Semantic transferability and prototypicality in Chinese and English: a study of the semantic acquisition of "thin" by Chinese learners of English

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Semantic transferability and prototypicality in Chinese and English
— A study of the semantic acquisition of "thin"
by Chinese learners of English

by

Rue Yuan

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CHAPTER 1. INTRODUCTION

In the field of second language (L2) acquisition, researchers as well as L2 teachers have long been aware of the differences in lexical usage patterns and in the meaning ascribed to L2 words by native speakers and by L2 learners. It has been observed that L2 learners appear to use more words of general than of specific meaning, tend to both overextend and underextend word meanings, and often fail to respond to constraints of register and collocation. In the case of polysemous words, it is also found that L2 learners acquire some meanings but not others. Idioms and figurative language present great problems for L2 learners. All these facts seem to indicate there are constraints on L2 learners’ lexical acquisition. However, what these constraints are is not fully known.

In considering the factors that may be responsible for the performance differences between L2 learners and native speakers, a factor that cannot be ignored is the influence of the learners’ native language. In the past decades many attempts have been made to study native language influence on L2 acquisition, and enormous evidence had been found in support for the notion of language transfer, which, simply put, refers to the phenomenon in which the learner transfers knowledge about the native language to the learning of the target language. Apart from those who hold a radical version of language nativism, and those who deny any theory incorporating
the principle that human beings use prior experiences in acquisition of new knowledge, most researchers in the field now agree that language transfer does occur, and that the influence of native language on second language acquisition should not be minimized.

However, though it is recognized that native language transfer plays an important role in L2 learning, it is also found from the analyses of transfer that L2 learners do not seem to transfer everything of their native language in their use of the target language (Eckman 1984; Gundel & Tarone 1983; Adjemian 1983; Rutherford 1983). As a matter of fact, learners seem to be selective in determining what to transfer. In an attempt to characterize a strategy of transfer in L2 learning and performance, Kellerman (1982) claimed that a learner with a given native language could use that language to make predictions about the target language, transferring native language forms and features whenever it was felt that they could be successfully employed in the target language, with suitable adjustment being made according to the supposed constraints imposed by the target language structure. Thus, a learner’s knowledge or intuitions of the native language structure may serve as the basis for determination of what to transfer, with the knowledge or intuitions of the target language structure being the criterion for adjusting these selections. The implication of Kellerman’s claim here is that, given a native language and a target language, transfer can be predicted from a learner’s perception of the language distance between the two languages. If a learner perceives that the two languages are close (possibly in terms of structure similarities), transfer may be more likely to occur than if the learner perceives them to be distant. Moreover, one’s native language structure may already embody a gradience of transferability, i.e., some items or structures will be
regarded more transferable than others.

The notion of "transferability" as introduced by Kellerman (1982) is "a measure of the specificity of a native language item in terms of comparable items. It is independent of perception of language distance, though it will interact with this to partially determine actual transfer performance". According to Kellerman, transferability is thus a theoretical construct which makes the predictions of the following kind: "If item i is more transferable than item j, then if an ideal population of learners consistently transfer j, they will also transfer i, though the converse is not necessarily true. If j is not transferred, then no prediction can be made about i".

In a study that was devoted to testing the notion of "transferability" in lexis, Kellerman (1982) found that transferability of the senses of a polysemous word seemed to be related to the closeness of the senses to the "primary sense" of the polysemous word. The closer a sense is to the primary sense, the more transferable it should be. However, the problem is, as Kellerman himself has pointed out, with the definition of "closeness" one is going to adopt. As it is found that similarity of meaning with the core sense itself does not directly predict transferability, then what does "closeness" to the primary sense mean? Though a primary sense, according to Kellerman, is the unmarked meaning (a concept which will be introduced later), and its "primariness" is an intuitive judgement, this may be a composite of high frequency of occurrence, syntactic flexibility, literalness or concreteness (Kellerman 1982).

