicated by negative transfer, for it has been observed that the existence of L1 networks can interfere L2 learning (Gass et al., 2013) and L2 category boundaries may be determined by L1 (Ervin-Tripp, 1961). This means that the similarities between L1 and L2 may obscure their differences (Ringbom, 1987) and the real challenge may be the distinction of subtle differences (Oller & Ziahosseiny, 1970), and that conceptual restructuring may be exacting (Gathercole & Moawad, 2010; Kecskes & Papp, 2000; Pavlenko, 2009). Non-equivalence may complicate L2 vocabulary learning, for it may be painstaking to develop new linguistic categories from scratch (Jiang, 2002; Pavlenko, 2009). As well, learners may only have the explicit knowledge without conceptual representations of the L2 words, which may result in avoidance and lexical borrowing (Pavlekno, 2009). However, non-equivalence may also facilitate L2 vocabulary acquisition, for the arguments that the absence of L1 linguistic categories may have a facilitative novelty effect (Kleinmann, 1977) that, in the absence of L1 competition, language-specific categories may be easier to learn (Ervin-Tripp, 1961; Kecskes & Papp, 2000;

Pavlenko, 1997) with concrete than abstract words (Pavlekno, 2009). Once L2 non-equivalents are established, they may function with similar idiomaticity and automaticity to L1 words (Jiang, 2002). Given these issues, this study puts forward two research questions about lexicalized concepts: Which conceptual relationship poses the greatest difficulty for L2 vocabulary learning? Do conceptual relationships affect receptive and productive knowledge in the same manner in L2 vocabulary learning?

For grammaticized concepts, research has found that different treatments of grammatical number in different languages may affect language speakers' perceptions of object properties (Jiang, 2004b; Imai & Gentner, 1997; Lucy, 1992; Lucy & Gaskins, 2001; Sera & Goodrich, 2010), and may lead to negative conceptual transfer that is observed commonly in L2 learners' difficulties with acquiring the numeral marking and countability of nouns (Han, 2010; Hiki, 1991; Yoon, 1993). Even though number marking and countability have been investigated for their notorious difficulty in many studies, few studies have tackled the underlying conceptual differences (Han, 2010). Also, one phenomenon closely related to grammatical number has received little attention from research on conceptual transfer: a singular object in one language can be encoded as plural in the other language, which indicates different conceptualizations of the numeral meanings of nouns in different languages. Additionally, in studies concerning number marking and conceptual transfer, countability has often been measured with metalinguistic judgment (Han, 2010; Hiki, 1991; Yoon, 1993), which is more likely to involve explicit knowledge and does not necessarily reflect conceptual representations. These unresolved issues evoke another research question for this study and will be elaborated with examples in Chinese and

English. As a classifier language, Chinese does not differentiate between count and mass nouns, and relies on quantifiers and classifiers to express numeral meaning of nouns, whereas English, a noun class language, has incorporated count/mass distinction into basic word meaning as countability, and employs morphosyntax to express numeral meanings though occasional plus classifiers. Given these differences, it is very likely that, when learning English nouns, Chinese native speakers may experience negative conceptual transfer, probably because they have to increase their sensitivity to numeral meanings incorporated in nouns, which is not required in Chinese. Also, objects like *scissors*, *trousers*, and *glasses* are regarded as plural in English, whereas their Chinese translation equivalents *jiandao (剪刀)*, *changku (长裤)*, and *yanjing (眼镜)* are treated as singular. This difference in plural marking may also increase the difficulty of learning English vocabulary for Chinese native speakers. To investigate these issues, this study aims to address the third research question: How will conceptual transfer affect learning the numeral meanings of L2 nouns?

To summarize, this study investigates three research questions:

(1) Which conceptual relationship, i.e., conceptual equivalence, partial equivalence, or non-equivalence, poses the greatest difficulty for L2 vocabulary learning?

(2) Do conceptual relationships affect receptive and productive knowledge in the same manner in L2 vocabulary learning?

(3) How will conceptual transfer affect learning the numeral meanings of L2 nouns?

Chapter 3 Research Methods

In this chapter, the overall design of this study is presented, followed by the detailed descriptions of the instruments, participants, and procedure.

3.1 Overall Design

An elicited narrative task (see Appendix I) and a forced-choice task (see Appendix II) were employed with Chinese learners of English to answer the research questions (RQs), and an adapted language history questionnaire (see Appendix III) was also adopted to provide participants' language background. RQ (1) and (2) were investigated with the elicited narrative task and forced-choice task, and RQ (3) with the elicited narrative task. For RQ (1) and (2), the elicited narrative task was used to assess participants' productive knowledge and the forced-choice task for receptive knowledge. The levels of difficulty posed by different conceptual relationships on L2 vocabulary learning were compared in both tasks. For RQ (3), the elicited narrative task was adopted to provide spontaneous and contextual data for analyzing issues related to learning the numeral meanings of L2 nouns, including countability and plural marking.

Both the elicited narrative task and the forced-choice task were used to study the linguistic categories of L2 words in the bilingual mind. Combining experimental and ethnographical methods, elicited narrative tasks can keep control of the same stimuli and meanwhile allow free-style and variant production of participants, and can also provide participants' spontaneous lexical choices in context so as to reveal how they name and encode real-world referents in language (Jarvis, 1998; Pavlenko, 2008,

2009; Pavlenko & Driagina, 2007). Also, visual stimuli in elicited narrative tasks can reflect not only participants' naming of specific referents, but also their categorization and interpretation (Jarvis, 1998; Pavlenko & Driagina, 2007), which can provide more information for analysis. Given these advantages, this study employed an elicited narrative task with a visual stimulus, following the general design of previous studies (e.g., Jarvis, 1998; Pavlenko, 2008; Pavlenko & Driagina, 2007). The forced-choice task in this study was developed from Gathercole and Moawad's (2010) experiment on early and late bilinguals' conceptual representations of L1 and L2 vocabulary. Similar to their design, the forced-choice task in this study adopted the format of choosing appropriate picture(s) for a denoted word, but different from their combination of audio questions with printed choice items, this study printed out both questions and choice items, because listening skills may be an additional factor and affect the results. Details of the task design and development are elaborated in the following parts.

3.2 Elicited Narrative Task

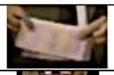
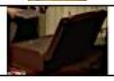
The stimulus for this task is a four-minute video with a background sound-track but no verbal exchanges. The video, *Mr. Bean Packing for Holiday* (see Figure 3.1), is one segment of the episode *Mr. Bean Rides Again* (Driscoll et. al., 1992) in the popular British television program series *Mr. Bean* (Bennett-Jones & Vertue, 1990-1995). In this video, Mr. Bean packs his possessions into a suitcase in his room. At first, he puts several items into the suitcase, but fails to close it due to its limited size. Then, he empties the suitcase and begins to repack his possessions. He tries to include all necessities in the most economical way, which turns out to be ridiculous. After he has packed all of his possessions and locked the suitcase, he suddenly finds a

left-behind book. It is already impossible to pack this book into the locked suitcase, so he takes out another bigger suitcase from under the bed. He puts the book into it and then realizes his vain attempt at packing just now. Then he also puts the smaller suitcase into the bigger one. Here the video ends. In this task, participants were asked to watch the video and then write in English to describe in details how Mr. Bean packs his possessions.

Figure 3.1 Screen Shot of *Mr. Bean Packing for Holiday*

This video was chosen because several different objects are involved and when participants described the process of Mr. Bean's packing, they had to mention them. Their word choices would reflect the conceptual relationships and the numeral meanings of the words in their minds and reveal their productive knowledge of the words. For precise and convenient references to the objects in the video, they were named in chronological order in the following format: *Obj1, Obj2, Obj3…* There appear 22 different objects in the video and Table 3.1 shows their names and pictures captured from the video.

Table 3.1 Names and Pictures of the Objects in the Video

Name	Picture	Name	Picture
Obj1		Obj2	
Obj3		Obj4	
Obj5		Obj6	
Obj7		Obj8	
Obj9		Obj10	
Obj11		Obj12	
Obj13		Obj14	
Obj15		Obj16	
Obj17		Obj18	
Obj19		Obj20	
Obj21		Obj22	

To provide the lexical ranges of these objects, 24 narratives by English native speakers were collected in the pilot studies. Their nationalities are shown in Figure 3.2, and according to the Proficiency Scale (Li, Sepanski, & Zhao, 2006; see Figure 3.3), all of them reported their Chinese proficiency as being no higher than functional (see Figure 3.4). Since conceptual restructuring requires high proficiency in and long exposure to the target language, their generally low proficiency in Chinese could not have affected their conceptual representations of English considerably.

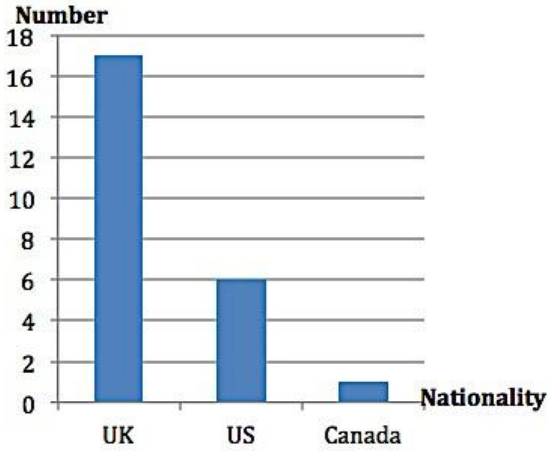


Figure 3.2 Nationalities of English Native Speakers (Elicited Narrative Task)

Proficiency Scale						
Very poor	*Poor*	*Fair*	*Functional*	*Good*	*Very good*	*Native-like*
1	2	3	4	5	6	7

Figure 3.3 Proficiency Scale. Adapted from "Language history questionnaires: A web-based interface for bilingual research" by P. Li, S. Sepanski, & X. Zhao, 2006, *Behavior Research Methods*, 38, p. 208. Copyright 2006 by Psychonomic Society, Inc.

Chinese				1			
Mandarin	2	1	1	1			
Cantonese	1	6	1				
Proficiency Scale	1 *Very Poor*	2 *Poor*	3 *Fair*	4 *Functional*	5 *Good*	6 *Very Good*	7 *Native-like*

Figure 3.4 English Native Speakers' Proficiency of Chinese/Mandarin/Cantonese (Elicited Narrative Task)

Since the main purpose of this study is to access the conceptual representations of words in the mind, misspelled words in the original written narratives were corrected before being transcribed into individual txt files. As for the words that were unable to be recognized or corrected, they were transcribed in their original forms. The txt files were then analyzed with the software *AntConc 3.4.3* (Anthony, 2014) with the *Lemma*

List for English (developed by Yasumasa Someya) loaded. Based on Table 3.1, the corresponding nouns used in the narratives were marked and summarized, including their countability and number marking. For words that could be used as nouns and verbs in different contexts, the judgment was made based on their specific contexts in the narratives. Besides, two kinds of nouns were excluded from analysis: those that were too general such as *clothes*, *stuffs*, and *objects*, and those that were used mistakenly for reference, such as labeling the underwear as *socks*. Table 3.2 shows the words used as references in the narratives. Individual range reflected how many narrators used the word as reference and their proportion to the number of narrators who referred to the object, and total range showed how many narrators referred to the object and their proportion to the total number of narrators. It is reasonable that some objects were mentioned more often than others, because the narrators may assign different extents of importance to different objects based on their own understanding.

Table 3.2 Objects and Their References (English Native Speakers)

Object	Lemma	Numeral Meaning	Range			
			Individual		Total	
Obj1	briefcase	countable	1	4.17%	24	100.00%
	case	countable	11	45.83%		
	suitcase	countable	20	83.33%		
Obj2	can	countable	10	62.50%	16	66.67%
	tin	countable	6	37.50%		
Obj3	blanket	countable	1	6.67%	15	62.50%
	towel	countable	14	93.33%		
Obj4	cloth	countable	4	26.67%	15	62.50%
	flannel	countable	4	26.67%		
	towel	countable	3	20.00%		
	washcloth	countable	4	26.67%		
Obj5	bikini	countable	1	16.67%	6	25.00%
	speedo	countable	2	33.33%		
	swimsuit	countable	1	16.67%		
	swimwear	uncountable	1	16.67%		
	trunks	plural	1	16.67%		

Obj6	pants	plural	1	10.00%	10	41.67%
	shorts	plural	4	40.00%		
	swimsuit	countable	1	10.00%		
	swimwear	uncountable	1	10.00%		
	trunks	plural	4	40.00%		
	underpants	plural	1	10.00%		
Obj7	shoes	countable	10	83.33%	12	50.00%
	slippers	countable	2	16.67%		
Obj8	shoe	countable	6	66.67%	9	37.50%
	slipper	countable	3	33.33%		
Obj9	bag	countable	1	11.11%	9	37.50%
	pack	countable	4	44.44%		
	package	countable	3	33.33%		
	packet	countable	1	11.11%		
Obj10	pants	plural	2	16.67%	12	50.00%
	underpants	plural	4	33.33%		
	underwear	uncountable	8	66.67%		
Obj11	soap	uncountable	12	100.00%	12	50.00%
Obj12	shirt	countable	17	100.00%	17	70.83%
Obj13	bag	countable	5	100.00%	5	20.83%
Obj14	brush	countable	3	18.75%	16	66.67%
	toothbrush	countable	15	93.75%		
Obj15	toothpaste	uncountable	18	100.00%	18	75.00%
Obj16	khakis	plural	2	10.53%	19	79.17%
	pants	plural	4	21.05%		
	trousers	plural	14	73.68%		
Obj17	scissors	plural	8	100.00%	8	33.33%
Obj18	shorts	plural	17	100.00%	17	70.83%
Obj19	shorts	plural	13	100.00%	13	54.17%
Obj20	bear	countable	13	81.25%	16	66.67%
	teddy	countable	14	87.50%		
Obj21	book	countable	17	100.00%	17	70.83%
Obj22	case	countable	11	47.83%	23	95.83%
	suitcase	countable	18	78.26%		

This table shows that 16 objects were mentioned by at least half of the narrators, including Obj1, Obj2, Obj3, Obj4, Obj7, Obj10, Obj11, Obj12, Obj14, Obj15, Obj16, Obj18, Obj19, Obj20, Obj21, and Obj22, while six were mentioned by fewer than 50%

narrators, including Obj5, Obj6, Obj8, Obj9, Obj13, and Obj17. Among the less mentioned objects, all of them appeared in at least 5 different narratives. Eight objects had only one lemma, including Obj11, Obj12, Obj13, Obj15, Obj17, Obj18, Obj19, and Obj21, and the rest 14 had two to six lemmas, including Obj1, Obj2, Obj3, Obj4, Obj5, Obj6, Obj7, Obj8, Obj9, obj10, Obj14, Obj16, Obj20, and Obj22. Except *briefcase* for Obj1 and *blanket* for Obj3, the individual range of every lemma for the objects was more than 10%. All of these lemmas provided the initial ranges of appropriate words for referring to these objects, and their numeral meanings offered the initial standard for judging conceptual transfer with target participants.

The classifiers used with the nouns were also summarized as in Table 3.3. Range indicates how many narrators used the classifier and their proportion to the total number of narrators. This table shows that 10 objects were used with classifiers: *pair* was collocated with eight objects, including Obj5, Obj6, Obj7, Obj10, Obj16, Obj17, Obj18, and Obj19, and *bar* was with Obj11 and *tube* with Obj15. Seven objects were mentioned by at least 25% narrators, including Obj10, Obj11, Obj15, Obj16, Obj17, Obj18, and Obj19, while the rest three, including Obj5, Obj6, and Obj7, were mentioned by around 10% narrators. This table provides the examples of appropriate collocations between the classifiers and nouns for subsequent judgment on the collocations by target participants.

Table 3.3 Objects and Their Classifiers (English Native Speakers)

Object	Classifier	Range	
Obj5	pair	3	12.50%
Obj6	pair	4	16.67%
Obj7	pair	2	8.33%
Obj10	pair	10	41.67%
Obj11	bar	8	33.33%
Obj15	tube	13	54.17%

Obj16	pair	6	25.00%
Obj17	pair	6	25.00%
Obj18	pair	6	25.00%
Obj19	pair	9	37.50%

These data from English native speakers in the pilot studies could provide referential information for the data analysis of target participants in the main study. However, the data from these two distinct groups of populations would not be compared directly, because they were not comparable in terms of sample size and background.

3.3 Forced-choice Task

The stimuli of this task were composed of 33 English words and 132 pictures, with four pictures for every word. The words were divided into three groups, i.e., conceptual equivalents, partial equivalents, and non-equivalents, with eleven words in every group. The pictures consisted of one target and three distractors for every word except two partial equivalents, each of which had two targets and two distractors. The target pictures were prototypical ones and the distractors were those often linked to the target ones. To confirm the prototypical features of the pictures, the author used the search engines Google and Baidu to find the pictures of the words and summarized their common features, so as to provide the guidelines for choosing the pictures. A word and four color pictures composited a test item, and for every kind of conceptual relationship, there were eleven test items. All test items were arranged randomly to compose Version A of the test, and by reordering the test items in Version A, Version B was produced. Each version was used to collect half of the data. In this task, participants were asked to choose the picture(s) that can be labeled by the word,

and later choose the words in the task they had never met before.

As for the development of stimuli, the author came up with the list of target English words with reference to dictionaries, including *Merriam-Webster's Collegiate Dictionary* (2012), *Oxford Advanced Learner's English-Chinese Dictionary* (Hornby, 2013), *Xiàndài Hànyǔ Cídiǎn* (2005), and *Xīnhuá Zìdiǎn* (2012), and the *British National Corpus*. Based on the author's understanding and the explanations in the dictionaries, words were divided into conceptual equivalents, partial equivalents, and non-equivalents. Pictures for every word were collected from the free-license website *Open Clip Art* (Phillips & Harrington, 2004) and the personal blog of Debbie Teakle (http://debbieteakle.com.), with permission. The preliminary test items were developed and then given to English native speakers and Chinese learners of English in the pilot studies for data collection. Based on these data, quality test items were selected and comprised the final set of stimuli.

The quality of test items was judged on four criteria: word frequency, unknown rate, chosen rate, and compared rate. Word frequency was drawn from the *British National Corpus* for every word in order to ensure that it was comparable within every word group. Unknown rate of a word measured the proportion of participants who reported they had never met the word before, thus allowing the exclusion of words with high unknown rates. Chosen rate of an answer measured the probability of this answer being chosen by a participant, while compared rate of an answer referred to, compared with the most chosen answer, the probability of this answer being chosen by a participant. The formulae for calculating the unknown rate, chosen rate, and compared rate are shown in Figure 3.5.

$$\text{(a) } Unknown\ Rate\ (x) = \frac{\text{Reported Times as an Unmet Word}}{\text{Total Number of Participants}}$$

$$\text{(b) } Chosen\ Rate\ (x) = \frac{\text{Chosen Times of This Answer}}{\text{Total Number of Participants}}$$

$$\text{(c) } Compared\ Rate\ (x) = \frac{\text{Chosen Times of This Answer}}{\text{The Largest Chosen Times of Four Answers}}$$

Figure 3.5 Formulae of Unknown Rate, Chosen Rate, and Compared Rate

The chosen rate and the compared rate were calculated with data from English native speakers, while the unknown rate relied on data from Chinese learners of English, i.e., target population of this study. Notably, the unknown rate could only be calculated ex post facto, i.e., before target participants completed the test, there was no way to know which words should be deleted for their high unknown rates. The unknown rates from the pilot studies could have provided some reference, but it was more feasible to exclude widely unknown words from analysis after target participants' responses in the main study were collected, because for different groups of target participants, the unknown rate of a word would be different. According to these criteria, a quality test item was expected to have a comparable frequency and a relatively low unknown rate (<20%) of the word, as well as a high chosen rate and a high compared rate (≥50%) of its targeted answer(s).

In the final set of stimuli, the word frequency of every word group was comparable. By using Paul Nation's *Range Program with British National Corpus List (25,000)*, the frequency level of every word was produced, as shown in Table 3.4. To facilitate comparison, frequency levels were grouped into three frequency ranges: most frequent (F15-F16), mid frequent (F13-F14), and least frequent (F9-F12). The proportion of every frequency range of different word groups was calculated in Table

3.5. In the three word groups, the most frequent words took up about 50% to 70%, the mid frequent words about 20% to 30%, and the least frequent words about 10% to 30%. Discrepancies were not large because every group consisted of only eleven words.

Table 3.4 Frequency Level of Words

Conceptual Equivalents		Partial Equivalents		Non-equivalents	
Word	Level	Word	Level	Word	Level
MOSQUITO	F10	TELESCOPE	F11	PYRAMID	F9
SCISSORS	F13	CAP	F14	HALLOWEEN	F10
ALCOHOL	F14	PURSE	F14	CLOWN	F12
SATELLITE	F14	BRUSH	F15	CIRCUS	F13
CALCULATOR	F15	PLATE	F15	BIBLE	F14
FINGER	F15	SHIP	F15	EASTER	F15
FRIDGE	F15	SOCK	F15	PRAYER	F15
PRISON	F15	SUGAR	F15	PUDDING	F15
BUILDING	F16	BOTTLE	F16	CHRISTMAS	F16
DOCUMENT	F16	CHAIR	F16	CHURCH	F16
HEART	F16	DOOR	F16	JESUS	F16

Table 3.5 Frequency Range of Words

	Most Frequent		Mid Frequent		Least Frequent	
Conceptual Equivalents	7	63.64%	3	27.27%	1	9.09%
Partial Equivalents	8	72.73%	2	18.18%	1	9.09%
Non-equivalents	6	54.55%	2	18.18%	3	27.27%

When piloting the test items, the unknown rates were calculated with data collected in two pilot studies, while the chosen rates and compared rates were calculated with data collected at three consecutive times. In the pilot studies with Chinese learners of English, both new and old items in the updated tests were piloted at the same time. Differently, with English native speakers, not all test items in the updated tests were piloted at the same time. Because it was difficult to recruit a completely new group of English native speakers to pilot an updated test, piloting only the new items in the updated tests was more realistic and feasible. That is, in data

collection with English native speakers, after the whole test was piloted at the first time, only new items were involved in later pilot studies. Although the test items were piloted with English native speakers and Chinese learners of English in different formats, every test item received at least 22 responses from English native speakers and at least 31 responses from Chinese learners of English. Table 3.6 shows the number of responses every word received from English native speakers and Chinese learners of English in the pilot studies.

Table 3.6 Responses from English Native Speakers and Chinese Learners of English in Pilot Studies

Conceptual Equivalents			Partial Equivalents			Non-equivalents		
Word	ENG	CHN	Word	ENG	CHN	Word	ENG	CHN
SCISSORS	22	67	TELESCOPE	22	67	PYRAMID	22	67
SATELLITE	22	67	SUGAR	22	67	PUDDING	27	31
PRISON	27	31	SOCK	27	31	PRAYER	23	31
MOSQUITO	22	67	SHIP	22	67	JESUS	27	31
HEART	27	31	PURSE	22	67	HALLOWEEN	22	67
FRIDGE	27	31	PLATE	22	67	EASTER	27	31
FINGER	23	31	DOOR	27	67	CLOWN	22	67
DOCUMENT	27	31	CAP	27	31	CIRCUS	27	31
CALCULATOR	22	67	BOTTLE	22	67	CHURCH	22	67
BUILDING	23	31	CHAIR	22	67	CHRISTMAS	27	31
ALCOHOL	22	67	BRUSH	22	67	BIBLE	27	31

Note: ENG = English native speakers, CHN = Chinese learners of English

As for the background of the participants involved in stimuli development, the nationalities of English native speakers are shown in Figure 3.6. According to the Proficiency Scale (Li et al., 2006; see Figure 3.3), all of them reported their Chinese proficiency as being below functional. Even though six of them reported they had knowledge of Chinese or Cantonese (see Figure 3.7), their proficiency was relatively low and therefore their conceptual representations of English linguistic categories were not likely to have been changed by Chinese linguistic categories. The background of Chinese learners of English who participated in the pilot studies was

the same as for those in the main study, which is elaborated in later parts.

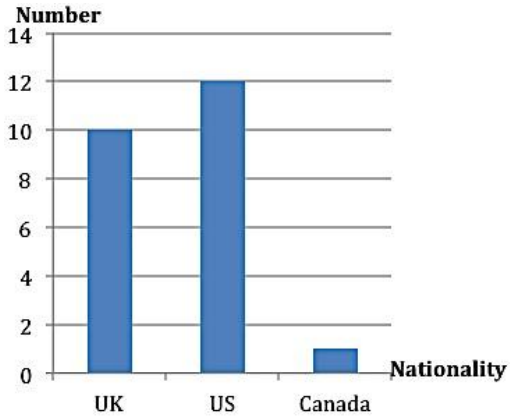


Figure 3.6 Nationalities of English Native Speakers (Forced-choice Task)

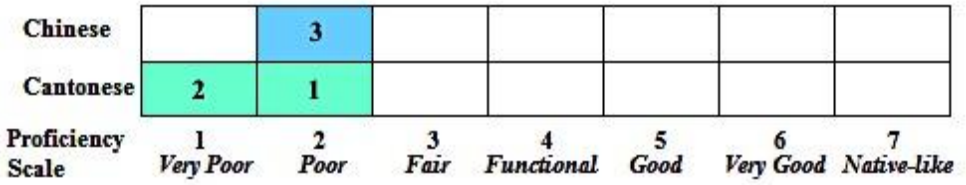


Figure 3.7 English Native Speakers' Proficiency of Chinese/Cantonese (Forced-choice Task)

Based on data from the pilot studies with English native speakers and Chinese learners of English, as well as the unknown rate from the main study, the final set of stimuli was confirmed. Table 3.7 shows the chosen rates and compared rates of every item's answers, as well as every word's unknown rates in the two pilot studies and the main study. The chosen rates and compared rates of target answers are shaded in green. If there is no number, it means the rate was zero. If there is a "/", it means this answer was the most chosen one, and there was no need to calculate a compared rate. In the final set of stimuli, every word had an unknown rate lower than 18%, all target answers had a chosen rate higher than 70%, and all non-target answers had a compared rate lower than 30%. These figures indicate generally good quality of the test items.