The "closeness" to the primary sense perhaps can be characterized in terms of prototypicality or centrality of polysemy in the prototypical meaning theory. This meaning theory is developed out of Rosch et al.'s "prototype theory" of categorization (Rosch et al. 1976a, 1976b), which is different from the classical view. In the
classical theory of categorization, the properties that define a category are shared by all members and all members have equal status as members of the category (Minsky 1961; Brown 1958; Carroll 1956). No member should have any special status. However, in the "prototype theory" categorization is viewed differently. According to this theory, categories have internal asymmetrical structure, that is, certain members of a category have a special cognitive status—that of a "best example". Categories in this theory are thus composed of certain members being the "clearest cases" or "best examples" of the category, "surrounded" by other members which are less representative of the category. The "clearest cases" or best examples are referred to as prototypes or prototypical members, and the asymmetries of category membership are called prototype effects. In addition to claiming prototype effects of categorization, the theory proposes basic-level effects of categorization, by which it is meant that categories are not merely organized in terms of simple taxonomic hierarchies (classification by class inclusion). Instead, categories "in the middle" of a hierarchy are the most basic, relative to a variety of psychological criteria: Gestalt perception, the ability to form a mental image, motor interactions, and ease of learning, remembering, and use. Moreover, the prototype theory implies the idea that some categories have degrees of membership and no clear boundaries (see Lakoff 1987).

The prototypical meaning theory utilizes the themes of the prototype theory of categorization. Lakoff (1987, p.58) makes the claim that language uses our general cognitive apparatus. He argues that linguistic categories should be of the same type as other categories in our conceptual system. They should, in particular, show prototype and basic-level effects. In view of polysemy, Lakoff argues it should be regarded as categorization: the related meanings of words form categories and the meanings as
members of a category bear family resemblances to one another. Family resemblances in prototype theory refer to the idea that members of a category may be related to one another without all members having properties in common that define the category (Lakoff 1987, p. 12). A polysemous word may accordingly have a central meaning or prototypical meaning which is also called the "core" or "prototype", "surrounded" by other meanings/senses that are increasing in "distance" from the "core" or the "prototype". The related meanings of a word are thus graded and can be measured in terms of their relative centrality or prototypicality (distance from the core or the prototype) within the semantic category of the word. Kellerman's "closeness" to the primary sense may perhaps be understood as the same as "centrality" or "prototypicality" in prototypical meaning theory.

Rosch et al. (1976a, 1976b) proposed the prototype theory in an attempt to make claims about the universal principles of categorization. They made it clear that the aspects of the theory that are intended to be universals do not include the content of categories. Rosch (1977) has argued that categories reflect both real world correlational structure and the state of knowledge of that structure of the people doing the categorizing. Since the structure of the environment differs greatly in different parts of the world, one would expect the categories of different cultures to differ. In addition, interest in and knowledge of attributes and their correlation for specific domains differ among cultures, subcultures, and individuals.

The claim that the categories of different cultures may be different is of special interest in the discussion of linguistic categories, such as polysemy, as the same type of categories in our conceptual system. By category, it is meant a number of objects which are considered equivalent. Categories are generally designated by names, e.g.,
dog, animal. Polysemy, however, involves complex definition. The term as used here refers to the related meanings that native speakers perceive of a word. If we accept the claim that polysemy should be regarded as forming categories as designated by polysemous words, it follows, on the basis of prototype theory, that polysemy should not only show prototype effects, but also show cross-linguistic differences in the meanings a polysemous word may have. That is, a word may not be expected to have the exact equivalent mappings of meaning in two different languages. Further, by following the same line of thought, it can be reasoned that an equivalent term may be expected to show differences in the prototype effects cross-linguistically: a word may have approximately the same range of meanings in two different languages but differ in terms of degrees of centrality or prototypicality of those meanings.

Kellerman has done a number of studies in predicting transferability from native language structures. Also he believes that the actual transfer performance of native language items may be adjusted by learners’ perception of language distance between their native language and a given target language. His focus of study has therefore been on the relationship of transferability to centrality or prototypicality of word senses. Kellerman (1977, 1978) has demonstrated experimentally with similarity ratings that native language intuitions about word senses and use could be used as a source of predictions about transferability, and that "closeness to the core" did seem to be related to it. With the view of prototype theory as applied in polysemy in mind, it would be interesting to extend Kellerman’s studies by using different experimental methods and to examine empirically cross-linguistic differences of prototype effects in polysemous words, especially those which show different ranges of meanings cross-linguistically. Also, it would be interesting to examine, in the case of second language
learners, the impact that the prototypicality or centrality structure of polysemy in one's native language has on the acquisition of L2 meanings of equivalent terms.

The purpose of this study is therefore to investigate whether transferability in lexis can be predicted by the centrality or prototypicality of word senses in a learner's native language, and to investigate what factors may help L2 learners acquire those L2 meanings that do not exist in the native language while at the same time suppressing those meanings that are highly central and transferable in the native language, but are less central or acceptable in the target language. In general, the interest of this study is to discover to what extent L2 learners' native language can influence their native-like achievement of target language performance with respect to the lexicon.

The problems that second language learners face in lexical acquisition are enormous. Some problems like learning new "phonetic forms" for the equivalent terms, or acquiring lexical terms which are absent in the lexicon of the native language can be solved along with one's progress in the target language. Some other problems, however, do not seem to disappear as one progresses. These persistent problems are imposed by the concepts that learners have already internalized in the native language, and are difficult to break. The results of this study will be interesting in that: (1) They may reveal to us to some degree the nature as well as the extent of cross-linguistic influence in L2 learners' lexical acquisition, and specify some of the most difficult and subtle obstacles learners have to overcome in becoming competent users of the second language. (2) They may show us what factors can help L2 learners break native language constraints in achieving native-like L2 lexical competence and performance. In addition, the factors found may be of great value in guiding vocabulary teaching in L2 classrooms. (3) The results may illustrate the cross-linguistic
influences of prototype-effects in polysemy, and provide linguistic evidence for the arguments that language makes use of our cognitive apparatus and that linguistic categories are like other categories in our conceptual system.

The following is a general review of various studies that fall under three major topics: (i) the development of prototype theory and its related themes; (ii) polysemy and second language acquisition; (iii) studies of transfer in L2 acquisition.
CHAPTER 2. REVIEW OF LITERATURE

This chapter reviews relevant literature germane to three strands of research: the development of the prototype theory, L2 lexical acquisition, and native language transfer in L2 acquisition. As a major part of the theoretical background of the present study lies in prototype theory, the first five sections will be an overview of some major themes, ideas, and experimental studies that have led to its development. The last two sections review studies in L2 lexical acquisition research and native language transfer in L2 acquisition. Finally, the questions and hypotheses that grow out of the theories and experimental studies reviewed are presented at the end of the chapter.

Prototype Theory and Wittgenstein

Ludwig Wittgenstein is associated with the ideas of family resemblance, centrality and gradience which have become the principal concepts of the prototype theory of categorization. Wittgenstein had noticed the crack in the classical theory of categorization in his work "Philosophical Investigations" (Wittgenstein 1953, pp.66-71). The classical category has clear boundaries, which are defined by common properties. Wittgenstein pointed out that a category like "game" does not fit the classical mold, since there are no common properties shared by all games. Some games, like ring-
around-the-rosy, involve mere amusement, and there is no competition, that is, no winning or losing involved, while in other games there is. Some games involve luck, while others involve skill, like playing chess. Though there is no single collection of properties that all games share, the category is united by what Wittgenstein calls family resemblance. Members of a family resemble each other in various ways: they may share the same build, facial features, hair color, eye color, temperament, and the like. But there need be no single collection of properties shared by everyone in a family. Games, in this respect, are like families. Chess and poker both involve competition, skill, and the use of long time strategies. Chess and old maid both involve competition. Poker and old maid are both card games. In short, Wittgenstein concludes that games, like family members, are similar to one another in a wide variety of ways. That, and not a single, well-defined collection of common properties, is what makes "game" a category.