Table 3.7 Chosen Rate, Compared Rated, and Unknown Rate of Words

Rate (%) / Word	Answer A		Answer B		Answer C		Answer D		Pilot 1	Pilot 2	Main
	Chosen	Compared	Chosen	Compared	Chosen	Compared	Chosen	Compared	Unknown	Unknown	Unknown
Conceptual Equivalents											
SCISSORS			100	/					2.78	3.23	3.42
SATELLITE					4.55	4.76	95.45	/	5.56	16.13	17.09
PRISON			96.30	/	3.70	3.85					
MOSQUITO					100	/			5.56	6.45	3.42
HEART			100	/							
FRIDGE	100	/									1.71
FINGER	4.35	4.55	95.65	/							
DOCUMENT			3.70	3.70	7.41	7.41	100	/			
CALCULATOR	100	/			4.55	4.55					
BUILDING					100	/					
ALCOHOL							100	/			
Partial Equivalents											
TELESCOPE	100	/							5.56		0.85
SUGAR	9.09	9.09	100	/							
SOCK					33.33	33.33	100	/		3.23	0.85
SHIP	4.55	5					90.91	/			
PURSE	18.18	20	90.91	/							
PLATE	100	/	27.27	27.27							0.85
DOOR	3.70	3.85	96.30	/							
CAP	3.70	3.70			100	/					
BOTTLE			9.09	9.09	4.55	4.55	100	/			
CHAIR	4.55	4.55			100	/	72.73	72.73			0.85
BRUSH	90.91	/			90.91	/				3.23	1.71

Table 3.7 Chosen Rate, Compared Rated, and Unknown Rate of Words (Continue)

Rate (%) / Word	Answer A		Answer B		Answer C		Answer D		Pilot 1	Pilot 2	Main
	Chosen	Compared	Chosen	Compared	Chosen	Compared	Chosen	Compared	Unknown	Unknown	Unknown
Non-equivalents											
PYRAMID	9.09	9.09	100	/			4.55	4.55	13.89	12.90	16.24
PUDDING	14.81	16			92.59	/				9.68	14.53
PRAYER	13.04	13.04			100	/					0.85
JESUS			96.30	/	3.70	3.85					
HALLOWEEN			100	/							0.85
EASTER	100	/							5.56		5.13
CLOWN					100	/					0.85
CIRCUS			100	/						3.23	5.98
CHURCH	100	/									
CHRISTMAS					3.70	3.70	100	/		3.23	
BIBLE							100	/			

3.4 Participants

Originally 157 Chinese learners of English took part in the data collection, but 15 were disqualified because of their incomplete responses to the two tasks, their misunderstanding of the task requirements, or their unmatched language background. Totally 142 participants, 16 males and 126 females, were included in the analysis. All of them were freshmen majoring in English at Sun Yat-sen University, China, and none of them had lived or travelled overseas for more than three months. All gave written informed consents to take part in this study.

Their average age was 18.9 years old, with the oldest 21 and the youngest 16. Figure 3.8 shows the allocation of their ages. Their average age to start learning English was 8.7 years old, with the youngest three years old and the oldest 14. Figure 3.9 shows the allocation of their ages to start learning English. All of them had learned English for at least six years, and their average years of learning English was 10.2 and the longest was 15. Figure 3.10 shows the allocation of their years of learning English.

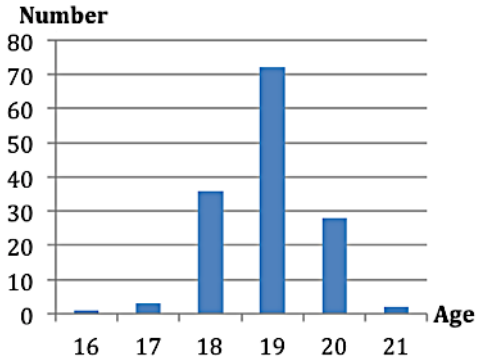


Figure 3.8 Age of Participants

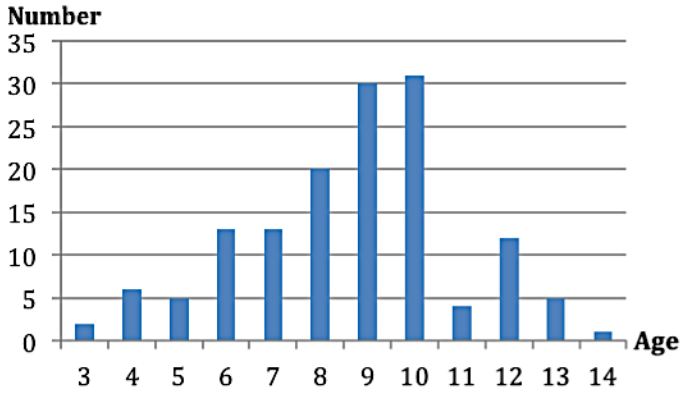


Figure 3.9 Age to Start Learning English

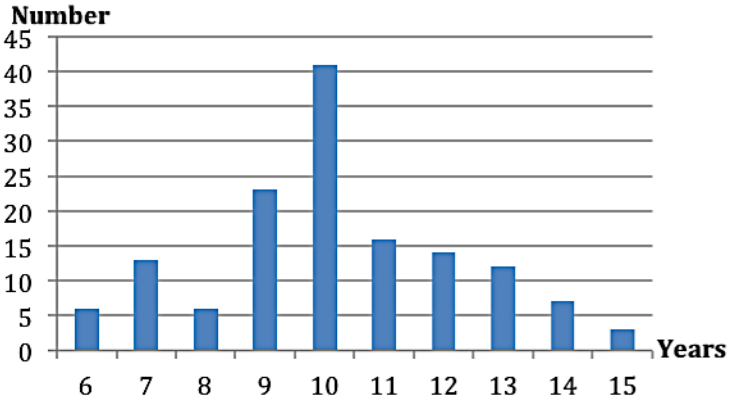


Figure 3.10 Years of Learning English

Participants' overall English proficiency was indicated by their scores of the *Comprehensive Course in English I*, which was a compulsory course in the first semester of freshman studies and assessed every aspect of their use of English. Their average score was 85.4, and the highest score was 94 and the lowest 75. Figure 3.11 shows the allocation of their scores.

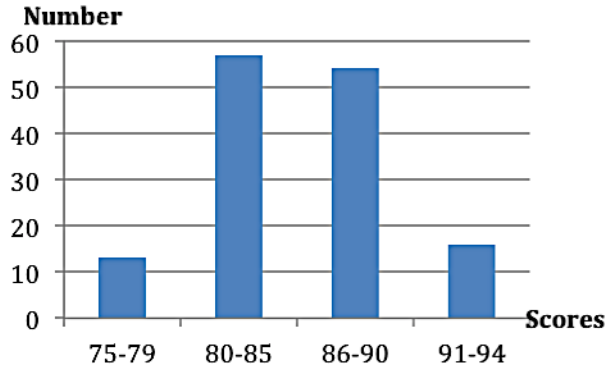


Figure 3.11 Scores of *Comprehensive Course in English I*

3.5 Procedure

Data collection was conducted on the Zhuhai Campus of Sun Yat-sen University and lasted for two weeks. Participants came as a class at their convenient timeslots and completed the tasks in a classroom. There were five timeslots for data collection.

Every data collection lasted for about one hour. First, the author gave Chinese instructions on the procedure and elaborated on the requirements of each task. Participants were asked to complete a booklet that included the elicited narrative task, the forced-choice task, and the adapted language history questionnaire. They needed to complete these tasks in order but there was no time limit for completion. After confirming they were clear about the requirements, they were given three minutes to read the instructions of the elicited narrative task. Then the author played the video for three times, during which participants were allowed to take notes. Participants wrote down their answers on the booklet at their own space, and when they finished, they returned the booklet to the author. During data collection, they were prevented to use any dictionary or materials, but could ask the author for help with clarifying instructions.

Chapter 4 Results

This chapter provides the results of data analyses. Quantitative analyses were conducted for the elicited narrative task and the forced-choice task. Further analysis on the qualitative data that had been quantified was conducted for the elicited narrative task. For each task, the author starts with the coding method and then shows the results of the analysis.

4.1 Elicited Narrative Task

The coding of the written narratives was similar to that with English native speakers. Since the main purpose was to access the conceptual representations of words in the mind, misspelled words in the original texts were corrected and then transcribed into individual txt files. As for the words that were unable to be recognized or corrected, they were transcribed in their original forms. In few cases, Chinese words were used between the English writing, which indicated the narrator did not know the corresponding English word. These words were substituted with spaces during transcription. The txt files were then analyzed with *AntWordProfiler 1.4.1* (Anthony, 2014) and *AntConc 3.4.3* (Anthony, 2014) with the *Lemma List for English* (developed by Yasumasa Someya) loaded.

Based on Table 3.1, the corresponding nouns used in the narratives were marked and summarized, including their countability and number marking. For words that could be used as nouns and verbs in different contexts, the judgment was made based on their specific contexts in the narratives. Besides, two kinds of nouns were excluded from analysis: those that were too general such as *clothes*, *stuffs*, and *objects*, and

those that were used mistakenly for reference such as labeling the underwear as *socks*.

4.1.1 Quantitative Analysis

Every participant was assigned an ID that consisted of their class abbreviation and a number. For every narrative, the number of tokens and word families were generated with *AntWordProfiler 1.4.1* (Anthony, 2014), and its vocabulary diversity was calculated according to the formula: $Diversity = \frac{\text{Number of Word Families}}{\text{Number of Tokens}}$ (see Table 4.1). The descriptives, including the minimum, maximum, mean, and standard deviation, of token, word family and diversity were also calculated (see Table 4.2).

Table 4.1 Token, Word Family, Diversity of the Narratives

ID	Token	Word Family	Diversity	ID	Token	Word Family	Diversity	ID	Token	Word Family	Diversity
BA-1	209	84	40.19%	BF-1	309	95	30.74%	IB-19	226	92	40.71%
BA-2	191	82	42.93%	BF-2	183	72	39.34%	IB-20	320	100	31.25%
BA-3	137	69	50.36%	BF-3	223	82	36.77%	IB-21	217	82	37.79%
BA-6	200	80	40.00%	BF-4	182	68	37.36%	TE-1	285	102	35.79%
BA-7	183	91	49.73%	BF-5	238	83	34.87%	TE-3	453	114	25.17%
BA-8	128	56	43.75%	BF-6	249	88	35.34%	TE-4	361	133	36.84%
BA-9	222	94	42.34%	BF-7	186	75	40.32%	TE-5	187	82	43.85%
BA-10	163	75	46.01%	BF-8	226	91	40.27%	TE-6	138	61	44.20%
BA-11	276	100	36.23%	BF-9	170	63	37.06%	TE-7	208	78	37.50%
BA-12	254	101	39.76%	BF-10	139	55	39.57%	TE-8	259	88	33.98%
BA-13	204	74	36.27%	BF-11	160	61	38.13%	TE-9	143	50	34.97%
BA-15	244	84	34.43%	BF-12	119	59	49.58%	TE-11	143	68	47.55%
BA-16	310	109	35.16%	BF-13	132	60	45.45%	TE-12	321	113	35.20%
BA-17	79	44	55.70%	BF-14	166	78	46.99%	TE-13	305	112	36.72%
BA-18	329	101	30.70%	BF-15	182	70	38.46%	TE-14	317	108	34.07%
BA-20	88	41	46.59%	BF-16	182	81	44.51%	TE-16	133	58	43.61%
BA-21	216	85	39.35%	BF-18	128	54	42.19%	TF-1	289	107	37.02%
BA-22	169	74	43.79%	IA-1	171	76	44.44%	TF-3	306	105	34.31%
BA-23	180	80	44.44%	IA-2	182	77	42.31%	TF-4	283	99	34.98%
BA-24	30	22	73.33%	IA-3	126	58	46.03%	TF-5	261	78	29.89%
BB-1	166	67	40.36%	IA-4	147	70	47.62%	TF-6	288	102	35.42%
BB-2	129	47	36.43%	IA-5	101	54	53.47%	TF-7	330	99	30.00%
BB-3	171	53	30.99%	IA-6	148	65	43.92%	TF-8	352	97	27.56%
BB-4	179	72	40.22%	IA-7	177	80	45.20%	TF-9	275	104	37.82%

BB-5	153	65	42.48%	IA-8	262	75	28.63%	TF-10	105	51	48.57%
BB-6	91	45	49.45%	IA-9	170	61	35.88%	TF-11	191	73	38.22%
BB-7	71	39	54.93%	IA-10	238	98	41.18%	TF-12	243	91	37.45%
BB-8	148	74	50.00%	IA-11	152	56	36.84%	TF-13	128	60	46.88%
BB-9	267	88	32.96%	IA-12	237	101	42.62%	TF-14	173	65	37.57%
BB-10	180	74	41.11%	IA-13	233	81	34.76%	TF-15	218	79	36.24%
BB-11	243	86	35.39%	IA-14	151	66	43.71%	TF-16	223	85	38.12%
BB-12	98	40	40.82%	IA-15	210	74	35.24%	TF-17	168	86	51.19%
BB-13	143	72	50.35%	IA-16	129	64	49.61%	TF-18	339	105	30.97%
BB-15	237	95	40.08%	IB-1	141	75	53.19%	TG-1	394	116	29.44%
BB-16	153	64	41.83%	IB-4	336	122	36.31%	TG-2	384	143	37.24%
BB-17	256	102	39.84%	IB-5	250	95	38.00%	TG-3	416	140	33.65%
BB-18	143	64	44.76%	IB-6	235	93	39.57%	TG-4	314	87	27.71%
BB-19	295	99	33.56%	IB-7	207	80	38.65%	TG-5	666	154	23.12%
BB-20	226	77	34.07%	IB-8	354	104	29.38%	TG-6	392	137	34.95%
BB-21	143	65	45.45%	IB-9	206	81	39.32%	TG-7	420	125	29.76%
BB-22	222	84	37.84%	IB-10	197	80	40.61%	TG-9	208	85	40.87%
BB-23	207	80	38.65%	IB-11	330	105	31.82%	TG-10	169	71	42.01%
BB-24	247	80	32.39%	IB-12	156	49	31.41%	TG-12	265	89	33.58%
BB-25	534	114	21.35%	IB-13	232	88	37.93%	TG-13	162	60	37.04%
BE-1	144	70	48.61%	IB-14	383	117	30.55%	TG-14	121	48	39.67%
BE-2	177	73	41.24%	IB-16	282	84	29.79%	TG-15	204	73	35.78%
BE-3	312	102	32.69%	IB-17	313	89	28.43%				
BE-4	410	108	26.34%	IB-18	288	101	35.07%				

Table 4.2 Descriptives of Token, Word Family and Diversity of the Narratives

	N	Sum	Minimum	Maximum	Mean	Std. Deviation
Token	142	31,778	30	666	223.789	93.7160
Word Family	142	915	22	154	82.070	22.4109
Diversity	142	/	.213483	.733333	.390138	.0719173

Table 4.1 and 4.2 show that the total length of the narratives was 31,778 words and the total number of word families was 915. The shortest narrative was 30 words while the longest was 666 words, and the average length of the narratives was about 224 words. The number of word families in a narrative ranged from 22 to 154, with the average about 82. Correspondingly, the minimum diversity of the narratives was

about 21.35% while the maximum was about 73.33%, with the average about 39.01%. The standard deviations of tokens, word families, and diversity were about 93.72, 22.41, and 7.19% respectively, and they were generally acceptable.

Table 4.3 shows the lemmas used as references in the narratives. Individual range reflected how many participants used the lemma as reference and their proportion to the number of participants who referred to the object, and total range showed how many participants referred to the object and their proportion to the total number of participants. These figures could reflect how likely a lemma was used by the participants as reference to a specific object. It is reasonable that some objects were mentioned more often than others, because the participants may assign different extents of importance to different objects based on their own understanding.

Table 4.3 Objects and Their References (Chinese Learners of English)

Object	Lemma	Range			
		Individual		Total	
Obj1	box	12	8.96%	134	94.37%
	carrier	1	0.75%		
	case	52	38.81%		
	luggage	4	2.99%		
	package	2	1.49%		
	suitcase	104	77.61%		
	trunk	1	0.75%		
Obj2	bottle	38	35.85%	106	74.65%
	can	57	53.77%		
	jar	1	0.94%		
	tin	12	11.32%		
Obj3	blanket	6	5.45%	110	77.46%
	carpet	3	2.73%		
	cloth	5	4.55%		
	cover	4	3.64%		
	quilt	5	4.55%		
	sheet	7	6.36%		
	towel	80	72.73%		

	washcloth	1	0.91%		
Obj4	cloth	7	6.60%	106	74.65%
	cover	1	0.94%		
	handkerchief	14	13.21%		
	napkin	6	5.66%		
	rag	1	0.94%		
	sheet	2	1.89%		
	towel	78	73.58%		
	washcloth	1	0.94%		
Obj5	boxers	1	1.32%	76	53.52%
	briefs	7	9.21%		
	pants	11	14.47%		
	panties	1	1.32%		
	shorts	13	17.11%		
	swimsuit	2	2.63%		
	trousers	5	6.58%		
	underclothes	1	1.32%		
	underwear	36	47.37%		
Obj6	boxers	3	4.48%	67	47.18%
	briefs	3	4.48%		
	pants	11	16.42%		
	shorts	26	38.81%		
	trousers	5	7.46%		
	underclothes	1	1.49%		
	underwear	21	31.34%		
Obj7	shoes	77	98.72%	78	54.93%
	slippers	1	1.28%		
Obj8	shoe	78	97.50%	80	56.34%
	slipper	2	2.50%		
Obj9	bag	14	58.33%	24	16.90%
	pack	1	4.17%		
	package	6	25.00%		
	packet	1	4.17%		
	parcel	2	8.33%		
Obj10	brief	6	7.23%	83	58.45%
	inclothes	1	1.20%		
	pants	4	4.82%		
	panty	1	1.20%		
	shorts	3	3.61%		
	underwear	68	81.93%		

Obj11	soap	76	100.00%	76	53.52%
Obj12	cloth	4	3.64%	110	77.46%
	shirt	71	64.55%		
	T-shirt	37	33.64%		
Obj13	bag	8	88.89%	9	6.34%
	package	1	12.50%		
Obj14	brush	35	31.82%	110	77.46%
	brushing	1	0.91%		
	toothbrush	88	80.00%		
Obj15	cream	2	1.80%	111	78.17%
	paste	12	10.81%		
	toothcream	2	1.80%		
	toothpaste	98	88.29%		
	toothwash	1	0.90%		
Obj16	khakis	1	0.79%	127	89.44%
	pants	89	70.08%		
	shorts	1	0.79%		
	trousers	29	22.83%		
Obj17	scissors	28	100.00%	28	19.72%
Obj18	pants	20	40.00%	50	35.21%
	shorts	27	54.00%		
	trousers	6	12.00%		
Obj19	khakis	1	1.39%	72	50.70%
	pants	20	27.78%		
	shorts	46	63.89%		
	trousers	6	8.33%		
Obj20	bear	92	89.32%	103	72.54%
	Teddy	47	45.63%		
Obj21	bible	4	3.31%	121	85.21%
	book	82	67.77%		
	magazine	1	0.83%		
	notebook	40	33.06%		
Obj22	box	10	7.19%	139	97.89%
	case	35	25.18%		
	luggage	5	3.60%		
	package	1	0.72%		
	suitcase	101	72.66%		
	trunk	1	0.72%		

This table shows that 17 objects were mentioned by more than half of the participants, including Obj1, Obj2, Obj3, Obj4, Obj5, Obj7, Obj8, Obj10, Obj11, Obj12, Obj14, Obj15, Obj16, Obj19, Obj20, Obj21, and Obj22, while five were mentioned by less than 50% participants, including Obj6, Obj9, Obj13, Obj17, and Obj18. Among the five less mentioned objects, except Obj13, all were mentioned by at least 15% participants. Except Obj11 and Obj17, which had only one lemma, the rest 20 objects, including Obj1, Obj2, Obj3, Obj4, Obj5, Obj6, Obj7, Obj8, Obj9, Obj10, Obj12, Obj13, Obj14, Obj15, Obj16, Obj18, Obj19, Obj20, Obj21, and Obj22, had two to nine lemmas. Among the lemmas for every object, the individual range was between 0.72% and 100%. All of the objects had at least a lemma with an individual range no less than 38.81%. Seventeen objects had lemmas with an individual range less than 10%, including nine having lemmas with an individual range less than 1% (see Table 4.4). The individual range of lemmas for one object could be totally more than 100% because some participants used more than one lemma to refer to the same object.

Table 4.4 Lemmas with an Individual Range less than 10%

Object	Lemma
Obj1	box, luggage, package
Obj3	blanket, carpet, cloth, cover, quilt, sheet
Obj4	cloth, napkin, sheet,
Obj5	boxers, briefs, panties, swimsuit, trousers, underclothes
Obj6	boxers, briefs, trousers, underclothes
Obj7	slippers
Obj8	slippers
Obj9	pack, packet, parcel
Obj10	inclothes, pants, panty, shorts
Obj12	cloth
Obj15	cream, paste, toothcream
Obj19	khakis, trousers
Obj21	bible

Obj22	box, luggage
Individual Range less than 1%	
Obj1	carrier, trunk
Obj2	jar
Obj3	washcloth
Obj4	cover, rag, washcloth
Obj14	brushing
Obj15	toothwash
Obj16	khakis, shorts
Obj21	magazine
Obj22	package, trunk

The classifiers used with the lemmas were also summarized as in Table 4.5. Individual range reflected how many participants used the lemma as reference and their proportion to the number of participants who referred to the object, and total range showed how many participants referred to the object and their proportion to the total number of participants. These figures could reflect how likely a classifier was used by the participants to collocate with a lemma.

Table 4.5 Objects and Their Classifiers (Chinese Learners of English)

Object	Classifier	Range			
		Individual		Total	
Obj5	pair	4	100.00%	4	2.82%
Obj6	pair	8	100.00%	8	5.63%
Obj7	pair	60	100.00%	60	42.25%
Obj10	pair	10	100.00%	10	7.04%
Obj11	bar	6	85.71%	7	4.93%
	cake	1	14.29%		
Obj15	bar	1	100.00%	1	0.70%
Obj16	pair	31	100.00%	31	21.83%
Obj17	pair	7	100.00%	7	4.93%
Obj18	pair	7	100.00%	7	4.93%
Obj19	pair	38	100.00%	38	26.76%

This table shows that 10 objects were used with classifiers, including Obj5, Obj6, Obj7, Obj10, Obj11, Obj15, Obj16, Obj17, Obj18, and Obj19. Eight objects were collocated with *pair*, including Obj5, Obj6, Obj7, Obj10, Obj16, Obj17, Obj18, and Obj19, while Obj11 was with *bar* and *cake* and Obj15 with *bar*. The total ranges of these classifiers were relatively low: except Obj7, Obj16, and Obj19, whose total ranges were more than 20%, Obj5, Obj6, Obj10, Obj11, Obj17, and Obj18 had an total range lower than 10%, and that of Obj15 was even less than 1%. This indicates the participants did not use the classifiers frequently.

The numeral meanings of word types used by the participants for referring to the objects were also summarized (see Table 4.6). Four kinds of numeral meanings were marked: a) *c/s*: countable, used as a singular noun; b) *c/p*: countable, used as a plural noun; c) *u*: uncountable; and d) *?*: unable to judge. For every word type, the number of participants who used every kind of numeral meanings was calculated, as well as its proportion to the total number of participants who referred to the object. These figures could indicate how likely a kind of numeral meaning of a word type was used by the participants for reference to a specific object.

Table 4.6 Numeral Meanings of Words as References to the Objects

Object	Type	Numeral Meaning		
Obj1	box	c/s	6	50.00%
		?	6	50.00%
Obj1	carrier	c/s	1	100.00%
Obj1	case	c/s	11	21.15%
		?	41	78.85%
Obj1	luggage	?	4	100.00%
Obj1	package	c/s	1	50.00%
		?	1	50.00%
Obj1	suitcase	c/s	33	31.73%
		?	71	68.27%
Obj1	trunk	c/s	1	100.00%

Obj2	bottle	c/s	34	89.47%
		u	4	10.53%
Obj2	can	c/s	55	96.49%
		u	2	3.51%
Obj2	jar	c/s	1	100.00%
Obj2	tin	c/s	12	100.00%
Obj2	beer	c/s	16	29.09%
		u	37	67.27%
		?	2	3.64%
Obj3	blanket	c/s	1	16.67%
		?	5	83.33%
Obj3	carpet	c/s	3	100.00%
Obj3	cloth	u	2	40.00%
		c/s	3	60.00%
Obj3	cover	?	3	75.00%
Obj3	covers	c/s	1	25.00%
Obj3	quilt	c/s	1	20.00%
		?	4	80.00%
Obj3	sheet	c/s	4	57.14%
		?	3	42.86%
Obj3	swimsuit	c/s	2	100.00%
Obj3	towel	c/s	41	51.25%
		u	1	1.25%
		?	38	47.50%
Obj3	washcloth	?	1	100.00%
Obj4	cloth	c/s	5	71.43%
		u	2	28.57%
Obj4	cover	c/s	1	100.00%
Obj4	handkerchief	c/s	12	85.71%
		?	2	14.29%
Obj4	napkin	c/s	5	83.33%
		?	1	16.67%
Obj4	rag	c/s	1	100.00%
Obj4	sheet	c/s	2	100.00%
Obj4	towel	c/s	62	79.49%
		u	1	1.28%
		?	15	19.23%
Obj4	washcloth	u	1	100.00%
Obj5	boxer	?	1	100.00%

Obj5	brief	c/s	3	42.86%
		?	2	28.57%
	briefs	c/s	2	28.57%
Obj5	pant	c/s	1	9.09%
	pants	c/s	3	27.27%
		c/p	7	63.64%
Obj5	panties	c/p	1	100.00%
Obj5	shorts	c/s	9	69.23%
		c/p	2	15.38%
		?	2	15.38%
Obj5	trouser	c/s	1	20.00%
	trousers	c/s	3	60.00%
		?	1	20.00%
Obj5	underclothes	u	1	100.00%
Obj5	underwear	c/s	28	77.78%
		u	1	2.78%
		?	7	19.44%
Obj6	boxer	c/s	1	33.33%
	boxers	c/p	2	66.67%
Obj6	briefs	c/s	3	100.00%
Obj6	pants	c/s	1	9.09%
		c/p	10	90.91%
Obj6	shorts	c/s	10	38.46%
		c/p	6	23.08%
		?	10	38.46%
Obj6	trouser	c/s	1	20.00%
	trousers	c/s	3	60.00%
		?	1	20.00%
Obj6	underclothes	u	1	100.00%
Obj6	underwear	c/s	15	71.43%
		?	6	28.57%
Obj7	shoes	c/p	77	100.00%
Obj7	slippers	c/p	1	100.00%
Obj8	shoe	c/s	71	91.03%
	shoes	c/s	7	8.97%
Obj8	slipper	c/s	2	100.00%
Obj9	bag	c/s	11	78.57%
		?	3	21.43%
Obj9	pack	c/s	1	100.00%
Obj9	package	c/s	3	50.00%

		?	3	50.00%
Obj9	packet	c/s	1	100.00%
Obj9	parcel	c/s	1	50.00%
		?	1	50.00%
Obj10	brief	c/s	1	16.67%
		?	1	16.67%
	briefs	c/s	4	66.67%
Obj10	inclothes	c/s	1	100.00%
Obj10	pants	c/s	4	100.00%
Obj10	panty	c/s	1	100.00%
Obj10	shorts	c/s	1	33.33%
		c/p	2	66.67%
Obj10	underwear	c/s	55	80.88%
		u	5	7.35%
		?	8	11.76%
Obj11	soap	c/s	51	67.11%
		u	14	18.42%
		?	11	14.47%
Obj12	cloth	c/s	2	50.00%
		u	1	25.00%
		?	1	25.00%
Obj12	shirt	c/s	71	100.00%
Obj12	T-shirt	c/s	37	100.00%
Obj13	bag	c/s	7	87.50%
		?	1	12.50%
Obj13	package	?	1	100.00%
Obj14	brush	c/s	2	5.71%
		?	33	94.29%
Obj14	brushing	?	1	100.00%
Obj14	toothbrush	c/s	7	7.95%
		?	81	92.05%
Obj15	cream	u	2	100.00%
Obj15	paste	?	12	100.00%
Obj15	toothcream	?	2	100.00%
Obj15	toothpaste	c/s	3	2.97%
		?	98	97.03%
Obj15	toothwash	?	1	100.00%
Obj16	khakis	c/p	1	100.00%
Obj16	pant	c/s	5	5.62%
	pants	c/s	20	22.47%

		c/p	64	71.91%
Obj16	shorts	?	1	100%
Obj16	trouser	?	4	13.79%
	trousers	c/s	11	37.93%
		c/p	9	31.03%
		?	15	51.72%
Obj17	scissor	c/s	2	7.14%
	scissors	c/s	3	10.71%
		c/p	23	82.14%
Obj18	pants	c/s	4	20.00%
		c/p	16	80.00%
Obj18	shorts	c/s	6	22.22%
		c/p	8	29.63%
		?	13	48.15%
Obj18	trouser	c/s	1	16.67%
	trousers	c/s	2	33.33%
		?	3	50.00%
Obj19	khakis	c/s	1	100.00%
Obj19	pants	c/s	7	35.00%
		c/p	13	65.00%
Obj19	shorts	c/s	12	26.09%
		c/p	26	56.52%
		?	9	19.57%
Obj19	trouser	c/s	1	16.67%
	trousers	c/s	5	83.33%
Obj20	bear	c/s	15	16.30%
		?	77	83.70%
Obj20	Teddy	c/s	3	6.38%
		?	44	93.62%
Obj21	bible	c/s	1	25.00%
		?	3	75.00%
Obj21	book	c/s	66	80.49%
		?	16	19.51%
Obj21	magazine	c/s	1	100.00%
Obj21	notebook	c/s	29	72.50%
		?	11	27.50%
Obj22	box	c/s	10	100.00%
Obj22	case	c/s	34	97.14%
		?	1	2.86%
Obj22	luggage	c/s	5	100.00%

Obj22	package	c/s	1	100.00%
Obj22	suitcase	c/s	101	100.00%
Obj22	trunk	c/s	1	100.00%

This table shows that 11 word types for seven objects were unknown of their numeral meanings: *luggage* for Obj1, *cover* and *washcloth* for Obj3, *boxer* for Obj5, *package* for Obj13, *brushing* for Obj14, *paste*, *toothcream*, and *toothwash* for Obj15, and *shorts* and *trouser* for Obj16. Seventy-six word types for 21 objects, except Obj11, had only one known numeral meaning (see Table 4.7), while 23 word types for 12 objects had more than one (see Table 4.8). The known numeral meaning of a word type took up from 1.25% to 100% of a lemma's numeral meanings expressed by the participants.