Wittgenstein also observed that there was no fixed boundary to the category of "game". The category could be extended and new kinds of games introduced, provided that they resemble previous games in appropriate ways. He cites the example of the category of "number" to suggest that some members of a category (e.g., finite number) are central and are better examples than others (e.g., transfinite and complex numbers). If anything is a number, the integers are numbers, whereas transfinite numbers may not be considered. Integers are central, and they have a status as members of the category of "number" that complex numbers or transfinite numbers do not have.
Prototype Theory and the Color Studies

A major contribution of cognitive anthropology to prototype theory was the color research of Brent Berlin and Paul Kay, which empirically established the ideas of centrality and gradience. In traditional views, events of the world present an essentially undifferentiated continuum to our most naive perceptions. It is presumed that only our language forces us to divide up this continuum into lexically labeled classes that are mutually contrasting. It has been thought that each language makes its own distinctions, which have little to do with the distinctions made by other languages. Our perceptual abilities are seen as too flexible and too complex to impose any particular categorization upon the world's events (Burling 1970, p. 47; Whorf 1956). Berlin and Kay questioned such arbitrariness in the way that languages segment the color space. In their classic study, they found some surprising regularities in what they called "basic color terms" (Berlin & Kay 1969). They defined the basic color term as such:

1. It must consist of only one morpheme, like "green", rather than more than one, as in "dark green" or "grass-colored".

2. The color referred to by the term must not be contained within another color. "Scarlet" is, for example, contained within "red".

3. It must not be restricted to a small number of objects. "Blond", for example, is restricted to hair, wood, and perhaps a few other things.

4. It must be common and generally known, like "yellow" as opposed to "saffron" (cf. Berlin & Kay 1969, pp. 6-7).
Berlin and Kay found in their investigations that, though languages may differ in the number of the basic color terms they have, speakers of all languages seem to place the foci of their color labels at very nearly the same spots on the color chart. It is reported that languages with no more than two basic color terms always have their foci at black and white, though the two basic color terms translated into English are something like "dark" and "light". Languages with three basic color terms always add the third one at the focus that we call "red". Most of the warm colors—yellows, oranges, and browns—may be included under red at this stage, but its focus is still a proper red. When a language has four basic color terms, three still have their foci at black, white, and red, but the fourth one may be either at yellow or at green. The fifth term adds the one missed at the previous stage, so that all languages with exactly five basic color terms will have "black", "white", "red", "yellow", and "green". The focus of the sixth is always at blue, etc. It is claimed that the color categories that basic color terms can attach to are the equivalents of the English color categories named by black, white, red, yellow, green, blue, brown, purple, pink, orange and gray. Languages form a hierarchy based on the number of basic color terms they have and the color categories those terms refer to (Berlin & Kay 1969, pp. 17-35).

Berlin and Kay's results suggest that color terminology does not seem to be assigned arbitrarily. Further, their discovery of "focal colors" shows that color categories are not uniform. Some members of the category "red" are better examples of the category than others. Focal red is the best example. Color categories thus have central members. There is no general principle, however, for predicting the boundaries from the central members. These seem to vary somewhat arbitrarily from language to language.
Eleanor Rosch carried out several color studies which meshed with Berlin and Kay's results. Rosch's early work was on Dani, a New Guinea language that has only two basic color categories (Heider 1972a): mili (dark-cool, including black, green and blue) and mola (light-warm, including white, red, yellow). Rosch found that Dani speakers, when asked for the best example of their own color categories, chose focal colors, for example, white, red, or yellow for mola with different speakers making different choices.