Table 4.7 Types with Only One Known Numeral Meaning

Object	Type
Obj1	box, carrier, case, package, suitcase, trunk
Obj2	jar, tin
Obj3	blanket, carpet, covers, quilt, sheet, swimsuit
Obj4	cover, handkerchief, napkin, rag, sheet, washcloth
Obj5	brief, briefs, pant, panties, trouser, trousers, underclothes
Obj6	boxer, boxers, briefs, trouser, trousers, underclothes, underwear
Obj7	shoes, slippers
Obj8	shoe, shoes, slipper
Obj9	bag, pack, package, packet, parcel
Obj10	brief, briefs, inclothes, pants, panty,
Obj12	shirt, T-shirt
Obj13	bag
Obj14	brush, toothbrush
Obj15	cream, toothpaste
Obj16	khakis, pant,
Obj17	scissor
Obj18	trouser, trousers
Obj19	khakis, trouser, trousers

Obj20	bear, Teddy
Obj21	bible, book, magazine, notebook
Obj22	box, case, luggage, package, suitcase, trunk

Table 4.8 Types with More Than One Known Numeral Meaning

Object	Type
Obj2	bottle, can, beer
Obj3	cloth, towel
Obj4	cloth, towel
Obj5	pants, shorts, underwear
Obj6	pants, shorts
Obj10	shorts, underwear
Obj11	soap
Obj12	cloth
Obj16	pants, trousers
Obj17	scissors
Obj18	pants, shorts
Obj19	pants, shorts

The results of the quantitative analyses could reveal the different levels of statistical importance of every word used in the narratives, and provide statistical support and reference for the qualitative analysis and the generalization of the research findings. These results will also be discussed in relation to the qualitative data in the following part.

4.1.2 Quantitative Analysis Based on Qualitative Data

4.1.2.1 Words with Lexicalized Concepts

According to the author's knowledge of Chinese and English vocabulary and the explanations in the dictionaries, including *Merriam-Webster's Collegiate Dictionary* (2012), *Oxford Advanced Learner's English-Chinese Dictionary* (Hornby, 2013),

Xiàndài Hànyǔ Cídiǎn (2005), and *Xīnhuá Zìdiǎn* (2012), words used as references to the objects were divided into three groups, i.e., conceptual equivalents, partial equivalents, and non-equivalents, based on their conceptual relationships with their Chinese translation equivalents.

Table 4.9 shows the words in the group of conceptual equivalents. These words referred to 17 objects, including Obj3, Obj4, Obj5, Obj6, Obj7, Obj8, Obj9, Obj10, Obj11, Obj13, Obj14, Obj15, Obj16, Obj17, Obj18, Obj19, and Obj21. Twelve objects, including Obj3, Obj4, Obj5, Obj7, Obj8, Obj10, Obj11, Obj14, Obj15, Obj16, Obj19, and Obj21, were mentioned by more than half of the participants, and five were mentioned by fewer than 50%. Among the five less mentioned objects, except Obj13, all were mentioned by more than 10% participants.

Table 4.9 Conceptual Equivalents

Object	Lemma	Range			
		Individual		Total	
Obj3	towel	80	72.73%	110	77.46%
	sheet	7	6.36%		
	blanket	6	5.45%		
	quilt	5	4.55%		
	cloth	5	4.55%		
	cover	4	3.64%		
	carpet	3	2.73%		
	washcloth	1	0.91%		
Obj4	towel	78	73.58%	106	74.65%
	handkerchief	14	13.21%		
	cloth	7	6.60%		
	napkin	6	5.66%		
	sheet	2	1.89%		
	cover	1	0.94%		
	rag	1	0.94%		
	washcloth	1	0.94%		
Obj5	underwear	36	47.37%	76	53.52%
	shorts	13	17.11%		

	pants	11	14.47%		
	briefs	7	9.21%		
	trousers	5	6.58%		
	swimsuit	2	2.63%		
	boxers	1	1.32%		
	panties	1	1.32%		
	underclothes	1	1.32%		
Obj6	shorts	26	38.81%	67	47.18%
	underwear	21	31.34%		
	pants	11	16.42%		
	trousers	5	7.46%		
	boxers	3	4.48%		
	briefs	3	4.48%		
	underclothes	1	1.49%		
Obj7	shoes	77	98.72%	78	54.93%
	slippers	1	1.28%		
Obj8	shoe	78	97.50%	80	56.34%
	slipper	2	2.50%		
Obj9	bag	14	58.33%	24	16.90%
	package	6	25.00%		
	parcel	2	8.33%		
	pack	1	4.17%		
	packet	1	4.17%		
Obj10	underwear	68	81.93%	83	58.45%
	briefs	6	7.23%		
	pants	4	4.82%		
	shorts	3	3.61%		
	inclothes	1	1.20%		
	panty	1	1.20%		
Obj11	soap	76	100.00%	76	53.52%
Obj13	bag	8	87.50%	9	6.34%
	package	1	12.50%		
Obj14	toothbrush	88	80.00%	110	77.46%
	brush	35	31.82%		
	brushing	1	0.91%		
Obj15	toothpaste	98	88.29%	111	78.17%
	paste	12	10.81%		
	cream	2	1.80%		
	toothcream	2	1.80%		
	toothwash	1	0.90%		

Obj16	pants	89	70.08%	127	89.44%
	trousers	29	22.83%		
	khakis	1	0.79%		
	shorts	1	0.79%		
Obj17	scissors	28	100.00%	28	19.72%
Obj18	shorts	27	54.00%	50	35.21%
	pants	20	40.00%		
	trousers	6	12.00%		
Obj19	shorts	46	63.89%	72	50.70%
	pants	20	27.78%		
	trousers	6	8.33%		
	khakis	1	1.39%		
Obj21	book	82	67.77%	121	85.21%
	notebook	40	33.06%		
	bible	4	3.31%		
	magazine	1	0.83%		

In this table, the majority of the participants were able to choose the appropriate referential words for naming. For example, over 70% participants named Obj3 *towel*, which shares the same linguistic categories with *yujin (浴巾)* in Chinese. Other pairs of conceptual equivalents for naming included *towel* and *maojin (毛巾)* for Obj4, *underwear/shorts/pants* and *neiku (内裤)* for Obj5, Obj6 and Obj10, *shoe(s)* and *xiezi (鞋子)* for Obj7 and Obj8, *bag* and *bao (包)* for Obj9 and Obj13, *soap* and *feizao (肥皂)* for Obj11, *toothbrush* and *yashua (牙刷)* for Obj14, *toothpaste* and *yagao (牙膏)* for Obj15, *pants/trousers* and *kuzi (长裤)* for Obj16, *scissors* and *jiandao (剪刀)* for Obj17, *shorts/pants* and *duanku (短裤)* for Obj18 and Obj19, *book* and *shu (书)* and *notebook* and *bijiben (笔记本)* for Obj21. However, conceptual equivalence can still place some difficulty for learning. For example, six participants used *trousers* to refer to Obj18 and Obj19, which was inappropriate because *trousers* usually cover from waist to ankles. Generally speaking, the results indicate that conceptual equivalence

may not pose much difficulty for L2 learners.

Words in the group of partial equivalents are shown in Table 4.10. Three objects were involved, including Obj1, Obj2, and Obj22, all of which were mentioned by more than 70% participants. This indicates that the results of this word group provided support of statistical evidence. In the video, Obj1 and Obj22 are two suitcases in different sizes, and for each one, about 10 (7~9%) participants used the word *box* as reference. This conceptual transfer may be due to the phenomenon that Chinese native speakers usually refer to cuboid-shape objects as *xiangzi (箱子)*, whose translation equivalent is *box* in English, and the Chinese translation equivalent of *suitcase*, *xinglixiang (行李箱)*, actually contains the character of *xiang (箱)*. As for Obj2, conceptual transfer took place between the word *bottle* and its Chinese translation equivalent *pingzi (瓶子)*. In Chinese, native speakers often connect *ping (瓶)* and *guan (罐)* in expressions like *pingpingguanguan (瓶瓶罐罐)* to refer to different shapes of containers including *bottles*, *jars* and *cans*, and do not enforce strict distinctions among them. This may lead to the result that nearly 40 (35.85%) participants used *bottle* for reference to Obj2 mistakenly. These results indicate that partial equivalence may pose a certain extent of difficulty for L2 learners.

Table 4.10 Partial Equivalents

Object	Lemma	Range			
		Individual		Total	
Obj1	suitcase	104	77.61%	134	94.37%
	case	52	38.81%		
	box	12	8.96%		
	luggage	4	2.99%		
	package	2	1.49%		
	trunk	1	0.75%		
	carrier	1	0.75%		

Obj2	can	57	53.77%	106	74.65%
	bottle	38	35.85%		
	tin	12	11.32%		
	jar	1	0.94%		
Obj22	suitcase	101	72.66%	139	97.89%
	case	35	25.18%		
	box	10	7.19%		
	luggage	5	3.60%		
	package	1	0.72%		
	trunk	1	0.72%		

Conceptual transfer due to non-equivalence can be observed from the naming of Obj12 and Obj20 (see Table 4.11). Both objects were mentioned by more than 70% participants, and this indicates support of statistical evidence for the results. While the broad concept of *shirt*, which refers to the male garment for the upper body, is readily accepted in Chinese native speakers' daily life, *T-shirt*, a kind of upper garment originated from the United States in the early 20th century, does not have a Chinese counterpart and can only be translated phonologically as *Txushan (T 恤衫)*. Probably due to the absence of the concept of "T-shirt", nearly 40 (33.64%) participants mixed *shirt* with *T-shirt* in their naming of Obj12. *Teddy Bear* is another introduction from the United States. It also lacks a similar counterpart among the toys of Chinese native speakers and is translated phonologically as *taidixiong (泰迪熊)*. Likely because of the same reason, only around 50 (45.63%) participants managed to use the full name *Teddy Bear*, which in turn shows that over 50% participants failed to do so. These results indicate that non-equivalence may pose much difficulty for L2 learners.

Table 4.11 Non-equivalents

Object	Lemma	Range			
		Individual		Total	
Obj12	shirt	71	64.55%	110	77.46%
	T-shirt	37	33.64%		

	cloth	4	3.64%		
Obj20	bear	92	89.32%	103	72.54%
	Teddy	47	45.63%		

Generally, the major referential words used by Chinese learners of English for the group of conceptual equivalents were similar to those by English native speakers (see Table 3.2), but those for the groups of partial equivalents and non-equivalents were largely different. Figures above indicate that for productive vocabulary knowledge, conceptual equivalents may be generally easy for L2 learners, and non-equivalents may be more difficult than conceptual equivalents but easier than partial equivalents.

4.1.2.2 Numeral Meanings of Nouns

To access conceptual transfer that took place with the numeral meanings of L2 nouns, referential words were summarized and marked for their numeral meanings within the context of the narratives. Table 4.12 shows the referential words that led to conceptual transfer due to their numeral meanings. These words included 20 word types of 14 lemmas. Among the lemmas, six had only one word type with more than one numeral meaning, including *beer*, *bottle*, *can*, *shorts*, *soap*, and *underwear*; three had more than one word type but only one numeral meaning for every word type, including *boxer* & *boxers*, *brief* & *briefs*, and *shoe* & *shoes*; three had more than one word type and more than one numeral meaning for every word type, including *pant* & *pants*, *scissor* & *scissors*, and *trouser* & *trousers*; and two had only one word type and one numeral meaning, including *luggage* and *toothpaste*. For every word type, four kinds of numeral meanings were marked: a) *c/s*: countable, used as a singular noun; b) *c/p*: countable, used as a plural noun; c) *u*: uncountable; and d) *?*: unable to judge. For every word type, the number of participants who used every kind of numeral

meanings was calculated, as well as its proportion to the total number of participants who used the word type in their narratives. These figures could indicate how likely a kind of numeral meaning of a word type was used by the participants.

Table 4.12 Numeral Meanings of Words that Led to Conceptual Transfer

Type	Numeral Meaning			Object
beer	c/s	16	29.09%	Obj2
	u	37	67.27%	Obj2
	?	2	3.64%	Obj2
bottle	c/s	34	89.47%	Obj2
	u	4	10.53%	Obj2
boxer	c/s	1	25.00%	Obj6
	?	1	25.00%	Obj5
boxers	c/p	2	50.00%	Obj6
brief	c/s	4	28.57%	Obj5, Obj10
	?	3	21.43%	Obj5, Obj10
briefs	c/s	7	50.00%	Obj5, Obj6, Obj10
can	c/s	55	96.49%	Obj2
	u	2	3.51%	Obj2
luggage	c/s	5	100.00%	Obj22
pant	c/s	6	4.92%	Obj5, Obj16
pants	c/s	35	28.69%	Obj5, Obj6, Obj10, Obj16, Obj18, Obj19
	c/p	81	66.39%	Obj5, Obj6, Obj16, Obj18, Obj19
scissor	c/s	2	7.14%	Obj17
scissors	c/s	3	10.71%	Obj17
	c/p	23	82.14%	Obj17
shoe	c/s	71	91.03%	Obj8
shoes	c/s	7	8.97%	Obj8
shorts	c/s	26	28.89%	Obj5, Obj6, Obj10, Obj18, Obj19
	c/p	32	35.56%	Obj5, Obj6, Obj10, Obj18, Obj19
	?	32	35.56%	Obj5, Obj6, Obj18, Obj19
soap	c/s	51	67.11%	Obj11
	u	14	18.42%	Obj11
	?	11	14.47%	Obj11
toothpaste	c/s	3	2.97%	Obj15
	?	98	97.03%	Obj15
trouser	c/s	3	5.66%	Obj5, Obj6, Obj18, Obj19
	?	4	7.55%	Obj16
trousers	c/s	19	35.85%	Obj5, Obj6, Obj16, Obj18, Obj19

	c/p	9	16.98%	Obj16
	?	18	33.96%	Obj5, Obj6, Obj16, Obj18
underwear	c/s	67	77.01%	Obj5, Obj6, Obj10
	u	5	5.75%	Obj5, Obj10
	?	15	17.24%	Obj5, Obj6, Obj10

Words in Table 4.12 were divided into two groups based on the different sources of conceptual transfer, i.e., a) countability and b) plurality. These two groups were further divided into two subgroups respectively: a) countable without *s* (CWS), which referred to countable words that lacked the inflection *s* (see Table 4.13); b) uncountable as countable (UAC), which were the opposite of words in CWS (see Table 4.14); c) plural without *s* (PWS), which referred to plural words that ought be accompanied with the inflection *s* but did not (see Table 4.15); and d) with *s* but singular (WSS), which referred to plural words with the inflection *s* but were used as singular ones (see Table 4.16). Notably, in the original coding, words in the group of CWS were marked as uncountable nouns to maintain unification. Conceptual transfer related to plurality could also be observed from the collocation between the classifier *pair* and the nouns (see Table 4.17).

Table 4.13 shows words in the group of countable without *s* (CWS). Both *bottle* and *can* are countable nouns, but were used without inflection *s* in the narratives. Examples are as follow. In both examples, *bottle* and *can* were used after a number, which was *four* in Example 1 or *six* in Example 2, and suggest that the participants did not pay much attention to the inflectionalization of nouns, which is not required in Chinese. The phrases *four bottle of beer* and *six can of beer* also simulated the way of expressing numeral meanings of nouns in Chinese, that is, a number + a classifier + a noun, such as *si ping pijiu (四瓶啤酒)* (*four* + *bottle* + *beer*). In this group, the

number of cases of conceptual transfer was four (10.53%) for *bottle* and two (3.51%) for *can*. This indicates that L2 learners may not experience this source of conceptual transfer very often.

e.g. 1. *He counted for how many days he would travel and then decided to pack four bottle of beer.* (IB-5)

e.g. 2. *He can't give up the six can of beer, so he decide to reduce other things.* (IA-11)

Table 4.13 Transfer Type 1: Countable without *s* (CWS)

Type	Numeral Meaning			Object
bottle	c/s	34	89.47%	Obj2
	u	4	10.53%	Obj2
can	c/s	55	96.49%	Obj2
	u	2	3.51%	Obj2

Table 4.14 shows the words in the group of uncountable as countable (UAC). These words included *beer*, *luggage*, *soap*, *toothpaste*, and *underwear*. In Chinese, the numeral meanings of nouns are expressed by using a number and a classifier before the noun, and in that sense, all nouns are "countable" in Chinese. This means that Chinese learners of English may need to develop new linguistic categories for the countability of English nouns, and if they fail to do so, conceptual transfer may take place, as in the following examples. The number of cases of conceptual transfer was 16 (29.09%) for *beer*, five (100%) for *luggage*, 51 (67.11%) for *soap*, three (2.97%) for *toothpaste*, and 67 (77.01%) for *underwear*. This indicates that compared with the group of CWS, L2 learners may experience this source of conceptual transfer more often.

e.g. 3. *Firstly, he put his beers in the below of the case, next put his clothes and other things.* (BA-17)

e.g. 4. *To our surprise, he took out a big luggage and then the book into it.* (BA-22)

e.g. 5. *Then he picks up an underwear and put a soap on it.* (BE-2)

e.g. 6. *He also wasted most of a toothpaste to shrink it.* (TG-13)

Table 4.14 Transfer Type 2: Uncountable as Countable (UAC)

Type	Numeral Meaning			Object
beer	c/s	16	29.09%	Obj2
	u	37	67.27%	Obj2
	?	2	3.64%	Obj2
luggage	c/s	5	100.00%	Obj22
soap	c/s	51	67.11%	Obj11
	u	14	18.42%	Obj11
	?	11	14.47%	Obj11
toothpaste	c/s	3	2.97%	Obj15
	?	98	97.03%	Obj15
underwear	c/s	67	77.01%	Obj5, Obj6, Obj10
	u	5	5.75%	Obj5, Obj10
	?	15	17.24%	Obj6, Obj10

Examples 1 to 6 show that countability may be one of the causes of conceptual transfer with the numeral meanings of L2 nouns. Since Chinese is a classifier language and does not differentiate between count and mass nouns with morphosyntax, native speakers may encounter difficulty in learning the countability of English nouns.

Table 4.15 shows words in the group of plural without *s* (PWS). Words in this group included *boxer*, *brief*, *pant*, *scissor*, and *trouser*. These words reveal the different conceptualizations of objects in Chinese and English native speakers' minds. Words like *boxers*, *briefs*, *pants*, *scissors*, and *trousers* are usually plural and rarely appear as singular nouns in English, but their Chinese translation equivalents, *duanku*

(短裤), sanjiaoku (三角裤), kuzi (裤子), jiandao (剪刀), and *changku (长裤)* are seen as singular objects. Such difference is prone to conceptual transfer, and one of the manifestations was the absence of the inflection *s* with these English words, as in the examples below. The number of cases of conceptual transfer was one (25.00%) for *boxer*, four (28.75%) for *brief*, six (4.92%) for *pant*, two (7.14%) for *scissor*, and three (5.66%) for *trouser*. This indicates that L2 learners may not experience this source of conceptual transfer very often.

e.g. 7. *Then he removed 2 cans and threw away the bigger boxer and one shoe.* (TG-13)

e.g. 8. *After all things have changed, he locks his suitcase and takes a brief.* (TE-3)

e.g. 9. *He wants to choose one skirt, but finally, he keeping a short pant.* (IB-12)

e.g. 10. *…he picked up a scissor and looked the bear up and down…* (IB-20)

e.g. 11. *And he changed a small trouser from a big one.* (BB-16)

Table 4.15 Transfer Type 3: Plural without *s* (PWS)

Type	Numeral Meaning			Object
boxer	c/s	1	25.00%	Obj6
	?	1	25.00%	Obj5
brief	c/s	4	28.57%	Obj5, Obj10
	?	3	21.43%	Obj5, Obj10
pant	c/s	6	4.92%	Obj5, Obj16
scissor	c/s	2	7.14%	Obj17
trouser	c/s	3	5.66%	Obj5, Obj6, Obj18, Obj19
	?	4	7.55%	Obj16

Table 4.16 shows the words in the group of with *s* but singular (WSS). Words in this group included *pants*, *shoes*, *scissors*, *shorts* and *trousers*. This group is another source of conceptual transfer due to the conceptual difference in defining singular objects: participants used plural words with the inflection *s* as singular nouns as they

would do with the Chinese translation equivalents. Examples are as below. The number of cases of conceptual transfer was 35 (28.69%) for *pants*, seven (8.97%) for *shoes*, three (10.71%) for *scissors*, 26 (28.89%) for *shorts*, and 19 (35.85%) for *trousers*. This indicates that L2 learners may experience this source of conceptual transfer more often than the group of PWS.

e.g. 12. *He chose <u>one pants</u> and threw away the rest.* (BB-7)

e.g. 13. *…throw out <u>a shoes</u>, takes only the top of the toothbrush…* (BB-2)

e.g. 14. *Furthermore, he uses <u>a scissors</u> to cut his pants.* (BF-4)

e.g. 15. *…but after that, he finds out <u>a shorts</u>.* (BF-1)

e.g. 16. *Instead of <u>a</u> long <u>trousers</u>, he use a scissors to cut off the trouser into a shorts.* (IA-11)

Table 4.16 Transfer Type 4: With *s* but Singular (WSS)

Type	Numeral			Object
pants	c/s	35	28.69%	Obj5, Obj6, Obj10, Obj16, Obj18, Obj19
	c/p	81	66.39%	Obj5, Obj6, Obj16, Obj18, Obj19
shoes	c/s	7	8.97%	Obj8
scissors	c/s	3	10.71%	Obj17
	c/p	23	82.14%	Obj17
shorts	c/s	26	28.89%	Obj5, Obj6, Obj10, Obj18, Obj19
	c/p	32	35.56%	Obj5, Obj6, Obj10, Obj18, Obj19
	?	32	35.56%	Obj5, Obj6, Obj18, Obj19
trousers	c/s	19	35.85%	Obj5, Obj6, Obj16, Obj18, Obj19
	c/p	9	16.98%	Obj16
	?	18	33.96%	Obj5, Obj6, Obj16, Obj18

Examples 7 to 16 show that the different conceptualizations of singular nouns between Chinese and English may lead to difficulties in learning the plurality of L2 nouns. When learning English nouns, Chinese native speakers may need to not only develop new linguistic categories to store the plurality of nouns but also to internalize the plural meanings of English nouns whose Chinese translation equivalents are

regarded as singular nouns.

Conceptual transfer related to plurality could also be observed from the collocations between the classifier *pair* and the nouns used by the participants. Table 4.17 shows the objects that were collocated with the classifier *pair*. Individual range calculated how many participants used the classifier *pair* to collocate with every object and their proportion to the total number of participants who made the collocation with different objects. Total range calculated the proportion of the number of participants who made the collocation to the total number of participants. In this table, Obj7, which is a pair of shoes in the video, has the largest individual (36.36%) and total ranges (42.25%). This may be because both *shoes* and its Chinese translation equivalent *xiezi (鞋子)* are usually regarded as a plural noun and collocated with *a pair of* in English and with its Chinese translation equivalent *yishuang (一双)* respectively, which may pose little difficulty for the learners. In contrast, other objects, which are regarded as plural nouns in English and singular nouns in Chinese, have comparatively low individual and total ranges probably because the leaners need to internalize the plural meanings of the English nouns. The translation equivalents of these objects included *underwear/shorts/pants* and *neiku (内裤)* of Obj5, Obj6 and Obj10, *pants/trousers* and *kuzi (长裤)* of Obj16, *scissors* and *jiandao (剪刀)* of Obj17, and *shorts/pants* and *duanku (短裤)* of Obj18 and Obj19.

Table 4.17 Collocation between the Classifier *Pair* and the Objects

Object	Range		
	Individual		Total
Obj5	4	2.42%	2.82%
Obj6	8	4.85%	5.63%
Obj7	60	36.36%	42.25%
Obj10	10	6.06%	7.04%

Obj16	31	18.79%	21.83%
Obj17	7	4.24%	4.93%
Obj18	7	4.24%	4.93%
Obj19	38	23.03%	26.76%

The findings about the numeral meanings of nouns indicate that conceptual transfer may be generally caused by the different conceptualizations of count nouns and mass nouns between Chinese and English. The countability and plurality of English nouns may be two major sources of difficulty, and words that lead to conceptual transfer can be divided into four groups: a) countable without *s* (CWS), b) uncountable as countable (UAC), c) plural without *s* (PWS), and d) with *s* but singular (WSS). Another form of conceptual transfer caused by plurality can be the collocations between the classifier *pair* and L2 nouns.

4.2 Forced-choice Task

Participants' answers to the forced-choice task were coded in this way: for every test item, if they selected the target answer(s), they were given one point, while if they did not, they got no point. With these scores, every participant's scores for every word group were calculated. Based on these raw data, the following statistical analyses were conducted: reliability test, normality test, Friedman's ANOVA, and effect size.

4.2.1 Reliability Test

Cronbach's Alpha was calculated to assess the internal consistency of the test items in the task (see Table 4.18). It was about 0.69, and according to George and Mallery's (2003) rules of thumb that it is acceptable if $0.70 \leq \alpha < 0.80$ and questionable if $0.60 \leq \alpha < 0.70$, and 0.69 means the test items were a bit questionable but generally

reliable.

Table 4.18 Reliability Test

Case Processing Summary				Reliability Statistics	
Cases	Valid	Excluded[a]	Total	Cronbach's Alpha	N of Items
N (%)	142 (100)	0 (0)	142 (100)	.689	33

a. Listwise deletion based on all variables in the procedure.

4.2.2 Normality Tests

To decide whether the data could be analyzed with parametric tests or non-parametric tests, Normality Tests were conducted for every word group respectively, with word group as the independent variable and participants' scores for the word group as the dependent variable, as shown in Table 4.19. These results indicate that, within every word group, the scores of every participant for the word group were not in normal distribution, with $p<0.01$ (Shapiro-Wilk). Since the forced-choice task is a within-subject design, these data ought to be further analyzed with non-parametric tests, i.e., Friedman's ANOVA and Wilcoxon Signed-ranks Tests.

Table 4.19 Normality Test

Case Processing Summary							
		Cases					
		Valid		Missing		Total	
	Group	N	Percent	N	Percent	N	Percent
Score	1	142	100%	0	0%	142	100%
	2	142	100%	0	0%	142	100%
	3	142	100%	0	0%	142	100%

Descriptives					
	Group			Statistic	Std. Error
Score	1	Mean		10.10	.099
		95% Confidence Interval for Mean	Lower Bound	9.90	
			Upper Bound	10.29	
		5% Trimmed Mean		10.24	
		Median		10.00	
		Variance		1.380	
		Std. Deviation		1.175	
		Minimum		4	

		Maximum		11	
		Range		7	
		Interquartile Range		1	
		Skewness		-2.163	.203
		Kurtosis		6.790	.404
	2	Mean		4.91	.158
		95% Confidence Interval for Mean	Lower Bound	4.60	
			Upper Bound	5.22	
		5% Trimmed Mean		4.91	
		Median		5.00	
		Variance		3.545	
		Std. Deviation		1.883	
		Minimum		0	
		Maximum		9	
		Range		9	
		Interquartile Range		2	
		Skewness		-.008	.203
		Kurtosis		-.270	.404
	3	Mean		9.60	.118
		95% Confidence Interval for Mean	Lower Bound	9.36	
			Upper Bound	9.83	
		5% Trimmed Mean		9.72	
		Median		10.00	
		Variance		1.987	
		Std. Deviation		1.409	
		Minimum		4	
		Maximum		11	
		Range		7	
		Interquartile Range		2	
		Skewness		-1.152	.203
		Kurtosis		1.466	.404

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
Score	1	.269	142	.000	.728	142	.000
	2	.108	142	.000	.973	142	.006
	3	.218	142	.000	.854	142	.000

a. Lilliefors Significance Correction

4.2.3 Friedman's ANOVA

In Friedman's ANOVA, the dependent variable was every participant's score for every word group, and the independent variable was every word group. The results of

Friedman's ANOVA and the post hoc Wilcoxon Signed-ranks Tests on every pair of groups are shown in Table 4.20. To avoid Type I Error of rejecting a true null hypothesis, Bonferroni correction was performed and the usual *p* level of 0.05 was divided by 3, which was the number of Wilcoxon Signed-ranks Tests needed. Therefore, the corrected *p* level was 0.017. As the results show, with $p<0.017$ in Wilcoxon Signed-ranks Tests for every pair of groups, the scores of every word group were significantly different from each other. Conceptual equivalents (Group 1) have the highest score 10.10, non-equivalents (Group 3) have the moderate one 9.60, and partial equivalents (Group 2) have the lowest one 4.91.

Table 4.20 Friedman's ANOVA and Wilcoxon Signed-ranks Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
1	142	10.10	1.175	4	11
2	142	4.91	1.883	0	9
3	142	9.60	1.409	4	11

Friedman's ANOVA

Ranks		Test Statistics	
	Mean Rank	N	142
1	2.63	Chi-Square	237.470
2	1.00	df	2
3	2.37	ASymp. Sig.	.000
Bonferroni Correction		0.017	

Wilcoxon Signed-ranks Tests

Ranks					Test Statistics	
		N	Mean Rank	Sum of Ranks		2-1
2-1	Negative Ranks	142[a]	71.50	10153.00	Z	-10.376[d]
	Positive Ranks	0[b]	.00	.00	Asymp. Sig. (2-tailed)	.000
	Ties	0[c]				10473.00
	Total	142				
3-2	Negative Ranks	0[e]	.00	.00		3-2
	Positive Ranks	142[f]	71.50	10153.00	Z	-10.373[h]
	Ties	0[g]			Asymp. Sig. (2-tailed)	.000
	Total	142				
3-1	Negative Ranks	66[i]	50.23	3315.50		3-1
	Positive Ranks	29[j]	42.91	1244.50	Z	-3.957[l]

Ties	47[k]			Asymp. Sig. (2-tailed)	.000
Total	142				

a. 2<1; b. 2>1; c. 2=1; d. Based on positive ranks.
e. 3<2; f. 3>2; g. 3=2; h. Based on negative ranks.
i. 3<1; j. 3<1; k. 3=1; l. Based on positive ranks.

4.2.4 Effect Size

Effect size is an important supplement for traditional statistical significance tests, and can reflect the practical significance of test results (Plonsky & Oswald, 2014). The figures of effect size could reveal how much of the variations in the dependent variable could be explained by the independent variable (Plonsky & Oswald, 2014). A large effect size indicates a high correlation between two variables, while a small one indicates a rather low correlation. Since the overall effect size of Friedman's ANOVA is not very useful, Cohen's effect size was calculated for every pair of groups in Wilcoxon Signed-ranks Tests using the following formula: $r = \frac{Z}{\sqrt{N}}$. For conceptual equivalents and partial equivalence, $r_{2\text{-}1} \approx -0.8707$, for partial equivalents and non-equivalents, $r_{3\text{-}2} \approx -0.8705$, and for conceptual equivalents and non-equivalents, $r_{3\text{-}1} \approx -0.3321$. Based on Cohen's (1988) rules of thumb, the effect size is small if $r \approx 0.10$, medium if $r \approx 0.30$, or large if $r \geq 0.50$. The figures of $r_{2\text{-}1}$, $r_{3\text{-}2}$, and $r_{3\text{-}1}$ indicate that the effect size is large for the comparison between conceptual equivalents and partial equivalents, and between partial equivalents and non-equivalents, while it is medium for that between conceptual equivalents and non-equivalents.

Chapter 5 Discussion

In this chapter, results are discussed with respect to the research questions. The author first investigates learning L2 words with lexicalized concepts, including the interactions between conceptual relationship and level of difficulty and those between conceptual relationship and receptive and productive knowledge, and then reveals the effects of conceptual transfer on learning the numeral meanings of L2 nouns.

5.1 Conceptual Relationship and Level of Difficulty

For words with lexicalized concepts, the relationship between L1 and L2 translation equivalents can be conceptual equivalence, partial equivalence, and non-equivalence. The results from the elicited narrative task and the forced-choice task show that different conceptual relationships may pose different levels of difficulty for L2 vocabulary learning.

In the elicited narrative task, for words in the group of conceptual equivalents, the majority of participants managed to use the appropriate words for reference (see Table 4.9). The numbers and proportions of the participants who were able to produce the appropriate referential words were relatively large for most of the words in this group, as shown in Table 5.1. These figures indicate that the majority of participants were able to produce the words in this group without much difficulty. Accordingly, conceptual equivalence may be very easy for learning L2 words with lexicalized concepts.

Table 5.1 Appropriate Referential Words of Conceptual Equivalents

Object	Lemma	Individual Range	
Obj3	towel	80	72.73%

Obj4	towel	78	73.58%
Obj5	underwear	36	47.37%
	shorts	13	17.11%
	pants	11	14.47%
Obj6	shorts	26	38.81%
	underwear	21	31.34%
	pants	11	16.42%
Obj7	shoes	77	98.72%
Obj8	shoes	78	97.50%
Obj9	bag	14	58.33%
Obj10	underwear	68	81.93%
	pants	4	4.82%
	shorts	3	3.61%
Obj11	soap	76	100.00%
Obj13	bag	8	87.50%
Obj14	toothbrush	88	80.00%
Obj15	toothpaste	98	88.29%
Obj16	pants	89	70.08%
	trousers	29	22.83%
Obj17	scissors	28	100.00%
Obj18	shorts	27	54.00%
	pants	20	40.00%
Obj19	shorts	46	63.89%
	pants	20	27.78%
Obj21	book	82	67.77%
	notebook	40	33.06%

In the same task, participants displayed a certain extent of conceptual transfer with their use of words in the group of partial equivalents (see Table 4.10). Some participants ignored the conceptual difference between a *suitcase* and a *box*: 12 (8.96%) participants referred to Obj1 as a *box* and 10 (7.19%) did the same with Obj22. Even more participants failed to differentiate between a *can*/*tin* and a *bottle*: 38 (35.85%) participants named Obj2 a *bottle*. Although only three objects were involved in this group, these figures indicate that compared with the group of conceptual equivalents, partial equivalents may be more difficult for learning L2 words with lexicalized concepts.

For the group of non-equivalents, participants experienced the most negative conceptual transfer in producing the appropriate words in the elicited narrative task (see Table 4.11). For Obj12, 37 (33.64%) participants used the word *T-shirt* for naming, which means over one third of participants mixed the concepts of a *shirt* and a *T-shirt*. For Obj20, only 47 (45.63%) participants managed to produce the word *Teddy* in their narratives, and this in turn means the rest 56 (54.37%) participants failed to do so, that is, more than half participants encountered conceptual transfer. These two examples reveal that compared with the groups of conceptual equivalents and partial equivalents, non-equivalents may be the most difficult for learning L2 words with lexicalized concepts.

To summarize the findings on productive vocabulary knowledge from the elicited narrative task, conceptual equivalence may pose the least difficulty for learning L2 words with lexicalized concepts, while non-equivalence may lead to the greatest difficulty. The varying levels of difficulty of learning productive vocabulary knowledge are shown in Figure 5.1.

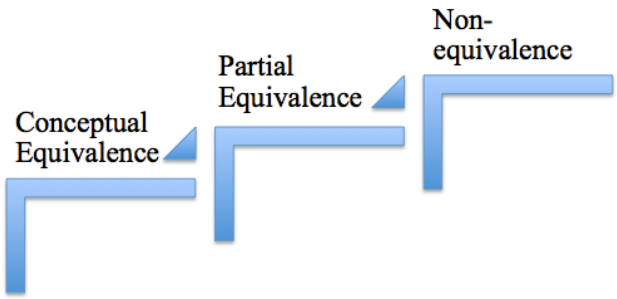


Figure 5.1 Levels of Difficulty of Productive Knowledge

In the forced-choice task, Friedman's ANOVA and Wilcoxon Signed-ranks Tests show that participants' scores of every word group were significantly different from

each other (see Table 4.20). Conceptual equivalents had the highest average score 10.10, non-equivalents had the moderate one 9.60, and partial equivalents had the lowest one 4.91. These figures indicate that for the receptive knowledge of words with lexicalized concepts, learners may experience the least difficulty with conceptual equivalents but the most difficulty with partial equivalents. The varying levels of difficulty of learning receptive vocabulary knowledge are shown in Figure 5.2.

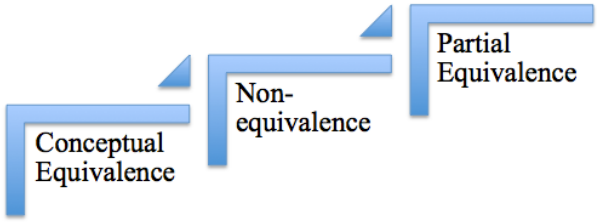


Figure 5.2 Levels of Difficulty of Receptive Knowledge

To summarize the findings on learning L2 words with lexicalized concepts: for receptive and productive knowledge, conceptual equivalence may pose the least difficulty. Partial equivalence may be the most difficult for learning the receptive vocabulary knowledge, while non-equivalence may pose the greatest difficulty for learning the productive vocabulary knowledge. The varying levels of difficulty of learning vocabulary knowledge are shown in Figure 5.3. Detailed discussion and explanation will follow in section 5.2.

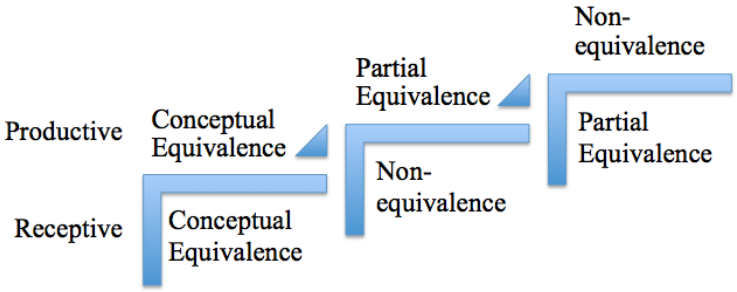


Figure 5.3 Levels of Difficulty of Vocabulary Knowledge

5.2 Conceptual Relationship and Receptive and Productive Knowledge

As pointed out by Nation (2013), receptive and productive knowledge refer to two different scopes of vocabulary knowledge: the former involves recognizing the word form and recalling its meaning in listening and reading, while the latter involves producing the word form to express meanings in speaking and writing. Receptive knowledge is generally regarded as easier to learn than productive knowledge (Nation, 2013). Admittedly, this study did not conduct direct comparison between learning receptive and productive knowledge for every conceptual relationship, but incorporated their different levels of difficulty in presenting the findings in Figure 5.3. That is, after gaining the findings that different conceptual relationships' levels of difficulty are different for receptive and productive knowledge, this study incorporated the generally accepted idea that receptive knowledge is easier than productive knowledge and combined the respective findings for these two kinds of knowledge.

As shown in Figure 5.3, conceptual equivalence may be the easiest to learn for both receptive and productive knowledge, which is generally in accordance with previous findings on conceptual transfer and L2 vocabulary acquisition. Such ease may be because learning L2 words in conceptual equivalence can rely on the preexisting links between L1 words and linguistic categories, and may only require the development and strengthening of the links between L2 words and the shared linguistic categories. For words in this group, learning the receptive knowledge may be easier than the productive knowledge, for recognizing a word form and recalling its meaning is generally easier than recalling the word form and its meaning.

When learning non-equivalents, learners may need to develop L2-specific categories from scratch and establish the links between them and L2 words, while for partial equivalents, learners may rely too much on the links between L1 words and the shared linguistic categories, and may ignore the existence of L2-specific categories, which may slow down their development. For non-equivalents, once learners have established new linguistic categories, these L2 words may function like conceptual equivalents, whereas for partial equivalents, learners may need to differentiate carefully between the shared linguistic categories and L1- and L2- specific categories. If they fail to make the differentiation between partial equivalents, they may have little chance to develop L2-specific categories and only keep the wrong links between L2 words and the preexisting linguistic categories.

Learning the receptive knowledge of non-equivalents may require learners to retrieve the meanings of a word form, while that of partial equivalents may require learners to make careful differentiations before retrieving the appropriate meanings. Therefore, learners may need to make more efforts in mastering the receptive knowledge of partial equivalents than that of non-equivalents. When learning the productive knowledge of partial equivalents, due to the preexistence of the shared linguistic categories, learners may encounter less difficulty in producing the corresponding word form, whereas for non-equivalents, learners may need to recall the new linguistic categories first and then produce the corresponding word form, which may require more efforts. As a result, non-equivalence may pose more difficulty than partial equivalence for learning the productive vocabulary knowledge.

In summary, conceptual equivalence may pose the least difficulty for learning

both receptive and productive vocabulary knowledge, while partial equivalence may be the most difficult to learn for receptive knowledge and non-equivalence may lead to the greatest difficulty in learning productive knowledge.

5.3 Conceptual Transfer and Numeral Meanings of Nouns

The results of the elicited narrative task show that plurality and countability may be two major sources of conceptual transfer in learning the numeral meanings of L2 nouns. Words that are prone to conceptual transfer can be divided into four groups: a) countable without *s* (CWS), which refer to countable words that lack the inflection *s* (see Table 4.13), e.g., *four bottle*; b) uncountable as countable (UAC), which are the opposite of words in CWS (see Table 4.14), e.g., *an underwear*; c) plural without *s* (PWS), which refer to plural words that ought be accompanied with the inflection *s* but do not (see Table 4.15), e.g., *a brief*; and d) with *s* but singular (WSS), which refer to plural words with the inflection *s* but are used as singular ones (see Table 4.16), e.g., *a shorts*. Countability may account for the major source of conceptual transfer in groups CWS and UAC, while plurality may account for that in groups PWS and WSS.

The numbers of cases of conceptual transfer are shown in Table 5.2. These figures indicate that the general probability of conceptual transfer may increase from CWS, PWS, WSS, to UAC (see Figure 5.4).

Table 5.2 Cases of Conceptual Transfer with Numeral Meanings

Group	Type	Case	
CWS	bottle	4	10.53%
	can	2	3.51%
UAC	beer	16	29.09%
	luggage	5	100.00%
	soap	51	67.11%
	toothpaste	3	2.97%
	underwear	67	77.01%

PWS	boxer	1	25.00%
	brief	4	28.75%
	pant	6	4.92%
	scissor	2	7.14%
	trouser	3	5.66%
WSS	pants	35	28.69%
	shoes	7	8.97%
	scissors	3	10.71%
	shorts	26	28.89%
	trousers	19	35.85%

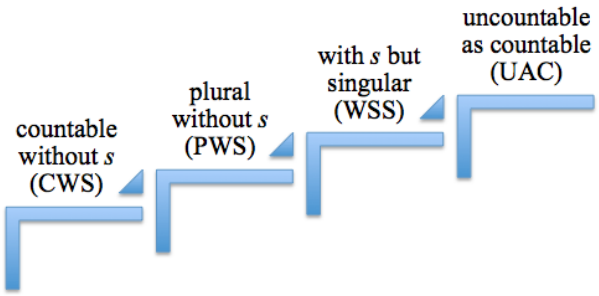


Figure 5.4 Probability of Conceptual Transfer

As shown in Figure 5.4, the group of UAC has the highest probability of conceptual transfer in learning the numeral meanings of L2 nouns. This may be because UAC is more subtle and implicit than the other three groups. All of the groups CWS, PWS, and WSS involve the inflection *s*, which can serve as an explicit marker for countability and plurality, while the group of UAC does not have any marker. That is, the appearance of the inflection *s* may be more likely to remind learners of the different treatments of the numeral meanings of nouns in English, whereas in the case of UAC, learners may be more likely to forget such requirement due to the lack of any explicit marker. To avoid conceptual transfer with the group of UAC, learners may need to develop L2-specific categories and strengthen the links between them and L2 words.

Although the group of WSS involves the inflection *s*, it has a higher probability of conceptual transfer than the groups of CWS and PWS. This may be closely related to the Chinese patterns of conceptualizing objects like *kuzi (裤子)-pants*, *xiezi (鞋子)-shoes*, *jiandao (剪刀)-scissors*, *duanku (短裤)-shorts*, and *changku (长裤)-trousers*. While words like these are regarded as singular in Chinese, their translation equivalents in English are regarded as plural and require the inflectionalization of the corresponding verbs. This means learners may need to establish the new L2-specific categories for representing the different treatments of words like these and establish the links between L2 words and these categories. However, for the groups of CWS and PWS, learners may only need to develop the new categories of countability and plurality and add the inflection *s* to L2 words, which may not demand the same amount of efforts as the group of WSS. Whereas the requirement of the former may be more like adding a new feature, that of the latter may tend to restructure the current patterns, which may inevitably suffer the effects and even resistance of the preexisting patterns and demand more efforts.

As the figures show that the group of CWS has a slightly lower probability of conceptual transfer than the group of PWS, this may be because the latter may also suffer small effects from the Chinese patterns of conceptualization. As mentioned previously, some objects like *kuzi (裤子)-pants* have different singular/plural status in Chinese and English, but in the group of PWS, learners may have already conformed to the English patterns of conceptualizing these words as plural, and what they failed to do may be add the inflection *s*, which may demand less amount of efforts than the group WSS. However, the existence of the Chinese patterns of conceptualization means overcoming the conceptual transfer of the group PWS may still be not as easy

as that of the group CWS, probably because the latter may only require establishing the new linguistic categories of countability and adding the inflection *s*.

Results on the collocations between the classifier *pair* and the nouns used by learners also show that plurality may lead to conceptual transfer in learning the numeral meanings of L2 nouns (see Table 4.17). Probably as a result of the same plural status shared by Obj7's translation equivalents *shoes* and *xiezi* (鞋子), the English word has the highest rates (36.36% of individual and 42.25% of total) of being collocated with the classifier *pair*. In contrast, for objects whose translation equivalents do not share the same singular/plural status in Chinese and English, the English words have low rates to be collocated with the classifier *pair*, including Obj5 (2.42% of individual and 2.82% of total), Obj6 (4.85% of individual and 5.63% of total), Obj10 (6.06% of individual and 7.04% of total), Obj16 (18.79% of individual and 21.83% of total), Obj17 (4.24% of individual and 4.93% of total), Obj18 (4.24% of individual and 4.93% of total), and Obj19 (23.03% of individual and 26.76% of total). These figures indicate that different conceptualizations of plurality may lead to conceptual transfer in learning the numeral meanings of L2 nouns. Since the classifier *pair* is usually collocated with plural nouns in Chinese, when encountering objects that are regarded as singular in Chinese but plural in English, learners may follow the Chinese patterns of conceptualizing plurality and avoid using the classifier *pair* with the English words. This may require learners to establish the new L2-specific categories for representing these differences in conceptualizing plurality and develop the links between them and L2 words.

In summary, the results of the elicited narrative task show that countability and

plurality may be two major sources of conceptual transfer in learning the numeral meanings of L2 nouns. Based on this, words that may cause conceptual transfer can be further divided into four groups: countable without *s* (CWS), uncountable as countable (UAC), plural without *s* (PWS), and with *s* but singular (WSS). Among the four groups, the probability of conceptual transfer may increase from CWS, PWS, WSS, to UAC. Conceptual transfer due to plurality can also be observed from the collocations between the classifier *pair* and the L2 words: learners may tend to use the classifier *pair* with words that share the same singular/plural status with its Chinese translation equivalents more often than words that do not.

Chapter 6 Conclusion

This chapter summarizes the main research findings from this study and provides the implications, limitations and suggestions for future research.

6.1 Summary of Findings

Results from the elicited narrative task and the forced-choice task show that for L2 words with lexicalized concepts, different conceptual relationships may lead to different levels of difficulty in learning the receptive and productive vocabulary knowledge. Conceptual equivalence may pose the least difficulty for learning, and partial equivalence may be the most difficult for learning the receptive knowledge, while non-equivalence for the productive knowledge. As for learning the numeral meanings of L2 nouns, countability and plurality may be two major sources of conceptual transfer, and words can be further divided into four groups: countable without *s* (CWS), uncountable as countable (UAC), plural without *s* (PWS), and with *s* but singular (WSS), with the probability of conceptual transfer increasing from CWS, PWS, WSS, to UAC. The collocations between the classifier *pair* and L2 nouns may lead to another form of conceptual transfer due to plurality: words sharing the same plurality with its Chinese translation equivalents may be more likely to be collocated with the classifier *pair* than words that do not.

6.2 Implications

Findings from this study can provide some implications for the Modified Hierarchical Model (Pavlenko, 2009) and the teaching and learning of L2 vocabulary.

Results on the words with lexicalized concepts can provide empirical evidence for the Modified Hierarchical Model (Pavlenko, 2009). As predicted by this model, different conceptual relationships between L1 and L2 translation equivalents can cause conceptual transfer and affect the learning of L2 words with lexicalized concepts. This study has also revealed the interactions between conceptual relationships and levels of difficulty in learning the receptive and productive vocabulary knowledge, so that it can provide new empirical data for refining and elaborating this model. Apart from the learning of explicit and implicit knowledge, this model may also provide explanations for other aspects of vocabulary knowledge, such as receptive and productive knowledge, because as found in this study, for different scopes of vocabulary knowledge, the level of difficulty posed by the conceptual relationship may be different. Generally, the findings on words with lexicalized concepts support this model.

Since different conceptual relationships may lead to different levels of difficulty in learning L2 words with lexicalized concepts, the focus in teaching and learning L2 vocabulary need to be tailored for words in different conceptual relationships. As suggested by Pavlenko (2009), the main task of learning words in conceptual equivalence is to establish the links between L2 words and preexisting linguistic categories, that of partial equivalence is to restructure the preexisting linguistic categories, and that of non-equivalence is to develop new linguistic categories. To improve L2 vocabulary teaching and learning, more attention needs to be paid to words in partial equivalence and non-equivalence. When teaching words in partial equivalence, teachers can devote more time and efforts to make clear distinctions between L1 and L2 translation equivalents, and for words in non-equivalence, they

can provide detailed and comprehensive information on L2 words and help students to establish the new concepts. In the design of exercises, for words in partial equivalence, teachers can create different scenarios and ask students to match the appropriate words with the specific scenarios, and for words in non-equivalence, they can ask students to retell the concepts contained in L2 words. Learners need to pay more attention to the differences between L1 and L2 translation equivalents in partial equivalence, and enrich their background knowledge of L2 words in non-equivalence.

Findings on the numeral meanings of L2 nouns can also be utilized in teaching and learning. As the probability of conceptual transfer may increase from the groups of countable without *s* (CWS), plural without *s* (PWS), with *s* but singular (WSS), to uncountable as countable (UAC), teachers can devote more time and efforts to make explicit illustrations of the differences in treating the numeral meanings of nouns between Chinese and English. Apart from stating the grammatical rules that words like *trousers* are usually regarded as plural nouns and used with the classifier *pair*, teachers can provide explicit comparisons on the treatments of the numeral meanings of nouns between L1 and L2, so as to arouse learners' awareness of these conceptual differences and help internalize and establish the L2-specific categories. Since UAC is most likely to cause conceptual transfer, teachers can increase its weight in class instruction and exercise design to help learners master the countability of words. Learners also need to pay more attention to words that are prone to conceptual transfer and do more exercises so as to establish the new linguistic categories and the links between them and L2 words.