Rosch (Heider 1972a, 1972b; Heider & Olivier 1972) went on to show that primary color categories were psychologically real for speakers of Dani, though they were not named, thus challenging Whorf's hypothesis that language determines one's conceptual system. If Whorf were right, Dani's two words for colors would determine two and only two conceptual categories of colors, and if it were language alone that determined color categorization, then the Dani should have equal difficulty learning new words for colors, no matter whether the color ranges had a primary color at the center or a nonprimary color. Rosch (Heider & Olivier 1972) studied how Dani speakers would learn new, made-up color terms with two groups of Dani subjects. One group was taught arbitrary names for eight nonfocal colors, and the other group, arbitrary names for eight focal colors. She found that the names for focal colors were learned more easily. In another study, Dani speakers were also found to be able to remember focal colors better than nonfocal colors (Heider 1972b). Rosch's color study also extended to children (Heider 1971). She showed that 3-year-old American children oriented toward focal colors in preference to nonfocal colors and that 4-year-old American children matched focal colors more accurately than nonfocal colors.
The Internal Structure of Categories

Rosch's early studies with color and form demonstrated the centrality and gradi­
ence within perceptual categories. It was then speculated that "perceptual salience" may be solely responsible for the rise of focal and nonfocal members of categories. However, not all categories have a perceptual basis, and many categories may be cul­

turally relative. In an attempt to determine whether subjects can make meaningful judgements about the internal structure of noun categories of other types, that is, the degree to which instances are "focal" members of categories, she extended her studies to physical objects. Several experimental techniques were developed for the investigation. Among these are:

Direct rating: Subjects are asked to rate on a scale from one to seven how good an example of a category various members are (see Rosch 1973a, 1973b).

Reaction time: Subjects were asked to press a button to indicate true or false in response to the form "An X (example) is a Y (category name)" (see Rosch 1973a).

Production example: Given a category name, subjects were asked to name or draw an example of the category (see Rosch et al. 1976b).

Generalization: For a particular category, subjects were told that one of the species (e.g., horses) had a given property (e.g., an unknown disease) and were asked to estimate the proportion of instances in the other species that possessed the property (see Rips 1975).
Family resemblances: "Family resemblances" were characterized as perceived similarities between representative and nonrepresentative members of categories. Subjects were told to list attributes for the members of the categories. The number of times of an attribute was credited to a particular category member was computed (see Rosch & Mervis 1975; Rosch, Simpson, & Miller 1976a). The higher the number of attributes a member shares with other category members, the higher the family resemblance.

Studies that employed these techniques found in each case the existence of asymmetries (called prototype effects) within categories. For example, subjects consistently rated robins to be more representative of the category BIRD than chickens, penguins and ostriches (Rosch 1973a). Response times for representative examples are shorter than for nonrepresentative examples (Rosch 1973a), and when asked to list or to draw examples of category members, subjects were more likely to list or draw more representative examples (Mervis, Catlin & Rosch 1973). A high correlation was also found between family resemblances and the numerical ratings of best examples derived from "Direct Rate" experiments (Rosch & Mervis 1975).

The above results formed empirical evidence for the establishment of the "prototype theory" of categorization: categories that have internal structure are composed of a "core meaning" which consists of the "clearest cases" (best examples) of the category, "surrounded" by other category members of decreasing similarity to the core meaning. The best examples or clearest cases are called prototypes. Prototypes are found to form the basis for inferences in reasoning (Rosch 1975a, 1975b; Kempton 1981; Rips 1975; Lakoff 1987).
The Fuzzy Set Theory and Its Application

Another important contribution to prototype theory is the "fuzzy set theory" developed by Zadeh. The relationship of this theory to Rosch's work has been stated by Kempton:

"Rosch lays the groundwork in psychological testing by demonstrating that a general concept, "amount of category membership", is valid and replicable across several different measurement techniques. Zadeh provides a formal means of expressing this concept and makes testable assertions about relative membership values in taxonomically related categories" (cited from Kempton 1981).

Zadeh's fuzzy set theory provides a "membership value" to characterize the relationship between an element and a set (Zadeh 1965, 1971, 1972, 1973). Thus, things are not simply members of a set or not members of a set, but rather members to a greater and lesser degree. Kempton (1977, 1981) uses this convention to assign numerical values to informant judgements of "more membership" and "less membership", thus allowing algebraic treatment of category membership. Lakoff extends the idea of set membership value to "degree of truth" of sentences. He analyzes hedges (phrases such as "sort of", "more or less", and "strictly speaking") in terms of fuzzy logic, proposing several different types of criteria for category membership (Lakoff 1972; also see Zadeh 1972).

Kay and McDaniel (1978) replace the earlier Berlin and Kay (1969) notions of "focus" and "boundary" of color categories with a fuzzy set formulation, which maps features such as wavelength into degrees of membership in color categories. They
apply fuzzy set union, intersection and inclusion to color categories and develop formulations for mutual exclusion and partition. Kay and McDaniel argue that fuzzy set theory provides a more appropriate means of discussing the universality and encoding sequence of basic color categories than did the earlier description of focus and boundary.

The Application of Prototype Theory to Word Meaning

Theories of word meaning are closely tied to theories of categorizations (Pulman 1975; Anglin 1970; Weinreich 1966). Like the traditional view on categorization, a traditional and very popular view of the word meaning has been a check-list theory (Smith and Medin 1981; Fillmore 1975). The check-list view claims that in order to capture the meaning of a word one has to establish a set of "necessary and sufficient conditions", in other words, a list of conditions are absolutely necessary to the meaning of a word, and when taken together are sufficient or adequate to encapsulate the meaning. These conditions are also called "conditions of criteriality" or "criterial attributes" since they are used to judge whether something is the meaning of a word or not (Aitchison 1987, pp. 43).

Opponents of this check-list view of word meaning point out two critical problems: first, it is difficult to decide what goes on to the check-list, since there appears to be no obvious way to draw a dividing line between essential and non-essential characteristics; second, for some things the check-list seems to be non-existent, since there hardly appear to be any necessary conditions (Fillmore 1975; Lakoff & Johnson 1980; Armstrong, Gleitman & Gleitman 1983). An alternative to the check-list view is that of fuzzy meaning. Fuzzy meaning supporters (Labov 1973; Lakoff 1972)
argue that word meanings are inevitably fluid for two reasons: the "fuzzy edge phenomenon" and the "family resemblance syndrome". Words have fuzzy edges in the sense that there is no clear point at which one word ends and another word begins. Labov (1973) demonstrated that when students were presented a set of drawings of containers and asked to label them as a cup, or a vase, or a bowl, they were able to agree on certain shapes but were quite confused when faced with something which is between, say, a cup and a vase. The family resemblance syndrome was clearly demonstrated by Wittgenstein's "game" example (Wittgenstein 1958, p. 66).

J. L. Austin is considered to be the precursor in the application of prototype theory to word meaning (Lakoff 1987, p. 18). According to Lakoff (1987, pp. 18-19), Austin's observation in his paper "The Meaning of a Word" written in 1940 and published in 1961, meant in contemporary terms that the senses of a word can be seen as forming a category, with each sense being a member of that category. Since the senses do not have properties in common, there are no fixed check-list senses that a word could be naming. However, the senses can be viewed as forming a category of the "family resemblance" kind. There are central senses and non-central senses. The senses may not be similar (in the sense of sharing properties), but instead are related to one another in other specifiable ways. It is such relationships among the senses that enable those senses to be viewed as constituting a single category: the relationships provide an explanation of why a single word is used to express those particular senses. Austin wrote

"The adjective healthy: when I talk of a healthy body, and again of a healthy complexion, of healthy exercise: the word is not just being used equivocally. . . . There is what we may call a primary nuclear sense of
'healthy': the sense in which 'healthy' is used of a healthy body. I call this nuclear because it is 'contained as a part' in the other two senses which may be set out as 'productive healthy bodies' and 'resulting from a healthy body'. . . . Now are we content to say that the exercise, the complexion, and the body are all called 'healthy' because they are similar? Such a remark can not fail to be misleading. Why make it? " (1961, p. 71).