In summary, findings from this study can provide empirical evidence to help

refine and elaborate the Modified Hierarchical Model (Pavlenko, 2009), and conceptual transfer need to be taken into consideration when teaching and learning L2 vocabulary.

6.3 Limitations

This study has three limitations. First, the overall English proficiency of the target participants was assessed with their scores of the *Comprehensive Course in English I* due to time and resource limits. It would have been more accurate to ask them to complete a standardized test like *IELTS* (International English Language Testing System) or *TOEFL* (Test of English as a Foreign Language). It is also very helpful to collect target participants' vocabulary size with vocabulary size tests. Second, the numbers of male participants and female participants were not comparable. Such ratio of male to female is very common in English majors in universities in mainland China. It is unknown whether this has affected the final results of this study. It would have been more acceptable to have comparable number of male and female participants. Finally, in the elicited narrative task, the groups of conceptual equivalents, partial equivalents, and non-equivalents did not have the same number of words. The comparison among these groups would have been more direct and clear if they were given the same number of words.

6.4 Suggestions for Future Research

Future research can continue to explore other factors on the interactions between conceptual transfer and learning L2 vocabulary, including overall English proficiency, vocabulary size, and word type. It is unclear about the role English proficiency plays in affecting conceptual transfer and L2 vocabulary acquisition, and whether a large

vocabulary size will provide facilitation to overcome negative conceptual. As this study mainly focuses on concrete words, future studies can explore abstract words including verbs, emotion words, etc. Additionally, different learning contexts, including English as a foreign language (EFL) and English as a second language (ESL), may also lead to different outcomes of L2 vocabulary learning in relation to conceptual transfer. It is also interesting to investigate the interactions between conceptual transfer and L2 vocabulary acquisition in cities like Hong Kong where English has been incorporated into daily life and used to develop new local vocabulary.

Appendices

Appendix I Adapted Answer Sheet of Elicited Narrative Task

*This is the adapted answer sheet of elicited narrative task, and it is slightly different from the actual one because information for another study was also collected in the original one.

Part I. Suppose you are going to tell how Mr. Bean packs his possessions in this video to someone who has never watched it before. Please describe the whole process and provide as many details as you can. Feel free to make some notes during watching. Please write down your description in **English** on the following lines.

(Please turn to next page for more space)

Appendix II　Test Items of Forced-choice Task

*The original test has been adapted here for easier and clearer reference.

Part II.　Which picture(s) can be labelled by the underlined word? Please choose the answer(s) as you deem right, and you may choose more than one option if necessary.

Example:

MOUSE


A.


B


C


D.

1.　Conceptual Equivalents

ALCOHOL


A.


B.

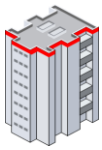

C.


D.

BUILDING


A.


B.


C.


D.

CALCULATOR


A.

B.

C.


D.

DOCUMENT

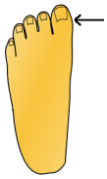

A.


B.


C.


D.

FINGER



A.

B.

C.

D.

FRIDGE

A.

B.

C.

D.

HEART

A.

B.

C.

D.

MOSQUITO

A.

B.

C.

D.

PRISON

A.

B.

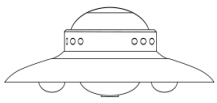
C.

D.

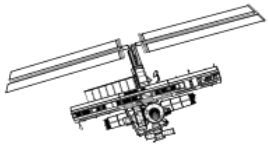
SATELLITE

A.

B.



C.



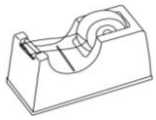
D.

SCISSORS


A.


B.


C.


D.

2. Partial Equivalents

BOTTLE


A.


B.

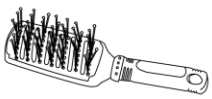

C.


D.

BRUSH


A.


B.


C.


D.

CAP


A.


B.


C.


D.

CHAIR


A.


B.


C.

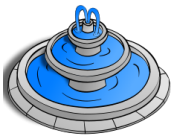

D.

DOOR


A.


B.


C.

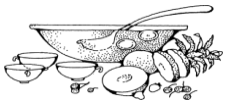

D.

PLATE

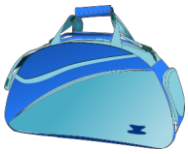

A.


B.


C.


D.

PURSE


A.


B.


C.


D.

SHIP


A.


B.


C.


D.

SOCK


A.


B.


C.


D.

SUGAR


A.


B.


C.

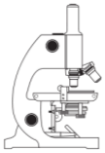

D.

TELESCOPE


A.


B.


C.


D.

3. Non-equivalents

BIBLE

A.

B.

C.

D.

CHRISTMAS

A.

B.

C.

D.

CHURCH

A.

B.

C.

D.

CIRCUS

A.

B.

C.

D.

CLOWN

A.

B.

C.

D.

EASTER

A.

B.

C.

D.

HALLOWEEN


A.


B.


C.


D.

JESUS


A.


B.


C.


D.

PRAYER


A.


B.


C.


D.

PUDDING


A.

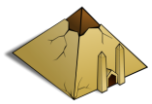

B.


C.


D.

PYRAMID


A.


B.


C.


D.

Please circle the following words that you have never met before.

ALCOHOL	BUILDING	CALCULATOR	DOCUMENT
FINGER	FRIDGE	HEART	MOSQUITO
PRISON	SATELITTE	SCISSORS	BOTTLE
BRUSH	CAP	CHAIR	DOOR
PLATE	PURSE	SHIP	SOCK
SUGAR	TELESCOPE	BIBLE	CHRISTMAS
CHURCH	CIRCUS	CLOWN	EASTER
HALLOWEEN	JESUS	PRAYER	PUDDING
PYRAMID			

Appendix III Adapted Language History Questionnaire

语言背景调查

姓名：_____ 年龄：_____
性别：_____

请尽你所能回答下述问题，非常感谢你的积极配合。

1. 你的出生国与居住国是否一样? 请在相应答案的字母上画圈：

A. 是

B. 否： 你的出生国是：_____，居住国是：_____，你已在居住国生活了_____(年)。

2. 你是否曾在其他国家生活或者旅行超过三个月？请在相应答案的字母上画圈：

A. 是： 请写出国家名称、逗留时间、学习或者试图学习的语言以及逗留期间使用该语言的 频率，并在相应的数字上画圈：

[对应描述] 从不 很少 偶尔 有时 经常 常常 总是
[代表数字] 1 2 3 4 5 6 7

国家	逗留时间(累积)	语言	使用频率
			1 2 3 4 5 6 7

B. 否

3. 请按照语言熟练的先后顺序列出你所了解的语言(包括方言 ;最先列出最熟练的语言)，并写出你初次学习该语言的年龄，以及你学习或使用了该语言多少年：

语言	学习该语言的最初年龄	学习或使用年数 **(累积)**

4. 请评价你所了解语言的听、说、读、写方面的能力，并在相应的数字上画圈：

[对应描述] 很差 差 勉强可用 可交流 好 很好 像母语般流利
[代表数字] 1 2 3 4 5 6 7

非母语语言	听	说	读	写

	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7

5. 请写出你上学期的综英、泛读分数及满分分数；如果你参加过非母语的标准化测试（如雅思、托福），请写出该测试的名称、你的分数及考卷满分分数。如果你对上述分数记得不清楚，请在"猜测分数"栏写下大概的数字：

名称	实际分数	猜测分数	满分分数
综英			
泛读			

6. 请估计每天你使用各种语言的时间（小时）及使用方式。使用方式指的是通过听、说、读、写哪一种或哪几种方式来使用该语言，请圈出所使用的方式：

语言	使用时间（小时）	使用方式
		听 说 读 写
		听 说 读 写
		听 说 读 写
		听 说 读 写

7. 从出生到中学前，你居住的省份及城市是：____________________________________

8. 你对本问卷有任何疑问或意见吗？

____

____

____

————非常感谢你的热情配合！————

Appendix IV Examples of Participants' Responses

Part I Elicited Narrative Task

BA-1

At the beginning, he put six cans of beer, a shower towl, a pair of shoes and a pair of pants into a very small suitcase, but he found that it was too small to contain all these things. Then he take out two cans of beer, changed the shower towl into an extremely tiny square towl and chose the shorter pants rather than the long ones. Besides, to save the space, he only put in one briefs and one piece of soap to clean it. And he chose one piece of cloth by counting and just put in one shoe. What's more interesting is that he broke off the toothbrush and squeezed most of the toothpaste out. When he cut off his long pants into short ones, he found that there was a pair of short pants right beside him. Then, after putting the things above, he closed the suitcase, however, there was still a book left outside of the suitcase, but he couldn't manage to put it into the suitcase any more. At that time, he took out another case much bigger than the suitcase from under the bed. Finally, he put the book and the small suitcase full of things into the big case.

IB-12

First step he put all things in his suitcase, but it's too small. so he makes the choice to keep his goods in his small suitcase. Then he keeps one beer in his suitcase, and next he replaces his quilt with a small towel. He wants to choose one skirt, but finally, he keeping a short pant. Next, he keeps one shoes and he chooses his white underwear and keeps a soap in it. Then, he cuts his pants shorter than before, but he finds another short one, so he replaces it. Next, he breaks off his toothbrush and keeps a small brush, and squeezes the toothpaste then keeps them in his small suitcase. Finally he takes his little bear into his suitcase. Then he finds a book left, and he wants to keep it, so he takes a big suitcase to put his book. Finally, he puts the small suitcase into the big suitcase.

TG-13

Mr Bean cramed all his possessions in a case that he was going to carry for vocation travel. However, although he tried to press the case, there were so many things that he had to put away them again. During this process, Mr Bean put all the things out of the case onto the bed and decided to give up somethings, reduce the things with the same or "similar" function and even cut off the things themselves. Firstly, he picked up the pink washcloth which may be the biggest thing among the possessions, and he turn right to his chest to get a handkerchief much smaller than the washcloth so his choice is the handkerchief. Next, he picked up a pair of shoes. Without hesitation, he threw away a shoe and chose to leave the other one. Then, he picked up a pair of boxers and a briefs and obviously the briefs were smaller, for which he took the briefs. Later he picked up several colorful shorts and wanted to select one only ones. He placed the

shorts unfolded on the bed in front of him and stretched out his forefinger to point clockwise at one pair at one number called in order. For the first and second time, he stopped when he pointed at blue ones. Without satisfaction, he changed the blue ones with pink ones and started the third time of counting numbers and pointing clockwise quickly. This time, he happily stopped at the pink ones and put them into the case. For the toothbrush, he break it off to two halves and took the one with the top. For the toothpaste, he sneezed it to reduce the content of it. For a pair of grey pants, he felt the legs too long and got the scissors out of the cabinet on his left to cut it into shorts. He never thought that he also had a pair of grey shorts which were similar to the ones he had just made. It came to the toy bear. With scissors in his right hand, he couldn't decided which part of the bear to cut so he kissed the boy bear and put it into the case. Contently, he locked the case and was going away. Suddenly he found a notebook he may need during the travel on the cabinet. Frowning, he bent to pull another case which is bigger out of under the bed and put the notebook and the former case in it.

Part II Forced-choice Task

Conceptual Equivalents	BA-1	IB-12	TG-13	Partial Equivalents	BA-1	IB-12	TG-13	Non-Equivalents	BA-1	IB-12	TG-13
ALCOHOL (D)	D	D	D	BRUSH (A,C)	A,C	A,C	A,D	BIBLE (D)	D	D	D
BUILDING (C)	C	C	C	CHAIR (C,D)	C,D	A	A,C,D	CHRISTMAS (D)	D	D	D
CALCULATOR (A)	A	A	A	BOTTLE (D)	D	D	D	CHURCH (A)	A	A	A
DOCUMENT (D)	D	D	D	CAP (C)	C	C	C	CIRCUS (B)	B	B	B
FINGER (B)	B	B	B	DOOR (B)	B	B	B	CLOWN (C)	C	C	C
FRIDGE (A)	A	A	A	PLATE (A)	A	A	A	EASTER (A)	A	A	A
HEART (B)	B	B	B	PURSE (B)	B	B	A,B,D	HALLOWEEN (B)	B	B	B
MOSQUITO (C)	C	C	C	SHIP (D)	D	A	D	JESUS (B)	B	B	B
PRISON (B)	B	B	B	SOCK (D)	D	D	C,D	PRAYER (C)	C	C	C
SATELLITE (D)	D	D	D	SUGAR (B)	B	A,B	A,B	PUDDING (C)	C	C	C
SCISSORS (B)	B	B	B	TELESCOPE (A)	A	B	A	PYRAMID (B)	B	A,B	B

Part III Language History Questionnaire (Demographic Background of the Three Participants)

	BA-1	IB-12	TG-13
年龄	19	20	19
性别	女	女	男
出生国与居住国相同	是	是	是
国外生活	否	否	否
掌握的语言 (语言-初学年龄-学习年数)	国-3-17 客-1-19	国-6-14 英-10-10	粤-自小-19 国-4~5-15

	英-10-9 西-18-1	西-19-1 韩-19-0.5	英-10-9 西-18-1
所了解语言的能力 (语言-听-说-读-写)	英-5-4-6-5 西-2-3-4-5	英-3-3-4-3 西-3-3-4-3	英-6-6-5-5 西-2-2-3-2
综英成绩	86	83	87~88
泛读成绩	87	87	90
每天各种语言的使用时间 (语言-使用时间-使用方式)	国-12-听、说、读、写 英-3-听、说、读、写 西-1~2-读、写	国-7-听、说、写 英-4-听、说、读、写 西-2-听、说、读、写	粤-3-听、说 国-5-听、说、读、写 英-3-听、说、读、写 西-1-听、说、读
初中前居住城市	江西赣州	河北沧州	广东江门

Appendix V Objects and Their References with Participant List (English Native Speakers)

Object	Lemma	Numeral Meaning	Range				Narrator
			Individual		Total		
Obj1	briefcase	countable	1	4.17%	24	100.00%	N4
	case	countable	11	45.83%			N3, N5, N6, N8, N12, N13, N15, N16, N18, N19, N21
	suitcase	countable	20	83.33%			N1, N2, N3, N4, N6, N7, N8, N9, N10, N11, N13, N14, N17, N18, N19, N20, N21, N22, N23, N24
Obj2	can	countable	10	62.50%	16	66.67%	N2, N3, N9, N10, N11, N14, N19, N21, N23, N24
	tin	countable	6	37.50%			N5, N6, N8, N13, N17, N20
Obj3	blanket	countable	1	6.67%	15	62.50%	N9
	towel	countable	14	93.33%			N3, N5, N6, N8, N10, N11, N13, N14, N16, N17, N20, N21, N23, N24
Obj4	cloth	countable	4	26.67%	15	62.50%	N6, N9, N17, N20
	flannel	countable	4	26.67%			N11, N13, N16, N21
	towel	countable	3	20.00%			N2, N5, N8
	washcloth	countable	4	26.67%			N3, N10, N23, N24
Obj5	bikini	countable	1	16.67%	6	25.00%	N16
	speedo	countable	2	33.33%			N21, N24
	swimsuit	countable	1	16.67%			N10
	swimwear	uncountable	1	16.67%			N6
	trunks	plural	1	16.67%			N13
Obj6	pants	plural	1	10.00%	10	41.67%	N11
	shorts	plural	4	40.00%			N17, N20, N21, N24
	swimsuit	countable	1	10.00%			N10
	swimwear	uncountable	1	10.00%			N6
	trunks	plural	4	40.00%			N8, N11, N13, N16
	underpants	plural	1	10.00%			N11
Obj7	shoes	countable	10	83.33%	12	50.00%	N3, N6, N8, N9, N10, N11, N15, N16, N17, N24
	slippers	countable	2	16.67%			N13, N21
Obj8	shoe	countable	6	66.67%	9	37.50%	N2, N5, N6, N9, N16, N19
	slipper	countable	3	33.33%			N12, N13, N14
Obj9	bag	countable	1	11.11%	9	37.50%	N3
	pack	countable	4	44.44%			N8, N13, N17, N24
	package	countable	3	33.33%			N10, N14, N24
	packet	countable	1	11.11%			N6

Obj10	pants	plural	2	16.67%	12	50.00%	N13, N17
	underpants	plural	4	33.33%			N8, N13, N17, N20
	underwear	uncountable	8	66.67%			N2, N6, N9, N10, N14, N21, N23, N24
Obj11	soap	uncountable	12	100.00%	12	50.00%	N2, N6, N8, N9, N10, N13, N14, N17, N20, N21, N23, N24
Obj12	shirt	countable	17	100.00%	17	70.83%	N1, N2, N3, N4, N6, N8, N9, N10, N13, N14, N16, N17, N19, N20, N21, N23, N24
Obj13	bag	countable	5	100.00%	5	20.83%	N3, N8, N10, N13, N24
Obj14	brush	countable	3	18.75%	16	66.67%	N2, N14, N17
	toothbrush	countable	15	93.75%			N3, N5, N6, N8, N9, N10, N13, N14, N15, N17, N18, N20, N21, N23, N24
Obj15	toothpaste	uncountable	18	100.00%	18	75.00%	N1, N2, N3, N4, N6, N7, N8, N9, N10, N11, N13, N15, N17, N18, N20, N21, N23, N24
Obj16	khakis	plural	2	10.53%	19	79.17%	N3, N24
	pants	plural	4	21.05%			N3, N4, N10, N14
	trousers	plural	14	73.68%			N1, N2, N5, N6, N8, N9, N11, N12, N13, N16, N17, N18, N20, N21
Obj17	scissors	plural	8	100.00%	8	33.33%	N3, N6, N8, N13, N17, N21, N23, N24
Obj18	shorts	plural	17	100.00%	17	70.83%	N3, N4, N5, N6, N8, N9, N11, N12, N13, N14, N15, N16, N17, N18, N20, N21, N24
Obj19	shorts	plural	13	100.00%	13	54.17%	N2, N3, N6, N8, N9, N10, N13, N14, N15, N16, N20, N21, N24
Obj20	bear	countable	13	81.25%	16	66.67%	N1, N3, N4, N6, N7, N9, N10, N11, N13, N16, N17, N20, N24
	teddy	countable	14	87.50%			N1, N4, N6, N7, N8, N9, N10, N11, N13, N16, N19, N20, N21, N24
Obj21	book	countable	17	100.00%	17	70.83%	N2, N3, N4, N6, N8, N9, N10, N12, N13, N14, N16, N17, N18, N19, N20, N21, N24
Obj22	case	countable	11	47.83%	23	95.83%	N1, N5, N6, N8, N12, N13, N15, N16, N18, N19, N20
	suitcase	countable	18	78.26%			N2, N3, N4, N6, N8, N9, N10, N11, N13, N14, N15, N17, N18, N20, N21, N22, N23, N24

Appendix VI Objects and Their Classifiers with Participant List (English Native Speakers)

Object	Classifier	Range		Narrator
Obj5	pair	3	12.50%	N6, N8, N13
Obj6	pair	4	16.67%	N6, N13, N20, N24
Obj7	pair	2	8.33%	N3, N24
Obj10	pair	10	41.67%	N2, N6, N8, N13, N14, N17, N20, N21, N23, N24
Obj11	bar	8	33.33%	N6, N8, N13, N17, N20, N21, N23, N24
Obj15	tube	13	54.17%	N1, N4, N6, N7, N8, N10, N11, N13, N17, N18, N20, N21, N23
Obj16	pair	6	25.00%	N3, N5, N8, N13, N23, N24
Obj17	pair	6	25.00%	N3, N6, N8, N13, N23, N24
Obj18	pair	6	25.00%	N3, N8, N11, N15, N21, N24
Obj19	pair	9	37.50%	N3, N6, N13, N15, N16, N18, N20, N21, N24

Appendix VII Objects and Their References with Participant List (Chinese Learners of English)

Object	Lemma	Range				Participant
		Individual		Total		
Obj1	box	12	8.96%	134	94.37%	BB-3, BB-4, BB-9, BB-10, BB-20, BB-21, IA-6, IA-8, IB-19, TE-7, TF-4, TF-12
	carrier	1	0.75%			BB-25
	case	52	38.81%			BA-1, BA-2, BA-3, BA-8, BA-10, BA-15, BA-17, BA-21, BB-2, BB-13, BB-15, BB-16, BB-25, BE-1, BE-2, BE-3, BF-1, BF-2, BF-3, BF-4, BF-5, BF-7, BF-11, BF-14, IA-1, IA-5, IA-9, IA-11, IA-13, IA-15, IB-1, IB-4, IB-20, TE-4, TE-13, TE-14, TF-3, TF-5, TF-7, TF-9, TF-13, TF-14, TF-17, TF-18, TG-1, TG-3, TG-4, TG-6, TG-7, TG-10, TG-12, TG-15
	luggage	4	2.99%			BA-6, BA-22, IA-16, TE-12
	package	2	1.49%			IA-6, IA-8
	suitcase	104	77.61%			BA-1, BA-3, BA-7, BA-9, BA-10, BA-11, BA-12, BA-13, BA-16, BA-18, BA-20, BA-21, BA-23, BB-1, BB-2, BB-5, BB-6, BB-7, BB-8, BB-11, BB-12, BB-15, BB-17, BB-18, BB-19, BB-22, BB-23, BB-25, BE-2, BE-3, BE-4, BF-2, BF-3, BF-4, BF-6, BF-7, BF-8, BF-9, BF-10, BF-11, BF-12, BF-13, BF-14, BF-15, BF-16, BF-18, IA-1, IA-2, IA-3, IA-4, IA-5, IA-7, IA-10, IA-12, IA-14, IA-15, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-21, TE-1, TE-3, TE-4, TE-5, TE-6, TE-8, TE-9, TE-11, TE-13, TE-16, TF-1, TF-5, TF-6, TF-7, TF-8, TF-9, TF-10, TF-11, TF-14, TF-15, TF-16, TF-18, TG-1, TG-2, TG-4, TG-5, TG-9, TG-10, TG-12,TG-13, TG-14, TG-15
	trunk	1	0.75%			BB-24
Obj2	bottle	38	35.85%	106	74.65%	BA-2, BA-23, BB-1, BB-8, BB-11, BB-20, BB-22, BB-25, BF-2, BF-7, BF-10, BF-11, BF-14, BF-16, BF-18, IA-1, IA-3, IA-9, IA-12, IA-13, IA-14, IB-5, IB-6, IB-8, IB-18, IB-19, TE-7, TE-8, TE-9, TE-11, TF-6, TF-10, TF-14, TG-1, TG-2, TG-5, TG-6, TG-9
	can	57	53.77%			BA-1, BA-8, BA-18, BB-4, BB-6, BB-10, BB-13, BB-15, BB-17, BB-18, BB-19, BB-23, BE-3, BE-4, BF-1, BF-3, BF-4, BF-6, BF-9, BF-10, BF-15, IA-2, IA-6, IA-8, IA-10, IA-11, IA-15, IB-7, IB-9, IB-10, IB-11, IB-13, IB-14, IB-16, IB-21, TE-1, TE-3, TE-4,

						TE-5, TE-12, TE-13, TE-14, TF-1, TF-3, TF-5, TF-8, TF-9, TF-11, TF-12, TF-17, TF-18, TG-4, TG-7, TG-12, TG-13, TG-14, TG-15
	jar	1	0.94%			BB-21
	tin	12	11.32%			BA-7, BA-9, BA-10, BB-16, BB-24, IB-1, TF-4, TF-7, TF-13, TF-15, TF-16, TG-5
Obj3	blanket	6	5.45%	110	77.46%	BF-6, BF-15, IB-14, TE-6, TE-14, TG-6
	carpet	3	2.73%			BB-22, IA-15, TG-9
	cloth	5	4.55%			BE-1, IB-17, IB-18, IB-20, TE-7
	cover	4	3.64%			BA-23, BB-8, BB-23, TG-4
	quilt	5	4.55%			BA-21, BA-22, IB-12, TE-4, TE-11
	sheet	7	6.36%			IB-4, BE-2, BF-13, TF-8, TF-15, TF-16, TG-10
	towel	80	72.73%			BA-1, BA-2, BA-3, BA-7, BA-8, BA-9, BA-10, BA-11, BA-15, BA-16, BA-18, BA-20, BB-1, BB-3, BB-4, BB-11, BB-12, BB-15, BB-17, BB-18, BB-22, BB-24, BB-25, BE-3, BE-4, BF-1, BF-3, BF-4, BF-5, BF-7, BF-8, BF-9, BF-10, BF-11, BF-18, IA-1, IA-2, IA-3, IA-8, IA-9, IA-12, IA-13, IA-16, IB-4, IB-5, IB-6, IB-7, IB-8, IB-10, IB-11, IB-13, IB-16, IB-19, TE-1, TE-3, TE-5, TE-8, TE-9, TE-12, TE-13, TE-16, TF-1, TF-3, TF-4, TF-5, TF-6, TF-7, TF-9, TF-11, TF-12, TF-14, TF-17, TF-18, TG-1, TG-2, TG-5, TG-7, TG-12, TG-13, TG-14, TG-15
	washcloth	1	0.91%			TG-3
Obj4	cloth	7	6.60%	106	74.65%	BE-2, IB-18, TE-6, TE-7, TF-3, TG-6
	cover	1	0.94%			BB-23
	handkerchief	14	13.21%			BA-8, BA-20, BB-4, BB-15, BB-18, BB-20, BB-23, BF-4, IB-1, IB-17, TE-1, TE-4, TE-11, TG-3
	napkin	6	5.66%			BF-5, IB-11, IB-13, TF-5, TF-9, TF-16
	rag	1	0.94%			TF-15
	sheet	2	1.89%			TF-8, TF-10
	towel	78	73.58%			BA-1, BA-2, BA-3, BA-9, BA-15, BA-16, BA-21, BA-22, BA-23, BB-2, BB-3, BB-8, BB-9, BB-11, BB-22, BB-24, BB-25, BE-3, BE-4, BF-1, BF-2, BF-3, BF-7, BF-8, BF-9, BF-10, BF-11, BF-14, BF-15, IA-1, IA-2, IA-3, IA-5, IA-6, IA-7, IA-8, IA-9, IA-10, IA-12, IA-13, IA-15, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-12, IB-14, IB-16, IB-19, TE-1, TE-3, TE-8, TE-9, TE-12, TE-13, TE-16, TF-1, TF-4, TF-5, TF-6, TF-7, TF-11, TF-12, TF-13, TF-14, TF-17, TF-18, TG-1, TG-2, TG-5, TG-7, TG-10, TG-12, TG-14, TG-15
	washcloth	1	0.94%			BB-13

Obj5	boxers	1	1.32%	76	53.52%	TG-13
	briefs	7	9.21%			BA-2, BB-9, BF-1, TE-3, TF-10, TG-3, TG-15
	pants	11	14.47%			BA-1, BB-5, BB-10, BB-18, BB-19, BE-4, BF-7, IB-12, TE-4, TE-9, TG-14
	panties	1	1.32%			BB-13
	shorts	13	17.11%			BA-13, BB-2, BF-3, IA-15, IB-8, IB-9, IB-10, IB-16, TF-9, TF-11, TG-2, TG-7, TG-12
	swimsuit	2	2.63%			BB-15, BF-4
	trousers	5	6.58%			BB-16, IA-1, IA-2, IB-5, TG-1
	underclothes	1	1.32%			BA-21
	underwear	36	47.37%			BA-6, BA-7, BA-8, BA-15, BB-3, BB-4, BB-11, BB-22, BB-25, BE-3, BF-2, BF-13, IA-3, IA-5, IA-6, IA-7, IA-11, IA-13, IB-7, IB-11, IB-13, IB-14, IB-18, IA-19, TE-1, TE-5, TE-8, TF-4, TF-7, TF-12, TF-18, TG-5, TG-6, TG-7, TG-9, TG-10
Obj6	boxers	3	4.48%	67	47.18%	BB-13, TG-3, TG-13
	briefs	3	4.48%			BA-2, BB-9, TF-10
	pants	11	16.42%			BA-1, BA-10, BB-5, BB-19, BB-25, BF-3, BF-4, BF-16, TE-4, TE-14, TG-9
	shorts	26	38.81%			BA-13, BB-2, BB-3, BB-15, BB-20, BE-4, BF-3, BF-7, BF-9, IA-15, IB-10, IB-16, TE-4, TE-5, TE-8, TE-16, TF-9, TF-11, TF-16, TG-2, TG-4, TG-6, TG-7, TG-12, TG-14, TG-15
	trousers	5	7.46%			BB-16, IA-1, IA-2, IB-5, TG-1
	underclothes	1	1.49%			BA-21
	underwear	21	31.34%			BA-15, BB-4, BB-11, BB-22, BF-2, BF-6, IA-3, IA-5, IA-7, IB-7, IB-11, IB-13, IB-14, IB-18, IB-19, TE-1, TF-4, TF-7, TF-18, TG-5
Obj7	shoes	77	98.72%	78	54.93%	BA-1, BA-2, BA-7, BA-9, BA-13, BA-15, BA-16, BA-18, BA-21, BA-22, BA-23, BB-4, BB-5, BB-6, BB-8, BB-11, BB-12, BB-20, BB-21, BB-22, BB-23, BB-24, BB-25, BE-2, BE-4, BF-3, BF-4, BF-5, BF-6, BF-7, BF-9, BF-10, BF-11, BF-14, BF-16, IA-5, IA-6, IA-9, IA-12, IA-13, IA-14, IA-15, IB-5, IB-6, IB-7, IB-14, IB-16, IB-17, IB-18, IB-20, TE-1, TE-5, TE-8, TE-11, TE-12, TE-13, TE-14, TF-3, TF-4, TF-6, TF-7, TF-8, TF-11, TF-14, TF-15, TF-17, TF-18, TG-1, TG-2, TG-3, TG-4, TG-5, TG-7, TG-9, TG-12, TG-13, TG-14
	slippers	1	1.28%			TE-15

Obj8	shoe	78	97.50%	80	56.34%	BA-1, BA-3, BA-6, BA-8, BA-10, BA-12, BA-20, BB-1, BB-2, BB-3, BB-4, BB-9, BB-10, BB-15, BB-16, BB-17, BB-18, BB-19, BB-20, BB-21, BB-22, BB-24, BE-3, BE-4, BF-1, BF-2, BF-3, BF-4, BF-6, BF-7, BF-12, BF-13, BF-15, BF-18, IA-1, IA-2, IA-8, IA-9, IA-11, IA-12, IA-13, IA-16, IB-1, IB-4, IB-5, IB-6, IB-8, IB-11, IB-12, IB-13, IB-16, IB-18, IB-19, IB-21, TE-1, TE-3, TE-4, TE-9, TE-14, TF-1, TF-3, TF-7, TF-9, TF-13, TF-14, TF-15, TF-17, TF-18, TG-1, TG-2, TG-3, TG-4, TG-7, TG-10, TG-12, TG-13, TG-14, TG-15
	slipper	2	2.50%			IA-4, IA-10
Obj9	bag	14	58.33%	24	16.90%	BA-13, BA-18, BB-15, BF-5, BF-6, BF-8, IB-5, IB-16, IB-20, TE-1, TE-4, TE-12, TF-9, TF-11
	pack	1	4.17%			BB-17
	package	6	25.00%			BA-2, BA-23, IB-8, TF-3, TF-18, TG-13
	packet	1	4.17%			BB-25
	parcel	2	8.33%			BF-1, TF-16
Obj10	brief	6	7.23%	83	58.45%	BA-1, BA-2, BB-10, TF-10, TF-15, TG-15
	inclothes	1	1.20%			TG-4
	pants	4	4.82%			BB-7, BB-18, BF-11, TE-4
	panty	1	1.20%			IB-8
	shorts	3	3.61%			BF-3, TE-9, TE-16
	underwear	68	81.93%			BA-3, BA-7, BA-13, BA-15, BA-18, BA-20, BB-2, BB-15, BB-16, BB-17, BB-19, BB-22, BB-23, BB-25, BE-2, BE-3, BE-4, BF-4, BF-5, BF-6, BF-8, BF-9, BF-10, BF-13, IA-2, IA-6, IA-9, IA-10, IA-12, IA-13, IA-15, IA-19, IB-1, IB-5, IB-6, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-21, TE-1, TE-5, TE-7, TE-8, TE-11, TE-12, TE-13, TE-14, TF-3, TF-4, TF-5, TF-6, TF-7, TF-8, TF-9, TF-11, TF-14, TF-18, TG-1, TG-2, TG-5, TG-6, TG-7, TG-9, TG-12, TG-13
Obj11	soap	76	100.00%	76	53.52%	BA-1, BA-3, BA-15, BA-18, BA-20, BB-1, BB-2, BB-5, BB-10, BB-12, BB-15, BB-17, BB-18, BB-19, BB-22, BB-25, BE-2, BE-3, BE-4, BF-1, BF-3, BF-4, BF-5, BF-6, BF-9, BF-10, BF-11, BF-18, IA-2, IA-3, IA-6, IA-8, IA-12, IA-15, IB-1, IB-5, IB-6, IB-8, IB-12, IB-13, IB-14, IB-16, IB-17, IB-19, IB-20, IB-21, TE-1, TE-4, TE-5, TE-7, TE-8, TE-9, TE-12, TE-14, TE-16, TF-3, TF-4, TF-5, TF-6, TF-7, TF-8, TF-9, TF-10, TF-11, TF-12, TF-14, TF-15, TF-18, TG-1, TG-2, TG-5, TG-7, TG-9, TG-12, TG-13, TG-15
Obj12	cloth	4	3.64%	110	77.46%	BA-1, IB-20, TE-6, TE-16

	shirt	71	64.55%			BA-2, BA-3, BA-6, BA-7, BA-8, BA-9, BA-11, BA-12, BA-15, BA-16, BA-18, BB-1, BB-2, BB-3, BB-4, BB-9, BB-12, BB-13, BB-17, BB-20, BB-22, BB-23, BB-25, BE-1, BE-2, BE-3, BE-4, BF-1, BF-4, BF-5, BF-8, BF-10, BF-11, BF-12, BF-14, BF-15, BF-18, IA-1, IA-3, IA-8, IA-9, IB-4, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-13, IB-14, IB-18, IB-20, IB-21, TE-4, TE-5, TE-9, TE-11, TE-13, TE-14, TF-1, TF-3, TF-4, TF-5, TF-9, TF-10, TF-18, TG-2, TG-4, TG-7, TG-12, TG-14
	T-shirt	37	33.64%			BA-12, BA-13, BA-17, BB-5, BB-7, BB-10, BB-15, BF-7, BF-9, BF-16, IA-2, IA-4, IA-5, IA-7, IA-11, IA-12, IA-13, IA-14, IA-15, IB-5, IB-16, IB-17, IB-19, TE-1, TE-3, TE-8, TF-6, TF-8, TF-11, TF-12, TF-13, TF-14, TF-16, TG-5, TG-6, TG-9, TG-10
Obj13	bag	8	88.89%	9	6.34%	BA-21, BB-23, IB-14, IB-16, IB-20, TE-9, TF-18, TG-4
	package	1	12.50%			BA-9
Obj14	brush	35	31.82%	110	77.46%	BA-3, BA-7, BA-10, BA-15, BA-16, BA-21, BA-23, BB-1, BB-7, BB-16, BB-24, BE-2, BE-3, BF-8, BF-14, IA-4, IA-5, IA-10, IA-14, IB-12, IB-19, IB-20, TE-3, TE-5, TE-8, TE-11, TE-12, TE-13, TF-1, TF-3, TF-6, TF-9, TG-7, TG-9, TG-10
	brushing	1	0.91%			TG-13
	toothbrush	88	80.00%			BA-1, BA-2, BA-6, BA-7, BA-8, BA-9, BA-11, BA-12, BA-13, BA-16, BA-18, BA-22, BA-23, BB-1, BB-2, BB-3, BB-4, BB-5, BB-8, BB-9, BB-10, BB-11, BB-12, BB-13, BB-15, BB-17, BB-18, BB-19, BB-21, BB-22, BB-23, BB-24, BB-25, BE-2, BE-4, BF-1, BF-3, BF-4, BF-5, BF-6, BF-7, BF-9, BF-10, BF-11, BF-14, BF-18, IA-2, IA-3, IA-5, IA-8, IA-9, IA-10, IA-12, IA-13, IA-15, IA-16, IB-4, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-21, TE-1, TE-5, TE-7, TE-9, TE-12, TE-13, TE-14, TF-4, TF-5, TF-6, TF-7, TF-8, TF-10, TF-11, TF-12, TF-13, TF-14, TF-15
Obj15	cream	2	1.80%	111	78.17%	BF-3, TG-12
	paste	12	10.81%			BA-10, BA-21, BE-3, BF-14, IA-4, IA-14, IA-15, TE-5, TE-8, TE-12, TG-2, TG-7
	toothcream	2	1.80%			TF-7, TG-12

	toothpaste	98	88.29%			BA-1, BA-2, BA-3, BA-7, BA-8, BA-9, BA-11, BA-12, BA-13, BA-15, BA-16, BA-17, BA-18, BA-20, BA-21, BA-23, BB-1, BB-2, BB-3, BB-4, BB-8, BB-9, BB-10, BB-11, BB-12, BB-13, BB-15, BB-16, BB-17, BB-18, BB-19, BB-22, BB-23, BB-24, BB-25, BE-2, BE-4, BF-1, BF-4, BF-5, BF-6, BF-7, BF-8, BF-9, BF-10, BF-11, BF-16, BF-18, IA-3, IA-5, IA-7, IA-8, IA-15, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-18, IB-19, IB-20, IB-21, TE-1, TE-3, TE-4, TE-9, TE-11, TE-13, TE-14, TF-1, TF-3, TF-4, TF-5, TF-6, TF-8, TF-9, TF-10, TF-11, TF-12, TF-13, TF-14, TF-15, TF-16, TF-17, TF-18, TG-1, TG-2, TG-3, TG-5, TG-6, TG-10, TG-13, TG-15
	toothwash	1	0.90%			BB-5
Obj16	khakis	1	0.79%	127	89.44%	TF-7
	pants	89	70.08%			BA-1, BA-2, BA-3, BA-6, BA-7, BA-8, BA-11, BA-12, BA-13, BA-15, BA-17, BA-18, BA-20, BB-1, BB-3, BB-5, BB-6, BB-8, BB-9, BB-10, BB-11, BB-16, BB-17, BB-19, BB-20, BB-21, BB-22, BB-23, BB-24, BE-2, BE-3, BE-4, BF-1, BF-2, BF-3, BF-4, BF-5, BF-6, BF-10, BF-13, BF-16, BF-18, IA-3, IA-4, IA-6, IA-7, IA-9, IA-10, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-10, IB-11, IB-12, IB-13, IB-16, IB-19, IB-21, TE-3, TE-7, TE-9, TE-11, TE-13, TE-14, TE-16, TF-1, TF-3, TF-4, TF-6, TF-9, TF-10, TF-11, TF-12, TF-13, TF-14, TF-15, TG-1, TG-2, TG-3, TG-4, TG-5, TG-6, TG-10, TG-12, TG-13, TG-15
	shorts	1	0.79%			TE-6
	trousers	29	22.83%			BA-9, BA-10, BA-16, BA-21, BA-22, BB-2, BB-7, BB-10, BB-15, BB-25, BF-7, BF-8, BF-9, BF-11, BF-12, BF-14, BF-15, IA-1, IA-2, IA-5, IA-8, IA-11, IA-12, IA-13, IA-14, IA-15, IB-14, IB-17, IB-18, TE-1, TE-4, TE-5, TE-8, TF-16, TF-17, TF-18, TG-7, TG-10
Obj17	scissors	28	100.00%	28	19.72%	BA-9, BA-11, BA-12, BA-16, BA-18, BA-21, BB-10, BB-25, BF-4, BF-5, IA-11, IB-5, IB-6, IB-14, IB-20, TE-12, TF-1, TF-3, TF-7, TF-11, TF-14, TF-15, TF-17, TG-2, TG-3, TG-3, TG-5, TG-7
Obj18	pants	20	40.00%	50	35.21%	BA-3, BA-10, BB-11, BB-16, BB-19, BB-22, BE-4, BF-5, BF-16, IA-4, IA-15, IB-1, IB-4, IB-6, IB-8, IB-11, IB-13, IB-19, TF-12, TF-15

	shorts	27	54.00%			BA-6, BA-16, BA-20, BA-21, BB-2, BB-9, BB-15, BE-3, BF-6, BF-7, BF-8, BF-9, BF-14, IA-7, IA-9, IA-11, IB-10, IB-13, TE-6, TE-9, TF-3, TF-6, TF-12, TG-1, TG-2, TG-3, TG-6
	trousers	6	12.00%			BB-15, IA-8, IB-18, TE-1, TE-4, TF-8
Obj19	khakis	1	1.39%	72	50.70%	TF-7
	pants	20	27.78%			BA-1, BA-10, BB-11, BB-19, BE-4, BF-2, BF-4, BF-11, IA-6, IB-4, IB-6, IB-7, TE-3, TE-7, TE-13, TF-1, TG-4, TG-5, TG-7, TG-10
	shorts	46	63.89%			BA-3, BA-6, BA-12, BA-15, BA-16, BA-21, BB-1, BB-2, BB-3, BB-9, BB-15, BB-16, BE-3, BF-1, BF-5, BF-6, BF-7, BF-8, BF-9, BF-10, BF-14, BF-15, IA-7, IA-10, IA-15, IB-8, IB-10, IB-11, IB-13, IB-14, TE-4, TE-9, TE-12, TF-3, TF-8, TF-11, TF-13, TF-15, TF-16, TF-17, TF-18, TG-1, TG-2, TG-3, TG-6, TG-13
	trousers	6	8.33%			BB-25, BF-15, IA-12, IB-17, IB-18, TE-1
Obj20	bear	92	89.32%	103	72.54%	BA-2, BA-3, BA-6, BA-9, BA-12, BA-13, BA-16, BA-18, BB-2, BB-8, BB-9, BB-11, BB-12, BB-15, BB-16, BB-17, BB-20, BB-21, BB-22, BB-25, BE-2, BE-3, BE-4, BF-1, BF-2, BF-3, BF-5, BF-7, BF-8, BF-9, BF-10, BF-12, BF-14, BF-16, IA-3, IA-6, IA-7, IA-9, IA-10, IA-14, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-20, IB-21, TE-5, TE-6, TE-7, TE-8, TE-9, TE-12, TE-13, TE-14, TF-1, TF-3, TF-4, TF-6, TF-7, TF-8, TF-9, TF-10, TF-11, TF-12, TF-13, TF-15, TF-16, TF-17, TF-18, TG-1, TG-3, TG-4, TG-5, TG-6, TG-7, TG-9, TG-10, TG-12, TG-13, TG-14, TG-15
	Teddy	47	45.63%			BA-9, BA-13, BA-18, BA-20, BB-1, BB-2, BB-8, BB-12, BB-15, BB-21, BB-25, BE-1, BE-2, BE-3, BF-6, BF-7, BF-8, BF-9, BF-10, BF-14, BF-16, IA-2, IA-4, IA-9, IA-10, IA-12, IA-15, IB-7, IB-11, IB-13, IB-21, TE-1, TE-5, TE-8, TE-12, TF-1, TF-3, TF-5, TF-7, TF-14, TF-15, TF-16, TF-17, TF-18, TG-1, TG-10, TG-13
Obj21	bible	4	3.31%	121	85.21%	BA-16, TF-11, TF-12, TF-13
	book	82	67.77%			BA-1, BA-3, BA-8, BA-9, BA-10, BA-11, BA-12, BA-13, BA-15, BA-18, BA-21, BA-22, BB-4, BB-5, BB-6, BB-8, BB-11, BB-12, BB-15, BB-16, BB-17, BB-18, BB-22, BE-2, BE-3, BE-4, BF-1, BF-3, BF-4, BF-5, BF-6, BF-7, BF-9, BF-10, BF-16, BF-18, IA-3, IA-4, IA-6, IA-9, IA-14, IA-16, IB-4, IB-6, IB-8, IB-10,

						IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-19, TE-1, TE-3, TE-7, TE-8, TE-11, TE-12, TE-13, TE-14, TE-16, TF-1, TF-3, TF-5, TF-6, TF-7, TF-8, TF-9, TF-12, TF-13, TF-14, TF-15, TF-16, TF-18, TG-1, TG-2, TG-5, TG-7, TG-9, TG-10, TG-15
	magazine	1	0.83%			TG-5
	notebook	40	33.06%			BA-2, BA-20, BA-23, BB-1, BB-2, BB-3, BB-9, BB-10, BB-19, BB-20, BB-23, BB-24, BB-25, BE-4, BF-2, BF-8, BF-11, BF-12, BF-14, BF-15, IA-1, IA-8, IA-12, IA-13, IA-15, IB-9, IB-18, IB-20, TE-4, TE-5, TE-9, TF-4, TF-10, TG-3, TG-4, TG-5, TG-6, TG-12, TG-13, TG-14
Obj22	box	10	7.19%	139	97.89%	BB-3, BB-4, BB-9, BB-20, BB-21, IA-8, IB-19, TE-7, TF-4, TF-12
	case	35	25.18%			BA-2, BA-3, BA-8, BA-15, BB-2, BB-13, BB-16, BB-25, BE-1, BE-2, BE-3, BF-1, BF-3, BF-5, BF-11, BF-14, IA-5, IA-9, IA-11, IA-13, IA-15, IB-4, IB-20, TE-13, TE-14, TF-3, TF-13, TF-14, TF-17, TG-1, TG-3, TG-6, TG-7, TG-10, TG-12
	luggage	5	3.60%			BA-6, BA-22, BB-10, IA-16, TE-12
	package	1	0.72%			IA-6
	suitcase	101	72.66%			BA-7, BA-9, BA-10, BA-11, BA-12, BA-13, BA-16, BA-18, BA-20, BA-21, BA-23, BB-1, BB-2, BB-5, BB-6, BB-7, BB-8, BB-11, BB-12, BB-15, BB-17, BB-18, BB-19, BB-22, BB-23, BB-25, BE-3, BE-4, BF-2, BF-3, BF-4, BF-6, BF-7, BF-8, BF-9, BF-10, BF-12, BF-13, BF-14, BF-15, BF-16, BF-18, IA-1, IA-2, IA-3, IA-4, IA-5, IA-7, IA-10, IA-12, IA-14, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-21, TE-1, TE-3, TE-4, TE-5, TE-6, TE-8, TE-9, TE-11, TE-13, TE-14, TE-16, TF-1, TF-5, TF-6, TF-7, TF-8, TF-9, TF-10, TF-11, TF-14, TF-15, TF-16, TF-18, TG-1, TG-2, TG-4, TG-5, TG-7, TG-9, TG-10, TG-12, TG-13, TG-14, TG-15
	trunk	1	0.72%			BB-24

Appendix VIII Objects and Their Classifiers with Participant List (Chinese Learners of English)

Object	Classifier	Range				Participant
		Individual		Total		
Obj5	pair	4	100.00%	4	2.82%	BE-4, TF-9, TG-2, TG-4
Obj6	pair	8	100.00%	8	5.63%	BB-25, BF-3, TE-8, TF-9, TG-2, TG-3, TG-4, TG-6
Obj7	pair	60	100.00%	60	42.25%	BA-1, BA-2, BA-7, BA-13, BA-15, BA-18, BA-21, BA-23, BB-6, BB-10, BB-20, BB-22, BB-24, BB-25, BE-2, BE-3, BE-4, BF-4, BF-6, BF-7, BF-11, BF-16, IA-1, IA-2, IA-5, IA-9, IA-12, IA-15, IB-4, IB-5, IB-6, IB-7, IB-14, IB-16, IB-17, IB-18, TE-1, TE-3, TE-5, TE-8, TE-11, TE-12, TE-13, TE-14, TF-1, TF-4, TF-7, TF-14, TF-15, TF-17, TF-18, TG-1, TG-2, TG-3, TG-4, TG-7, TG-12, TG-13, TG-14, TG-15
Obj10	pair	10	100.00%	10	7.04%	BB-10, BE-4, BF-3, BF-8, IA-10, IB-16, IB-17, TE-4, TE-8, TE-16
Obj11	bar	6	85.71%	7	4.93%	BB-25, IB-14, IB-16, IB-20, TF-3, TF-18
	cake	1	14.29%			TF-15
Obj15	bar	1	100.00%	1	0.70%	BB-25
Obj16	pair	31	100.00%	31	21.83%	BA-1, BA-6, BA-10, BA-15, BA-18, BB-2, BB-10, BB-19, BB-24, BB-25, BE-3, BE-4, BF-2, IA-1, IA-10, IB-1, IB-4, IB-8, IB-17, IB-18, TF-4, TF-7, TF-8, TF-12, TF-14, TF-18, TG-2, TG-3, TG-4, TG-7, TG-13
Obj17	pair	7	100.00%	7	4.93%	BA-9, BB-25, IB-5, IB-14, TF-17, TG-2, TG-7
Obj18	pair	7	100.00%	7	4.93%	BB-2, BB-15, BE-3, BF-8, IB-8, IB-10, TF-3
Obj19	pair	38	100.00%	38	26.76%	BA-1, BA-12, BA-15, BA-16, BA-21, BB-2, BB-8, BB-15, BE-3, BE-4, BF-2, BF-5, BF-8, IA-1, IA-10, IB-4, IB-5, IB-8, IB-13, IB-14, TE-1, TE-4, TE-12, TF-3, TF-8, TF-9, TF-12, TF-14, TF-15, TF-16, TF-18, TG-1, TG-2, TG-3, TG-6, TG-7, TG-10, TG-13

Appendix IX Numeral Meanings of Words as References to the Objects with Participant List

Object	Type	Numeral Meaning			Participant
Obj1	box	c/s	6	50.00%	BB-9, BB-20, IB-19, TE-7, TF-4, TF-12
		?	6	50.00%	BB-3, BB-4, BB-10, BB-21, IA-6, IA-8,
Obj1	carrier	c/s	1	100.00%	BB-25
Obj1	case	c/s	11	21.15%	BA-1, BB-15, BE-1, BF-4, IA-11, IB-20, TE-13, TF-5, TF-9, TG-1, TG-3
		?	41	78.85%	BA-2, BA-3, BA-8, BA-10, BA-15, BA-17, BA-21, BB-2, BB-13, BB-16, BB-25, BE-2, BE-3, BF-1, BF-2, BF-3, BF-5, BF-7, BF-11, BF-14, IA-1, IA-5, IA-9, IA-13, IA-15, IB-1, IB-4, TE-4, TE-14, TF-3, TF-7, TF-13, TF-14, TF-17, TF-18, TG-4, TG-6, TG-7, TG-10, TG-12, TG-15
Obj1	luggage	?	4	100.00%	BA-6, BA-22, IA-16, TE-12
Obj1	package	c/s	1	50.00%	IA-8
		?	1	50.00%	IA-6
Obj1	suitcase	c/s	33	31.73%	BA-1, BA-7, BA-9, BA-12, BA-13, BA-23, BB-1, BB-2, BE-2, BE-4, BF-4, BF-6, BF-8, IA-1, IA-7, IB-1, IB-6, IB-7, IB-8, IB-9, IB-11, IB-13, IB-14, IB-16, IB-18, TE-11, TE-16, TF-14, TF-15, TF-16, TG-1, TG-4, TG-13
		?	71	68.27%	BA-3, BA-10, BA-11, BA-16, BA-18, BA-20, BA-21, BB-5, BB-6, BB-7, BB-8, BB-11, BB-12, BB-15, BB-17, BB-18, BB-19, BB-22, BB-23, BB-25, BE-3, BF-2, BF-3, BF-7, BF-9, BF-10, BF-11, BF-12, BF-13, BF-14, BF-15, BF-16, BF-18, IA-2, IA-3, IA-4, IA-5, IA-10, IA-12, IA-14, IA-15, IB-4, IB-5, IB-10, IB-12, IB-17, IB-21, TE-1, TE-3, TE-4, TE-5, TE-6, TE-8, TE-9, TE-13, TF-1, TF-5, TF-6, TF-7, TF-8, TF-9, TF-10, TF-11, TF-18, TG-2, TG-5, TG-9, TG-10, TG-12, TG-14, TG-15
Obj1	trunk	c/s	1	100.00%	BB-24
Obj2	bottle	c/s	34	89.47%	BA-2, BA-23, BB-1, BB-8, BB-11, BB-20, BB-25, BF-2, BF-7, BF-10, BF-11, BF-14, BF-16, BF-18, IA-1, IA-3, IA-9, IA-12, IA-13, IA-14, IB-6, IB-8, IB-18, IB-19, TE-7, TE-8, TE-9, TE-11, TF-10, TF-14, TG-1, TG-2, TG-6, TG-9
		u	4	10.53%	BB-22, IB-5, TF-6, TG-5
Obj2	can	c/s	55	96.49%	BA-1, BA-8, BA-18, BB-4, BB-6, BB-10, BB-13, BB-15, BB-17, BB-18, BB-19, BB-23, BE-3, BE-4, BF-1, BF-3, BF-4, BF-6, BF-9, BF-15, IA-2, IA-6, IA-8, IA-10, IA-15, IB-7, IB-9, IB-10, IB-11, IB-13, IB-14, IB-16, IB-21, TE-1, TE-3, TE-4, TE-5, TE-12, TE-13, TE-14, TF-1, TF-3, TF-5,