Austin's "primary nuclear sense" corresponds to central or prototypical senses in the contemporary prototypical meaning theory. The contained-as-a-part relationship is an instance of what is called metonomy, where the part stands for the whole (Norrick 1981, pp. 80-86). The word "healthy" can be seen as having three senses: A, B, C. Exercise of type B is productive of healthy bodies of type A, and complexion of type C results from healthy bodies of type A. With respect to naming, A stands for B and C. The three senses form a category whose members are thus related. A is the central member of this category of senses. B and C are extended senses, where metonomy is the principle of extension.

Coleman and Kay (1981) applied prototype theory and fuzzy set theory in the experimental investigation of the verb "lie". They found that their informants did not appear to have necessary and sufficient conditions characterizing the meaning of "lie". Instead they found a cluster of three conditions, no one of which was necessary and all of which varied in relative importance. The three conditions are a) falsity of belief; b) intended deception; c) factual falsity. It was found falsity of belief was the most important element of the prototype "lie", intended deception the next most important, and the factual falsity the least important.
Other applications of prototype theory to word meaning include studies of word meanings of "see" (Jackendoff 1983) and word meanings of "go" (Aitchison 1985). In each case a prototypical meaning was found: in the case of "seeing", one's gaze goes to an object and the object enters one's awareness; for "go", something moves from one point to another.

Prototype theory seems to be very powerful in explaining how humans cope with word meaning when it is fuzzy and fluid. Some have suggested that it seems likely that humans analyze a prototypical examplar of a word and then match any new example against the characteristics of the prototype (Aitchison 1987, pp. 52-62). The match does not have to be a perfect one, merely a reasonable fit. This explains how words can be used with slightly different meanings, and how people can recognize a new or damaged example of a category.

L2 Lexical Acquisition

Despite the recognized significance of vocabulary acquisition in language learning (Clark 1973; Sharwood Smith 1984; Hatch 1983), studies specifically devoted to the area of L2 lexical acquisition have been lacking. Several researchers (Levenston 1979; Meara 1982, 1984; Gass 1988) have called attention to this neglect, which is striking in that learners themselves readily admit that they experience considerable difficulty with vocabulary, and once they have gotten over the initial stages of acquiring their second language, most learners identify the acquisition of vocabulary as their greatest single source of problems (cf. Meara 1982).

The problems that L2 learners face in acquiring the lexical system of a target language is elegantly stated by Robert Lado in his classic work on contrastive analysis.
According to Robert Lado, L2 lexical acquisition involves learning of three aspects of words: their form, their meaning, and their distribution (Lado 1957, p. 76). The term "word form" here refers to sound segments, stress or tones that make up a word, and "distribution" refers to the places that a word can occur in a sentence, and also the social and situational context a word can be used. Lado wrote:

Similarity to and difference from the native language in form, meaning, and distribution will result in ease or difficulty in acquiring the vocabulary of a foreign language. Comparing the foreign language vocabulary with that of the native language we will find words that are (1) similar in form and in meaning, (2) similar in form but different in meaning, (3) similar in meaning but different in form, (4) different in form and different in meaning, (5) different in their type of construction, (6) similar in primary meaning but different in connotation, and (7) similar in meaning but with restrictions in geographical distribution (cited from Lado 1957, p. 80).

Lado classified these groups into three levels of difficulty: (1) easy, (2) normal, and (3) difficult. The areas of L2 lexical acquisition that are hypothesized to be difficult include:

1. Deceptive cognates – words that are similar in form but different in meaning. For example, the Spanish word "asistir" is similar in form to English "assist" but the meaning is quite different. The former is closer to the meaning of the English "attend". The English "assist" carries with it the feature of helping or supporting.