					TF-8, TF-9, TF-11, TF-12, TF-17, TF-18, TG-4, TG-7, TG-12, TG-13, TG-14, TG-15
		u	2	3.51%	BF-10, IA-11
Obj2	jar	c/s	1	100.00%	BB-21
Obj2	tin	c/s	12	100.00%	BA-7, BA-9, BA-10, BB-16, BB-24, IB-1, TF-4, TF-7, TF-13, TF-15, TF-16, TG-5
Obj2	beer	c/s	16	29.09%	BA-17, BA-21, BB-7, BB-22, BE-1, BE-2, BF-12, IA-13, IB-12, IB-20, TE-8, TF-6, TF-7, TF-16, TG-5, TG-10
		u	37	67.27%	BA-1, BA-23, BB-4, BB-5, BB-16, BB-17, BB-21, BF-3, BF-7, BF-15, BF-16, IA-5, IA-9, IA-11, IA-12, IA-14, IA-15, IB-1, IB-5, IB-6, IB-21, TE-9, TE-11, TE-12, TF-1, TF-3, TF-4, TF-8, TF-10, TF-14, TF-17, TG-1, TG-2, TG-7, TG-12, TG-14, TG-15
		?	2	3.64%	BA-3, IA-4
Obj3	blanket	c/s	1	16.67%	BF-6
		?	5	83.33%	BF-15, IB-14, TE-6, TE-14, TG-6
Obj3	carpet	c/s	3	100.00%	BB-22, IA-15, TG-9
Obj3	cloth	u	2	40.00%	BE-1, IB-20
		c/s	3	60.00%	IB-17, IB-18, TE-7
Obj3	cover	?	3	75.00%	BA-23, BB-8, BB-23,
Obj3	covers	c/s	1	25.00%	TG-4
Obj3	quilt	c/s	1	20.00%	BA-21
		?	4	80.00%	BA-22, IB-12, TE-4, TE-11
Obj3	sheet	c/s	4	57.14%	IB-4, TF-8, TF-15, TG-10
		?	3	42.86%	BE-2, BF-13, TF-16
Obj3	swimsuit	c/s	2	100.00%	BB-15, BF-4
Obj3	towel	c/s	41	51.25%	BA-1, BA-3, BA-15, BA-16, BB-11, BB-24, BB-25, BE-3, BE-4, BF-3, BF-4, BF-9, BF-11, BF-18, IA-1, IA-2, IA-3, IA-9, IB-4, IB-5, IB-6, IB-7, IB-10, IB-11, IB-16, IB-19, TE-1, TE-5, TE-8, TE-13, TF-1, TF-4, TF-7, TF-11, TF-18, TG-1, TG-2, TG-7, TG-12, TG-13, TG-14
		u	1	1.25%	BA-2
		?	38	47.50%	BA-7, BA-8, BA-9, BA-10, BA-11, BA-18, BA-20, BB-1, BB-3, BB-4, BB-12, BB-15, BB-17, BB-18, BB-22, BF-1, BF-5, BF-7, BF-8, BF-10, IA-8, IA-12, IA-13, IA-16, IB-8, IB-13, TE-3, TE-9, TE-12, TE-16, TF-3, TF-5, TF-6, TF-9, TF-12, TF-14, TF-17, TG-5, TG-15
Obj3	washcloth	?	1	100.00%	TG-3
Obj4	cloth	c/s	5	71.43%	BE-2, IB-18, TE-6, TE-7, TF-3
		u	2	28.57%	BE-1, TG-6

Obj4	cover	c/s	1	100.00%	BB-23
Obj4	handkerchief	c/s	12	85.71%	BA-8, BB-4, BB-15, BB-18, BB-20, BB-23, BF-4, IB-1, IB-17, TE-1, TE-11, TG-3
		?	2	14.29%	BA-20, TE-4
Obj4	napkin	c/s	5	83.33%	BF-5, IB-11, IB-13, TF-5, TF-9
		?	1	16.67%	TF-16
Obj4	rag	c/s	1	100.00%	TF-15
Obj4	sheet	c/s	2	100.00%	TF-8, TF-10
Obj4	towel	c/s	62	79.49%	BA-1, BA-3, BA-15, BA-16, BA-21, BA-22, BB-2, BB-3, BB-8, BB-9, BB-11, BB-22, BB-24, BB-25, BE-3, BE-4, BF-2, BF-7, BF-9, BF-11, BF-14, BF-15, IA-1, IA-3, IA-7, IA-8, IA-9, IA-10, IA-12, IA-13, IA-15, IB-4, IB-5, IB-6, IB-7, IB-8, IB-10, IB-12, IB-14, IB-19, TE-1, TE-8, TE-9, TE-12, TE-13, TE-16, TF-1, TF-4, TF-5, TF-6, TF-7, TF-14, TF-17, TF-18, TG-1, TG-5, TG-7, TG-10, TG-12, TG-14, TG-15, TF-11
		u	1	1.28%	BA-2
		?	15	19.23%	BA-9, BA-23, BF-1, BF-3, BF-8, BF-10, IA-2, IA-5, IA-6, IB-9, IB-16, TE-3, TF-12, TF-13, TG-2
Obj4	washcloth	u	1	100.00%	BB-13
Obj5	boxer	?	1	100.00%	TG-13
Obj5	brief	c/s	3	42.86%	BA-2, BB-9, TE-3
		?	2	28.57%	BF-1, TG-15
	briefs	c/s	2	28.57%	TF-10, TG-3
Obj5	pant	c/s	1	9.09%	IB-12
	pants	c/s	3	27.27%	BB-5, BF-7, TE-9
		c/p	7	63.64%	BA-1, BB-10, BB-18, BB-19, BE-4, TE-4, TG-14
Obj5	panties	c/p	1	100.00%	BB-13
Obj5	shorts	c/s	9	69.23%	BA-13, BB-2, IA-15, IB-8, IB-10, IB-16, TF-11, TG-7, TG-12
		c/p	2	15.38%	TF-9, TG-2
		?	2	15.38%	BF-3, IB-9
Obj5	trouser	c/s	1	20.00%	BB-16
	trousers	c/s	3	60.00%	IA-2, IB-5, TG-1
		?	1	20.00%	IA-1
Obj5	underclothes	u	1	100.00%	BA-21
Obj5	underwear	c/s	28	77.78%	BA-6, BA-7, BA-8, BB-3, BB-22, BB-25, BE-3, BF-2, BF-13, IA-3, IA-6, IA-7, IA-11, IA-13, IB-7, IB-11, IB-13, IB-14, IB-18, IA-19, TE-1, TE-5, TF-4, TF-7, TF-18, TG-5, TG-6, TG-7,
		u	1	2.78%	TE-8

		?	7	19.44%	BA-15, BB-4, BB-11, IA-5, TF-12, TG-9, TG-10
Obj6	boxer	c/s	1	33.33%	TG-13,
	boxers	c/p	2	66.67%	BB-13, TG-3
Obj6	briefs	c/s	3	100.00%	BA-2, BB-9, TF-10
Obj6	pants	c/s	1	9.09%	BB-5
		c/p	10	90.91%	BA-1, BA-10, BB-19, BB-25, BF-3, BF-4, BF-16, TE-4, TE-14, TG-9
Obj6	shorts	c/s	10	38.46%	BA-13, BB-2, BB-15, BB-20, IA-15, IB-10, IB-16, TF-11, TG-7, TG-12
		c/p	6	23.08%	BF-3, TE-8, TF-9, TG-2, TG-4, TG-6
		?	10	38.46%	BB-3, BE-4, BF-7, BF-9, TE-4, TE-5, TE-16, TF-16, TG-14, TG-15
Obj6	trouser	c/s	1	20.00%	BB-16
	trousers	c/s	3	60.00%	IA-2, IB-5, TG-1
		?	1	20.00%	IA-1
Obj6	underclothes	u	1	100.00%	BA-21
Obj6	underwear	c/s	15	71.43%	BB-22, BF-2, BF-6, IA-3, IA-7, IB-7, IB-11, IB-13, IB-14, IA-19, TE-1, TF-4, TF-7, TF-18, TG-5
		?	6	28.57%	BA-15, BB-4, BB-11, IA-5, IA-11, IB-18
Obj7	shoes	c/p	77	100.00%	BA-1, BA-2, BA-7, BA-9, BA-13, BA-15, BA-16, BA-18, BA-21, BA-22, BA-23, BB-4, BB-5, BB-6, BB-8, BB-11, BB-12, BB-20, BB-21, BB-22, BB-23, BB-24, BB-25, BE-2, BE-4, BF-3, BF-4, BF-5, BF-6, BF-7, BF-9, BF-10, BF-11, BF-14, BF-16, IA-5, IA-6, IA-9, IA-12, IA-13, IA-14, IA-15, IB-5, IB-6, IB-7, IB-14, IB-16, IB-17, IB-18, IB-20, TE-1, TE-5, TE-8, TE-11, TE-12, TE-13, TE-14, TF-3, TF-4, TF-6, TF-7, TF-8, TF-11, TF-14, TF-15, TF-17, TF-18, TG-1, TG-2, TG-3, TG-4, TG-5, TG-7, TG-9, TG-12, TG-13, TG-14
Obj7	slippers	c/p	1	100.00%	TE-15
Obj8	shoe	c/s	71	91.03%	BA-1, BA-3, BA-6, BA-8, BA-10, BA-12, BA-20, BB-1, BB-3, BB-4, BB-9, BB-10, BB-15, BB-16, BB-17, BB-18, BB-20, BB-21, BB-22, BB-24, BE-4, BF-2, BF-3, BF-4, BF-6, BF-7, BF-12, BF-13, BF-15, BF-18, IA-1, IA-2, IA-8, IA-9, IA-11, IA-12, IA-13, IA-16, IB-1, IB-5, IB-6, IB-8, IB-11, IB-13, IB-16, IB-18, IB-19, IB-21, TE-1, TE-4, TE-9, TE-14, TF-1, TF-3, TF-7, TF-9, TF-13, TF-14, TF-15, TF-17, TF-18, TG-1, TG-2, TG-3, TG-4, TG-7, TG-10, TG-12, TG-13, TG-14, TG-15
	shoes	c/s	7	8.97%	BB-2, BB-19, BE-3, BF-1, IB-4, IB-12, TE-3
Obj8	slipper	c/s	2	100.00%	IA-4, IA-10

Obj9	bag	c/s	11	78.57%	BA-13, BA-18, BB-15, BF-5, BF-6, BF-8, IB-16, TE-1, TE-4, TF-9, TF-11
		?	3	21.43%	IB-5, IB-20, TE-12
Obj9	pack	c/s	1	100.00%	BB-17
Obj9	package	c/s	3	50.00%	BA-2, BA-23, TF-18
		?	3	50.00%	IB-8, TF-3, TG-13
Obj9	packet	c/s	1	100.00%	BB-25
Obj9	parcel	c/s	1	50.00%	TF-16
		?	1	50.00%	BF-1
Obj10	brief	c/s	1	16.67%	TG-15
		?	1	16.67%	TF-10
	briefs	c/s	4	66.67%	BA-1, BA-2, BB-10, TF-15
Obj10	inclothes	c/s	1	100.00%	TG-4
Obj10	pants	c/s	4	100.00%	BB-7, BB-18, BF-11, TE-4
Obj10	panty	c/s	1	100.00%	IB-8
Obj10	shorts	c/s	1	33.33%	TE-9
		c/p	2	66.67%	BF-3, TE-16
Obj10	underwear	c/s	55	80.88%	BA-3, BA-7, BA-13, BA-15, BA-18, BA-20, BB-15, BB-17, BB-19, BB-22, BB-23, BB-25, BE-2, BE-3, BF-4, BF-5, BF-6, BF-9, BF-10, BF-13, IA-2, IA-6, IA-9, IA-10, IA-12, IA-13, IA-15, IA-19, IB-5, IB-6, IB-13, IB-14, IB-16, IB-21, TE-1, TE-5, TE-11, TE-12, TE-13, TE-14, TF-3, TF-4, TF-5, TF-6, TF-8, TF-9, TF-14, TF-18, TG-1, TG-2, TG-5, TG-6, TG-7, TG-12, TG-13
		u	5	7.35%	BE-4, BF-8, IB-17, TE-8, TF-7
		?	8	11.76%	BB-2, BB-16, IB-1, IB-12, IB-18, TE-7, TF-11, TG-9
Obj11	soap	c/s	51	67.11%	BA-3, BA-15, BA-18, BA-20, BB-1, BB-2, BB-15, BB-17, BB-19, BB-22, BE-2, BE-3, BE-4, BF-3, BF-4, BF-5, BF-6, BF-9, BF-10, BF-11, BF-18, IA-2, IA-6, IA-8, IA-12, IA-15, IB-1, IB-6, IB-8, IB-12, IB-13, IB-17, IB-21, TE-1, TE-4, TE-5, TE-8, TE-9, TE-12, TE-14, TF-4, TF-5, TF-8, TF-9, TF-11, TF-12, TG-2, TG-5, TG-9, TG-12, TG-15
		u	14	18.42%	BA-1, BB-25, IB-14, IB-16, IB-19, IB-20, TE-16, TF-3, TF-6, TF-7, TF-14, TF-15, TF-18, TG-1
		?	11	14.47%	BB-5, BB-10, BB-12, BB-18, BF-1, IA-3, IB-5, TE-7, TF-10, TG-7, TG-13
Obj12	cloth	c/s	2	50.00%	IB-20, TE-6
		u	1	25.00%	BA-1
		?	1	25.00%	TE-16

Obj12	shirt	c/s	71	100.00%	BA-2, BA-3, BA-6, BA-7, BA-8, BA-9, BA-11, BA-12, BA-15, BA-16, BA-18, BB-1, BB-2, BB-3, BB-4, BB-9, BB-12, BB-13, BB-17, BB-20, BB-22, BB-23, BB-25, BE-1, BE-2, BE-3, BE-4, BF-1, BF-4, BF-5, BF-8, BF-10, BF-11, BF-12, BF-14, BF-15, BF-18, IA-1, IA-3, IA-8, IA-9, IB-4, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-13, IB-14, IB-18, IB-20, IB-21, TE-4, TE-5, TE-9, TE-11, TE-13, TE-14, TF-1, TF-3, TF-4, TF-5, TF-9, TF-10, TF-18, TG-2, TG-4, TG-7, TG-12, TG-14
Obj12	T-shirt	c/s	37	100.00%	BA-12, BA-13, BA-17, BB-5, BB-7, BB-10, BB-15, BF-7, BF-9, BF-16, IA-2, IA-4, IA-5, IA-7, IA-11, IA-12, IA-13, IA-14, IA-15, IB-5, IB-16, IB-17, IB-19, TE-1, TE-3, TE-8, TF-6, TF-8, TF-11, TF-12, TF-13, TF-14, TF-16, TG-5, TG-6, TG-9, TG-10
Obj13	bag	c/s	7	87.50%	BA-21, BB-23, IB-16, IB-20, TE-9, TF-18, TG-4
		?	1	12.50%	IB-14
Obj13	package	?	1	100.00%	BA-9
Obj14	brush	c/s	2	5.71%	BA-3, IB-12
		?	33	94.29%	BA-7, BA-10, BA-15, BA-16, BA-21, BA-23, BB-1, BB-7, BB-16, BB-24, BE-2, BE-3, BF-8, BF-14, IA-4, IA-5, IA-10, IA-14, IB-19, IB-20, TE-3, TE-5, TE-8, TE-11, TE-12, TE-13, TF-1, TF-3, TF-6, TF-9, TG-7, TG-9, TG-10
Obj14	brushing	?	1	100.00%	TG-13
Obj14	toothbrush	c/s	7	7.95%	BA-11, BB-19, BB-25, TE-9, TF-8, TF-12, TF-14
		?	81	92.05%	BA-1, BA-2, BA-6, BA-7, BA-8, BA-9, BA-12, BA-13, BA-16, BA-18, BA-22, BA-23, BB-1, BB-2, BB-3, BB-4, BB-5, BB-8, BB-9, BB-10, BB-11, BB-12, BB-13, BB-15, BB-17, BB-18, BB-21, BB-22, BB-23, BB-24, BE-2, BE-4, BF-1, BF-3, BF-4, BF-5, BF-6, BF-7, BF-9, BF-10, BF-11, BF-14, BF-18, IA-2, IA-3, IA-5, IA-8, IA-9, IA-10, IA-12, IA-13, IA-15, IA-16, IB-4, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-21, TE-1, TE-5, TE-7, TE-12, TE-13, TE-14, TF-4, TF-5, TF-6, TF-7, TF-10, TF-11, TF-13, TF-15
Obj15	cream	u	2	100.00%	BF-3, TG-12
Obj15	paste	?	12	100.00%	BA-10, BA-21, BE-3, BF-14, IA-4, IA-14, IA-15, TE-5, TE-8, TE-12, TG-2, TG-7
Obj15	toothcream	?	2	100.00%	TF-7, TG-12
Obj15	toothpaste	c/s	3	2.97%	IA-7, TE-1, TG-13

		?	98	97.03%	BA-1, BA-2, BA-3, BA-7, BA-8, BA-9, BA-11, BA-12, BA-13, BA-15, BA-16, BA-17, BA-18, BA-20, BA-21, BA-23, BB-1, BB-2, BB-3, BB-4, BB-8, BB-9, BB-10, BB-11, BB-12, BB-13, BB-15, BB-16, BB-17, BB-18, BB-19, BB-22, BB-23, BB-24, BB-25, BE-2, BE-4, BF-1, BF-4, BF-5, BF-6, BF-7, BF-8, BF-9, BF-10, BF-11, BF-16, BF-18, IA-3, IA-5, IA-8, IA-15, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-18, IB-19, IB-20, IB-21, TE-3, TE-4, TE-9, TE-11, TE-13, TE-14, TF-1, TF-3, TF-4, TF-5, TF-6, TF-8, TF-9, TF-10, TF-11, TF-12, TF-13, TF-14, TF-15, TF-16, TF-17, TF-18, TG-1, TG-2, TG-3, TG-5, TG-6, TG-10, TG-15
Obj15	toothwash	?	1	100.00%	BB-5
Obj16	khakis	c/p	1	100.00%	TF-7
Obj16	pant	c/s	5	5.62%	BA-11, BA-18, BB-10, IA-7, TF-4
	pants	c/s	20	22.47%	BA-3, BB-9, BB-20, BE-2, BF-1, BF-3, BF-5, IA-10, IB-7, IB-8, IB-10, IB-11, TE-13, TE-14, TF-3, TF-9, TF-15, TG-4, TG-5, TG-12
		c/p	64	71.91%	BA-1, BA-2, BA-6, BA-7, BA-8, BA-12, BA-13, BA-15, BA-17, BA-20, BB-1, BB-3, BB-5, BB-6, BB-8, BB-11, BB-16, BB-17, BB-19, BB-21, BB-22, BB-23, BB-24, BE-3, BE-4, BF-2, BF-4, BF-6, BF-10, BF-13, BF-16, BF-18, IA-3, IA-4, IA-6, IA-9, IB-1, IB-4, IB-5, IB-6, IB-12, IB-13, IB-16, IB-19, IB-21, TE-3, TE-7, TE-9, TE-11, TE-16, TF-1, TF-6, TF-10, TF-11, TF-12, TF-13, TF-14, TG-1, TG-2, TG-3, TG-6, TG-10, TG-13, TG-15
Obj16	shorts	?	1	100%	TE-6
Obj16	trouser	?	4	13.79%	BF-12, IA-8, IA-11, IA-14
	trousers	c/s	11	37.93%	BB-15, BF-11, BF-14, BF-15, IA-1, IA-5, IA-11, IA-12, IB-14, TE-4, TF-16
		c/p	9	31.03%	BB-2, BB-10, BB-25, IB-17, IB-18, TE-8, TF-18, TG-7, TG-10
		?	15	51.72%	BA-9, BA-10, BA-16, BA-21, BA-22, BB-7, BF-7, BF-8, BF-9, IA-2, IA-13, IA-15, TE-1, TE-5, TF-17
Obj17	scissor	c/s	2	7.14%	IB-20, TG-5
	scissors	c/s	3	10.71%	BF-4, IA-11, IB-6
		c/p	23	82.14%	BA-9, BA-11, BA-12, BA-16, BA-18, BA-21, BB-10, BB-25, BF-5, IB-5, IB-14, TE-12, TF-1, TF-3, TF-7, TF-11, TF-14, TF-15, TF-17, TG-2, TG-3, TG-3, TG-7
Obj18	pants	c/s	4	20.00%	BB-11, IA-15, IB-1, IB-6

		c/p	16	80.00%	BA-3, BA-10, BB-16, BB-19, BB-22, BE-4, BF-5, BF-16, IA-4, IB-4, IB-8, IB-11, IB-13, IB-19, TF-12, TF-15
Obj18	shorts	c/s	6	22.22%	BA-6, BF-7, BF-9, IA-7, IA-11, TF-6
		c/p	8	29.63%	BB-2, BB-15, BE-3, BF-8, IB-10, TF-3, TG-2, TG-6
		?	13	48.15%	BA-16, BA-20, BA-21, BB-9, BF-6, BF-14, IA-9, IB-13, TE-6, TE-9, TF-12, TG-1, TG-3
Obj18	trouser	c/s	1	16.67%	IA-8
	trousers	c/s	2	33.33%	IB-18, TF-8
		?	3	50.00%	BB-15, TE-1, TE-4
Obj19	khakis	c/s	1	100.00%	TF-7
Obj19	pants	c/s	7	35.00%	BB-11, BB-19, BF-4, BF-11, IB-4, TE-7, TG-5
		c/p	13	65.00%	BA-1, BA-10, BE-4, BF-2, IA-6, IB-6, IB-7, TE-3, TE-13, TF-1, TG-4, TG-7, TG-10
Obj19	shorts	c/s	12	26.09%	BA-3, BA-6, BB-3, BB-16, BF-1, BF-6, BF-7, BF-9, BF-15, IA-7, IB-15, IB-11
		c/p	26	56.52%	BA-12, BA-15, BA-16, BA-21, BB-2, BB-9, BB-15, BE-3, BF-5, BF-8, IA-10, IB-8, IB-13, IB-14, TE-4, TE-12, TF-3, TF-8, TF-15, TF-16, TF-18, TG-1, TG-2, TG-3, TG-6, TG-13
		?	9	19.57%	BB-1, BF-10, BF-14, IA-15, IB-10, TE-9, TF-11, TF-13, TF-17
Obj19	trouser	c/s	1	16.67%	IA-12
	trousers	c/s	5	83.33%	BB-25, BF-15, IB-17, IB-18, TE-1
Obj20	bear	c/s	15	16.30%	BA-18, BB-9, BB-17, BF-1, IA-7, IB-1, IB-4, IB-8, IB-9, TE-12, TF-8, TF-10, TG-6, TG-7, TG-14
		?	77	83.70%	BA-2, BA-3, BA-6, BA-9, BA-12, BA-13, BA-16, BB-2, BB-8, BB-11, BB-12, BB-15, BB-16, BB-20, BB-21, BB-22, BB-25, BE-2, BE-3, BE-4, BF-2, BF-3, BF-5, BF-7, BF-8, BF-9, BF-10, BF-12, BF-14, BF-16, IA-3, IA-6, IA-9, IA-10, IA-14, IB-5, IB-6, IB-7, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-20, IB-21, TE-5, TE-6, TE-7, TE-8, TE-9, TE-13, TE-14, TF-1, TF-3, TF-4, TF-6, TF-7, TF-9, TF-11, TF-12, TF-13, TF-15, TF-16, TF-17, TF-18, TG-1, TG-3, TG-4, TG-5, TG-9, TG-10, TG-12, TG-13, TG-15
Obj20	Teddy	c/s	3	6.38%	BA-18, BF-6, TE-12
		?	44	93.62%	BA-9, BA-13, BA-20, BB-1, BB-2, BB-8, BB-12, BB-15, BB-21, BB-25, BE-1, BE-2, BE-3, BF-7, BF-8, BF-9, BF-10, BF-14, BF-16, IA-2, IA-4, IA-9, IA-10, IA-12, IA-15, IB-7, IB-11, IB-13, IB-21, TE-1, TE-5, TE-8, TF-1, TF-3, TF-5, TF-7, TF-14, TF-1, TF-16, TF-17, TF-18,

					TG-1, TG-10, TG-13
Obj21	bible	c/s	1	25.00%	TF-13
		?	3	75.00%	BA-16, TF-11, TF-12
Obj21	book	c/s	66	80.49%	BA-1, BA-3, BA-10, BA-11, BA-12, BA-15, BA-18, BA-22, BB-4, BB-5, BB-6, BB-8, BB-11, BB-15, BB-16, BB-17, BB-18, BB-22, BE-2, BE-3, BF-1, BF-3, BF-5, BF-6, BF-7, BF-9, BF-10, BF-16, BF-18, IA-6, IA-9, IA-14, IA-16, IB-4, IB-6, IB-10, IB-11, IB-12, IB-13, IB-14, IB-17, IB-19, TE-1, TE-7, TE-11, TE-12, TE-13, TE-14, TE-16, TF-1, TF-3, TF-6, TF-7, TF-8, TF-9, TF-13, TF-14, TF-15, TF-16, TF-18, TG-1, TG-2, TG-5, TG-7, TG-10, TG-15
		?	16	19.51%	BA-8, BA-9, BA-13, BA-21, BB-12, BE-4, BF-4, IA-3, IA-4, IB-8, IB-16, TE-3, TE-8, TF-5, TF-12, TG-9
Obj21	magazine	c/s	1	100.00%	TG-5
Obj21	notebook	c/s	29	72.50%	BA-2, BA-23, BB-2, BB-3, BB-9, BB-10, BB-19, BB-20, BB-25, BE-4, BF-2, BF-8, BF-11, BF-12, BF-14, BF-15, IA-1, IA-8, IA-13, IB-9, IB-18, IB-20, TE-9, TF-10, TG-3, TG-5, TG-6, TG-13, TG-14
		?	11	27.50%	BA-20, BB-1, BB-23, BB-24, IA-12, IA-15, TE-4, TE-5, TF-4, TG-4, TG-12
Obj22	box	c/s	10	100.00%	BB-3, BB-4, BB-9, BB-20, BB-21, IA-8, IB-19, TE-7, TF-4, TF-12
Obj22	case	c/s	34	97.14%	BA-2, BA-3, BA-8, BA-15, BB-2, BB-13, BB-16, BB-25, BE-1, BE-2, BE-3, BF-1, BF-3, BF-5, BF-11, BF-14, IA-9, IA-11, IA-13, IA-15, IB-4, IB-20, TE-13, TE-14, TF-3, TF-13, TF-14, TF-17, TG-1, TG-3, TG-6, TG-7, TG-10, TG-12
		?	1	2.86%	IA-5
Obj22	luggage	c/s	5	100.00%	BA-6, BA-22, BB-10, IA-16, TE-12
Obj22	package	c/s	1	100.00%	IA-6
Obj22	suitcase	c/s	101	100.00%	BA-7, BA-9, BA-10, BA-11, BA-12, BA-13, BA-16, BA-18, BA-20, BA-21, BA-23, BB-1, BB-2, BB-5, BB-6, BB-7, BB-8, BB-11, BB-12, BB-15, BB-17, BB-18, BB-19, BB-22, BB-23, BB-25, BE-3, BE-4, BF-2, BF-3, BF-4, BF-6, BF-7, BF-8, BF-9, BF-10, BF-12, BF-13, BF-14, BF-15, BF-16, BF-18, IA-1, IA-2, IA-3, IA-4, IA-5, IA-7, IA-10, IA-12, IA-14, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-17, IB-18, IB-21, TE-1, TE-3, TE-4, TE-5, TE-6, TE-8, TE-9, TE-11, TE-13, TE-14, TE-16, TF-1, TF-5, TF-6, TF-7, TF-8, TF-9, TF-10, TF-11, TF-14, TF-15, TF-16, TF-18,

					TG-1, TG-2, TG-4, TG-5, TG-7, TG-9, TG-10, TG-12, TG-13, TG-14, TG-15
Obj22	trunk	c/s	1	100.00%	BB-24

Appendix X Numeral Meanings of Words that Led to Conceptual Transfer with Participant List

Type	Numeral Meaning			Object	Participant
beer	c/s	16	29.09%	Obj2	BA-17, BA-21, BB-7, BB-22, BE-1, BE-2, BF-12, IA-13, IB-12, IB-20, TE-8, TF-6, TF-7, TF-16, TG-5, TG-10
	u	37	67.27%	Obj2	BA-1, BA-23, BB-4, BB-5, BB-16, BB-17, BB-21, BF-3, BF-7, BF-15, BF-16, IA-5, IA-9, IA-11, IA-12, IA-14, IA-15, IB-1, IB-5, IB-6, IB-21, TE-9, TE-11, TE-12, TF-1, TF-3, TF-4, TF-8, TF-10, TF-14, TF-17, TG-1, TG-2, TG-7, TG-12, TG-14, TG-15
	?	2	3.64%	Obj2	BA-3, IA-4
bottle	c/s	34	89.47%	Obj2	BA-2, BA-23, BB-1, BB-8, BB-11, BB-20, BB-25, BF-2, BF-7, BF-10, BF-11, BF-14, BF-16, BF-18, IA-1, IA-3, IA-9, IA-12, IA-13, IA-14, IB-6, IB-8, IB-18, IB-19, TE-7, TE-8, TE-9, TE-11, TF-10, TF-14, TG-1, TG-2, TG-6, TG-9
	u	4	10.53%	Obj2	BB-22, IB-5, TF-6, TG-5
boxer	c/s	1	25.00%	Obj6	TG-13
	?	1	25.00%	Obj5	TG-13
boxers	c/p	2	50.00%	Obj6	BB-13, TG-3
brief	c/s	4	28.57%	Obj5	BA-2, BB-9, TE-3
				Obj10	TG-15
	?	3	21.43%	Obj5	BF-1, TG-15
				Obj10	TF-10
briefs	c/s	7	50.00%	Obj5	TF-10, TG-3
				Obj6	BA-2, BB-9, TF-10
				Obj10	BA-1, BA-2, BB-10, TF-15
can	c/s	55	96.49%	Obj2	BA-1, BA-8, BA-18, BB-4, BB-6, BB-10, BB-13, BB-15, BB-17, BB-18, BB-19, BB-23, BE-3, BE-4, BF-1, BF-3, BF-4, BF-6, BF-9, BF-15, IA-2, IA-6, IA-8, IA-10, IA-15, IB-7, IB-9, IB-10, IB-11, IB-13, IB-14, IB-16, IB-21, TE-1, TE-3, TE-4, TE-5, TE-12, TE-13, TE-14, TF-1, TF-3, TF-5, TF-8, TF-9, TF-11, TF-12, TF-17, TF-18, TG-4, TG-7, TG-12, TG-13, TG-14, TG-15
	u	2	3.51%	Obj2	BF-10, IA-11
luggage	c/s	5	100.00%	Obj22	BA-6, BA-22, BB-10, IA-16, TE-12
pant	c/s	6	4.92%	Obj5	IB-12
				Obj16	BA-11, BA-18, BB-10, IA-7, TF-4
pants	c/s	35	28.69%	Obj5	BB-5, BF-7, TE-9
				Obj6	BB-5

				Obj10	BB-7, BB-18, BF-11, TE-4
				Obj16	BA-3, BB-9, BB-20, BE-2, BF-1, BF-3, BF-5, IA-10, IB-7, IB-8, IB-10, IB-11, TE-13, TE-14, TF-3, TF-9, TF-15, TG-4, TG-5, TG-12
				Obj18	BB-11, IA-15, IB-1, IB-6
				Obj19	BB-11, BB-19, BF-4, BF-11, IB-4, TE-7, TG-5
	c/p	81	66.39%	Obj5	BA-1, BB-10, BB-18, BB-19, BE-4, TE-4, TG-14
				Obj6	BA-1, BA-10, BB-19, BB-25, BF-3, BF-4, BF-16, TE-4, TE-14, TG-9
				Obj16	BA-1, BA-2, BA-6, BA-7, BA-8, BA-12, BA-13, BA-15, BA-17, BA-20, BB-1, BB-3, BB-5, BB-6, BB-8, BB-11, BB-16, BB-17, BB-19, BB-21, BB-22, BB-23, BB-24, BE-3, BE-4, BF-2, BF-4, BF-6, BF-10, BF-13, BF-16, BF-18, IA-3, IA-4, IA-6, IA-9, IB-1, IB-4, IB-5, IB-6, IB-12, IB-13, IB-16, IB-19, IB-21, TE-3, TE-7, TE-9, TE-11, TE-16, TF-1, TF-6, TF-10, TF-11, TF-12, TF-13, TF-14, TG-1, TG-2, TG-3, TG-6, TG-10, TG-13, TG-15
				Obj18	BA-3, BA-10, BB-16, BB-19, BB-22, BE-4, BF-5, BF-16, IA-4, IB-4, IB-8, IB-11, IB-13, IB-19, TF-12, TF-15
				Obj19	BA-1, BA-10, BE-4, BF-2, IA-6, IB-6, IB-7, TE-3, TE-13, TF-1, TG-4, TG-7, TG-10
scissor	c/s	2	7.14%	Obj17	IB-20, TG-5
scissors	c/s	3	10.71%	Obj17	BF-4, IA-11, IB-6
	c/p	23	82.14%	Obj17	BA-9, BA-11, BA-12, BA-16, BA-18, BA-21, BB-10, BB-25, BF-5, IB-5, IB-14, TE-12, TF-1, TF-3, TF-7, TF-11, TF-14, TF-15, TF-17, TG-2, TG-3, TG-3, TG-7
shoe	c/s	71	91.03%	Obj8	BA-1, BA-3, BA-6, BA-8, BA-10, BA-12, BA-20, BB-1, BB-3, BB-4, BB-9, BB-10, BB-15, BB-16, BB-17, BB-18, BB-20, BB-21, BB-22, BB-24, BE-4, BF-2, BF-3, BF-4, BF-6, BF-7, BF-12, BF-13, BF-15, BF-18, IA-1, IA-2, IA-8, IA-9, IA-11, IA-12, IA-13, IA-16, IB-1, IB-5, IB-6, IB-8, IB-11, IB-13, IB-16, IB-18, IB-19, IB-21, TE-1, TE-4, TE-9, TE-14, TF-1, TF-3, TF-7, TF-9, TF-13, TF-14, TF-15, TF-17, TF-18, TG-1, TG-2, TG-3, TG-4, TG-7, TG-10, TG-12, TG-13, TG-14, TG-15
shoes	c/s	7	8.97%	Obj8	BB-2, BB-19, BE-3, BF-1, IB-4, IB-12, TE-3
shorts	c/s	26	28.89%	Obj5	BA-13, BB-2, IA-15, IB-8, IB-10, IB-16, TF-11, TG-7, TG-12
				Obj6	BA-13, BB-2, BB-15, BB-20, IA-15, IB-10, IB-16, TF-11, TG-7, TG-12
				Obj10	TE-9
				Obj18	BA-6, BF-7, BF-9, IA-7, IA-11, TF-6

				Obj19	BA-3, BA-6, BB-3, BB-16, BF-1, BF-6, BF-7, BF-9, BF-15, IA-7, IB-15, IB-11
	c/p	32	35.56%	Obj5	TF-9, TG-2
				Obj6	BF-3, TE-8, TF-9, TG-2, TG-4, TG-6
				Obj10	BF-3, TE-16
				Obj18	BB-2, BB-15, BE-3, BF-8, IB-10, TF-3, TG-2, TG-6
				Obj19	BA-12, BA-15, BA-16, BA-21, BB-2, BB-9, BB-15, BE-3, BF-5, BF-8, IA-10, IB-8, IB-13, IB-14, TE-4, TE-12, TF-3, TF-8, TF-15, TF-16, TF-18, TG-1, TG-2, TG-3, TG-6, TG-13
	?	32	35.56%	Obj5	BF-3, IB-9
				Obj6	BB-3, BE-4, BF-7, BF-9, TE-4, TE-5, TE-16, TF-16, TG-14, TG-15
				Obj18	BA-16, BA-20, BA-21, BB-9, BF-6, BF-14, IA-9, IB-13, TE-6, TE-9, TF-12, TG-1, TG-3
				Obj19	BB-1, BF-10, BF-14, IA-15, IB-10, TE-9, TF-11, TF-13, TF-17
soap	c/s	51	67.11%	Obj11	BA-3, BA-15, BA-18, BA-20, BB-1, BB-2, BB-15, BB-17, BB-19, BB-22, BE-2, BE-3, BE-4, BF-3, BF-4, BF-5, BF-6, BF-9, BF-10, BF-11, BF-18, IA-2, IA-6, IA-8, IA-12, IA-15, IB-1, IB-6, IB-8, IB-12, IB-13, IB-17, IB-21, TE-1, TE-4, TE-5, TE-8, TE-9, TE-12, TE-14, TF-4, TF-5, TF-8, TF-9, TF-11, TF-12, TG-2, TG-5, TG-9, TG-12, TG-15
	u	14	18.42%	Obj11	BA-1, BB-25, IB-14, IB-16, IB-19, IB-20, TE-16, TF-3, TF-6, TF-7, TF-14, TF-15, TF-18, TG-1
	?	11	14.47%	Obj11	BB-5, BB-10, BB-12, BB-18, BF-1, IA-3, IB-5, TE-7, TF-10, TG-7, TG-13
toothpaste	c/s	3	2.97%	Obj15	IA-7, TE-1, TG-13
	?	98	97.03%	Obj15	BA-1, BA-2, BA-3, BA-7, BA-8, BA-9, BA-11, BA-12, BA-13, BA-15, BA-16, BA-17, BA-18, BA-20, BA-21, BA-23, BB-1, BB-2, BB-3, BB-4, BB-8, BB-9, BB-10, BB-11, BB-12, BB-13, BB-15, BB-16, BB-17, BB-18, BB-19, BB-22, BB-23, BB-24, BB-25, BE-2, BE-4, BF-1, BF-4, BF-5, BF-6, BF-7, BF-8, BF-9, BF-10, BF-11, BF-16, BF-18, IA-3, IA-5, IA-8, IA-15, IB-1, IB-4, IB-5, IB-6, IB-7, IB-8, IB-9, IB-10, IB-11, IB-12, IB-13, IB-14, IB-16, IB-18, IB-19, IB-20, IB-21, TE-3, TE-4, TE-9, TE-11, TE-13, TE-14, TF-1, TF-3, TF-4, TF-5, TF-6, TF-8, TF-9, TF-10, TF-11, TF-12, TF-13, TF-14, TF-15, TF-16, TF-17, TF-18, TG-1, TG-2, TG-3, TG-5, TG-6, TG-10, TG-15

trouser	c/s	3	5.66%	Obj5	BB-16
				Obj6	BB-16
				Obj18	IA-8
				Obj19	IA-12
	?	4	7.55%	Obj16	BF-12, IA-8, IA-11, IA-14
trousers	c/s	19	35.85%	Obj5	IA-2, IB-5, TG-1
				Obj6	IA-2, IB-5, TG-1
				Obj16	BB-15, BF-11, BF-14, BF-15, IA-1, IA-5, IA-11, IA-12, IB-14, TE-4, TF-16
				Obj18	IB-18, TF-8
				Obj19	BB-25, BF-15, IB-17, IB-18, TE-1
	c/p	9	16.98%	Obj16	BB-2, BB-10, BB-25, IB-17, IB-18, TE-8, TF-18, TG-7, TG-10
	?	18	33.96%	Obj5	IA-1
				Obj6	IA-1
				Obj16	BA-9, BA-10, BA-16, BA-21, BA-22, BB-7, BF-7, BF-8, BF-9, IA-2, IA-13, IA-15, TE-1, TE-5, TF-17
				Obj18	BB-15, TE-1, TE-4
underwear	c/s	67	77.01%	Obj5	BA-6, BA-7, BA-8, BB-3, BB-22, BB-25, BE-3, BF-2, BF-13, IA-3, IA-6, IA-7, IA-11, IA-13, IB-7, IB-11, IB-13, IB-14, IB-18, IB-19, TE-1, TE-5, TF-4, TF-7, TF-18, TG-5, TG-6, TG-7
				Obj6	BB-22, BF-2, BF-6, IA-3, IA-7, IB-7, IB-11, IB-13, IB-14, IB-19, TE-1, TF-4, TF-7, TF-18, TG-5
				Obj10	BA-3, BA-7, BA-13, BA-15, BA-18, BA-20, BB-15, BB-17, BB-19, BB-22, BB-23, BB-25, BE-2, BE-3, BF-4, BF-5, BF-6, BF-9, BF-10, BF-13, IA-2, IA-6, IA-9, IA-10, IA-12, IA-13, IA-15, IA-19, IB-5, IB-6, IB-13, IB-14, IB-16, IB-21, TE-1, TE-5, TE-11, TE-12, TE-13, TE-14, TF-3, TF-4, TF-5, TF-6, TF-8, TF-9, TF-14, TF-18, TG-1, TG-2, TG-5, TG-6, TG-7, TG-12, TG-13
	u	5	5.75%	Obj5	TE-8
				Obj10	BE-4, BF-8, IB-17, TE-8, TF-7
	?	15	17.24%	Obj5	BA-15, BB-4, BB-11, IA-5, TF-12, TG-9, TG-10
				Obj6	BA-15, BB-4, BB-11, IA-5, IA-11, IB-18
				Obj10	BB-2, BB-16, IB-1, IB-12, IB-18, TE-7, TF-11, TG-9

Appendix XI Collocation between the Classifier *Pair* and the Objects with Participant List

Type	Object	Range			Participant
		Individual		Total	
pair	Obj5	4	2.42%	2.82%	BE-4, TF-9, TG-2, TG-4
	Obj6	8	4.85%	5.63%	BB-25, BF-3, TE-8, TF-9, TG-2, TG-3, TG-4, TG-6
	Obj7	60	36.36%	42.25%	BA-1, BA-2, BA-7, BA-13, BA-15, BA-18, BA-21, BA-23, BB-6, BB-10, BB-20, BB-22, BB-24, BB-25, BE-2, BE-3, BE-4, BF-4, BF-6, BF-7, BF-11, BF-16, IA-1, IA-2, IA-5, IA-9, IA-12, IA-15, IB-4, IB-5, IB-6, IB-7, IB-14, IB-16, IB-17, IB-18, TE-1, TE-3, TE-5, TE-8, TE-11, TE-12, TE-13, TE-14, TF-1, TF-4, TF-7, TF-14, TF-15, TF-17, TF-18, TG-1, TG-2, TG-3, TG-4, TG-7, TG-12, TG-13, TG-14, TG-15
	Obj10	10	6.06%	7.04%	BB-10, BE-4, BF-3, BF-8, IA-10, IB-16, IB-17, TE-4, TE-8, TE-16
	Obj16	31	18.79%	21.83%	BA-1, BA-6, BA-10, BA-15, BA-18, BB-2, BB-10, BB-19, BB-24, BB-25, BE-3, BE-4, BF-2, IA-1, IA-10, IB-1, IB-4, IB-8, IB-17, IB-18, TF-4, TF-7, TF-8, TF-12, TF-14, TF-18, TG-2, TG-3, TG-4, TG-7, TG-13
	Obj17	7	4.24%	4.93%	BA-9, BB-25, IB-5, IB-14, TF-17, TG-2, TG-7
	Obj18	7	4.24%	4.93%	BB-2, BB-15, BE-3, BF-8, IB-8, IB-10, TF-3
	Obj19	38	23.03%	26.76%	BA-1, BA-12, BA-15, BA-16, BA-21, BB-2, BB-8, BB-15, BE-3, BE-4, BF-2, BF-5, BF-8, IA-1, IA-10, IB-4, IB-5, IB-8, IB-13, IB-14, TE-1, TE-4, TE-12, TF-3, TF-8, TF-9, TF-12, TF-14, TF-15, TF-16, TF-18, TG-1, TG-2, TG-3, TG-6, TG-7, TG-10, TG-13

Appendix XII Every Participant's Score of Every Test Item

ID	*SCIS	*SAT	*PRIS	*MO	*HEA	*FRIE	*FIN(	*DO(	*CAL	*BUI	*ALC	**TE	**SU	**SO	**SH	**PU	**PL	**DC	**CA	**BC	**CH	**BR	****	****	****	****	****	****	****	****	****	****	****	****
BA-1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	1	0	1
BA-2	1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	0	1	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0	1
BA-3	1	1	0	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	0	0	0	1	1	1	1	1	1	0	1	1	0	1	1
BA-6	1	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	1
BA-7	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-8	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	0	0	1	1	1	1	1	0	1	1	1	0	1
BA-9	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
BA-10	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-11	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-12	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
BA-13	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-15	1	0	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	0	0	1	0	1	1	1	1	1	1	0	1	1	0	1	1
BA-16	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-17	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	1	1	1	1	0	1	0	1	1	0	0	1
BA-18	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-20	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-21	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-22	1	0	1	1	1	1	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1	1	1	0	1	1	0	1	0	0	1
BA-23	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BA-24	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	1	1	1	1	1	0	1	0	1	1
BB-1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BB-2	1	0	1	0	1	1	1	0	1	1	1	0	0	1	0	0	0	1	1	0	0	0	1	1	1	1	1	1	0	1	1	1	1
BB-3	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	1	1
BB-4	1	1	0	1	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1
BB-5	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BB-6	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
BB-7	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	0	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1
BB-8	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	0	0	0	0	1	1	1	1	1	1	0	0	1	1	1
BB-9	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	0	0	0	0	0	1	0	1	1	1	0	1	0	1	1	1
BB-10	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	0	1	1	1	1	1
BB-11	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	0	1	1	0	1	0	0	0	1	1	1	1	1	1	0	1	1	1
BB-12	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	0	1	1	1	1
BB-13	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	0	0	1	1	1	1	0	1	0	1	1	1
BB-15	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1
BB-16	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	0	1	1	1	0	1	1	1
BB-17	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
BB-18	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	1	1	1
BB-19	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	0	1	1	1	1	1	0	1	0	1	1	1
BB-20	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	1	0	0	1	1	1	1	1	1	0	1	0	1	1	1
BB-21	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	0	1	0	0	0	1	1	1	1	0	1	0	1	1	1
BB-22	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1
BB-23	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	1	1
BB-24	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	0	1	1
BB-25	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1	0	1	1
BE-1	0	0	0	0	1	0	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	1	1	1
BE-2	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1

Appendix XII Every Participant's Score of Every Test Items (Continue)

BE-3	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1
BE-4	1	0	1	1	1	1	1	1	1	0	1	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0	1
IA-1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0	0	0	1	1	0	1	1	0	1	1	1	1
IA-2	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	1
IA-3	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	0	1	0	1	1	0	0	1	1	1	1	1	0	1	0	1	1	1
IA-4	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
IA-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1
IA-6	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	0	1	0	0	0	1	1	1	1	0	1	1	1	0	1	1
IA-7	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1
IA-8	1	1	1	0	1	1	0	1	1	1	1	1	0	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
IA-9	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	0	1	1	1
IA-10	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
IA-11	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1
IA-12	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	0	1	0	1	1	1
IA-13	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
IA-14	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
IA-15	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
IA-16	1	0	1	1	0	1	0	1	0	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
IB-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1
IB-4	1	1	1	1	1	1	1	0	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1	1	1	1
IB-5	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	0	1	1
IB-6	1	1	1	1	1	1	1	0	1	1	1	0	0	1	0	0	1	1	1	0	0	0	0	1	1	0	1	0	1	1	0	1	1
IB-7	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1
IB-8	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1
IB-9	1	1	0	1	1	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
IB-10	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
IB-11	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
IB-12	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1
IB-13	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1
IB-14	1	1	0	1	1	1	0	0	1	1	1	0	0	1	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1
IB-16	1	1	1	1	1	1	0	0	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	1	1	1	0	1
IB-17	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1	1
IB-18	1	0	1	1	1	1	1	0	1	1	1	1	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1
IB-19	1	1	1	1	1	1	0	0	0	1	1	0	1	1	0	0	1	0	1	0	0	0	1	1	1	1	1	1	1	1	0	1	1
IB-20	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	1	0	0	0	1
IB-21	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TF-1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
TF-3	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TF-4	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
TF-5	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1
TF-6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	0	1	1	1	1	1	0	1	1	1	1	1
TF-7	0	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	0	1	0	0	0	0	1	1	1	1	0	1	0	1	1	1
TF-8	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	1	0	1	0	1	1	1	1	1	1	1	0	0	1	1
TF-9	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
TF-10	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	1	1
TF-11	1	1	1	1	1	0	1	1	1	1	1	0	0	1	0	0	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1
TF-12	1	0	0	1	1	1	1	1	1	1	1	0	0	1	0	1	0	0	1	0	0	0	0	1	1	1	1	1	0	1	0	1	1

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TF-13	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	0	0	1	1	1	1	1	0	1	1	1	1	1
TF-14	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	0	0	1	1	1	1	0	1	0	1	1	1	1	1
TF-15	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1
TF-16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TF-17	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
TF-18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
TG-1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1
TG-2	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1
TG-3	1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TG-4	0	1	1	0	1	1	1	1	1	1	1	0	0	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
TG-5	0	0	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	1	1
TG-6	1	1	1	1	1	1	0	1	1	0	1	0	1	0	1	1	0	1	0	1	0	0	1	1	1	1	1	1	1	0	1	1	1
TG-7	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1
TG-9	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TG-10	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TG-12	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	1	1	1
TG-13	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
TG-14	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TG-15	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1
BF-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0	1	1	1	1	1	0	1	1	0	0	1
BF-2	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	0	0	0	1	1	1	1	0	1	1	1	1	1	1
BF-3	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1
BF-4	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
BF-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	0	1	1	1
BF-6	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1
BF-7	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	0	1	0	0	0	1	1	1	1	1	0	1	1	1	1	1
BF-8	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	0	1	1	1
BF-9	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1
BF-10	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1	0	1	1	1	1	1
BF-11	1	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1	1	1	1
BF-12	0	0	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	0	1
BF-13	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1
BF-14	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BF-15	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
BF-16	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
BF-18	1	1	1	0	1	1	0	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TE-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
TE-3	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	0	1	1	1	0	0	1	0	1	1	1
TE-4	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1
TE-5	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1
TE-6	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1
TE-7	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	0	0	0	1	1	0	1	1	1	1	1	0	1	1	1
TE-8	1	0	1	1	1	1	0	1	1	1	1	0	0	1	1	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
TE-9	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	1	0	0	0	1	1	1	1	1	1	1	0	0	1	1
TE-11	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1
TE-12	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	1	1	1
TE-13	1	1	0	1	1	1	1	0	1	0	1	0	0	0	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	1	0	0	1
TE-14	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	0	0	1	0	0	1	0	1	1	1	1	1	1	1	1	0
TE-16	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

Appendix XIII Every Participant's Scores for Every Word Group

ID	G1 Sum	G2 Sum	G3 Sum
BA-1	11	4	7
BA-2	10	4	6
BA-3	10	4	9
BA-6	7	2	4
BA-7	11	4	11
BA-8	10	5	9
BA-9	11	4	11
BA-10	11	7	11
BA-11	11	4	11
BA-12	11	9	11
BA-13	11	5	11
BA-15	10	4	9
BA-16	11	5	11
BA-17	10	3	7
BA-18	10	5	11
BA-20	11	5	11
BA-21	11	2	11
BA-22	7	2	7
BA-23	9	6	11
BA-24	11	3	8
BB-1	10	5	11
BB-2	8	3	10
BB-3	10	4	6
BB-4	9	7	10
BB-5	11	2	11
BB-6	11	6	11
BB-7	11	4	10
BB-8	10	5	9
BB-9	10	3	8
BB-10	10	7	10
BB-11	10	5	9
BB-12	11	6	10
BB-13	11	6	8
BB-15	11	7	11
BB-16	9	5	9
BB-17	11	9	11
BB-18	10	7	9
BB-19	10	5	9
BB-20	11	5	9
BB-21	10	6	8
BB-22	10	7	9
BB-23	10	1	7
BB-24	10	3	9
BB-25	11	6	10
BE-1	5	2	8
BE-2	10	5	9
BE-3	11	5	10
BE-4	9	2	8

ID	G1 Sum	G2 Sum	G3 Sum
IA-1	10	3	8
IA-2	4	0	5
IA-3	9	7	9
IA-4	11	4	11
IA-5	11	7	10
IA-6	11	3	9
IA-7	11	3	9
IA-8	9	5	11
IA-9	10	8	10
IA-10	11	6	11
IA-11	10	8	10
IA-12	10	2	8
IA-13	11	5	10
IA-14	10	8	11
IA-15	10	5	11
IA-16	7	4	10
IB-1	11	5	11
IB-4	10	2	8
IB-5	11	1	8
IB-6	10	4	7
IB-7	10	8	10
IB-8	11	3	9
IB-9	9	6	11
IB-10	11	7	11
IB-11	11	6	11
IB-12	11	7	10
IB-13	10	6	10
IB-14	8	6	8
IB-16	9	6	9
IB-17	10	2	7
IB-18	9	3	10
IB-19	8	4	10
IB-20	10	6	7
IB-21	10	6	11
TF-1	9	3	10
TF-3	10	7	11
TF-4	11	4	11
TF-5	11	6	9
TF-6	11	6	10
TF-7	9	4	8
TF-8	10	3	9
TF-9	11	4	11
TF-10	10	5	8
TF-11	10	5	10
TF-12	9	3	8
TF-13	11	6	10
TF-14	11	6	9
TF-15	11	6	10

ID	G1 Sum	G2 Sum	G3 Sum
TF-16	11	6	11
TF-17	11	8	11
TF-18	11	9	11
TG-1	10	3	10
TG-2	11	4	10
TG-3	10	5	11
TG-4	9	4	10
TG-5	8	4	9
TG-6	9	5	10
TG-7	11	6	10
TG-9	10	6	11
TG-10	11	5	11
TG-12	11	5	10
TG-13	11	4	11
TG-14	10	5	11
TG-15	10	5	11
BF-1	11	7	8
BF-2	11	6	9
BF-3	9	1	9
BF-4	10	9	11
BF-5	11	7	10
BF-6	10	4	10
BF-7	11	3	10
BF-8	11	6	10
BF-9	11	5	10
BF-10	11	3	10
BF-11	10	7	9
BF-12	8	1	9
BF-13	10	7	10
BF-14	11	4	11
BF-15	10	4	11
BF-16	10	6	10
BF-18	8	4	11
TE-1	11	9	11
TE-3	10	4	7
TE-4	11	8	11
TE-5	11	7	10
TE-6	11	7	10
TE-7	11	4	9
TE-8	9	4	11
TE-9	10	3	9
TE-11	11	7	11
TE-12	10	5	10
TE-13	8	3	8
TE-14	11	5	9
TE-16	11	4	10

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