2. "Strange" meanings – words that are different in form and represent meanings
that are "strange" to speakers of a particular native language, that is, meanings that represent a different grasp of reality. For example, in American English, "first floor" is different in form from Spanish "primer piso" and different in its grasp of what constitutes "first". In Spanish, "first floor" refers to the first level above ground, while in American English it refers to the first level at ground level.

3. New form types – words that are different in their morphological construction, such as idioms.

4. Different connotations – words that have widely different connotations in two languages.

5. Geographical restrictions – words that are restricted to a certain geographic areas within the area of the foreign language, that is, dialectal usage of words (Lado 1957, pp. 82-88).

Richards (1980) also pointed out that achievement in L2 lexical competence means knowing the probability of words being associated with other words (i.e., collocation), the limitations imposed on the use of the word according to variations of function and situation, the syntactic behavior associated with the word, its underlying form and its derivatives, and most importantly, the network of word associations, semantic values, and different meanings associated with a word.

These aspects of L2 vocabulary learning are by no means easily acquired by L2 learners. Studies of bilingual mental lexicons show remarkable difference of performance on word association tasks between native speakers and coordinate bilinguals (Lambert & Moore 1966; Ervin 1961), that is, those who had learned the second
language at some time after infancy, usually after ten years of age, and usually in a setting other than the family (Beardsmore 1982, pp. 24). In the traditional line of research in error analysis, Obanya (1974), Ludwig (1977), and Ringbom (1978) have analyzed lexical errors made by L2 learners and found that learners show fairly consistent usage patterns of L2 words. For example, learners seemed to prefer using one term over the other, which sometimes results in overspecifying or underspecifying the meanings intended. Learners also seemed to experience particular difficulty in using appropriate collocation, register, and dialectal forms.

Levenston has done a substantial body of work on L2 lexical acquisition and use (Levenston 1971, 1979; Levenston & Blum 1977; Blum & Levenston 1978). He was principally concerned with the idea of lexical simplification, or the ways in which learners cope with situations where they want to avoid certain types of words that are operating in their L2. Based on a combination of error analysis and lexical contrastive analysis, Blum and Levenston (1978) found that L2 lexical simplification results in communication effects of the following kind:

1. Inappropriate collocations. The word chosen may be semantically and conceptually appropriate but used in collocations that do not occur in native speakers' usage.

2. Misunderstanding. Some words chosen are totally unrecognizable. These words are often understood by listeners in a way very different from what the speaker intended. The misunderstanding is often passed unnoticed, or leads to anything from puzzlement to armed conflict.

3. Obscurity. A more general word is chosen instead of the more specific, restricted
term that native speakers would normally prefer.

4. Ambiguity. Learners overgeneralize a common word without realizing its degree of polysemy. In cases of ambiguity, native speakers are not quite sure which of the two or more clearly distinguishable meanings is the one intended by the L2 learner.

5. Inappropriate register or variety. L2 learners favor a certain word as a general, all-purpose vocabulary item that is register-restricted in native speakers' usage.

There is quite a lot of overlap in these results of the studies of L2 lexical acquisition. Those areas of difficulty as predicted by Lado seem to bear some intuitive as well as empirical truth concerning vocabulary learning. However, considering the problems as well as lexical usage patterns of L2 learners, native language structure seems to constitute a part but not all of the source for lexical simplification (Levenston & Blum 1977).

Language Transfer

Gass and Selinker (1983) defined language transfer as "the use of native language knowledge - in some as yet unclear way - in the acquisition of a second language". Studies of language transfer had traditionally been carried out within the framework of contrastive analysis, which, because of its theoretical grounding in structuralism and behaviorism, and because of its lack of predictive power as a theory, fell under attack of the Chomskyan theory. The studies of transfer also received a heavy blow following the rigorous efforts of those comparing child language acquisition with second language acquisition (Dulay & Burt 1972). Dulay and Burt (1974a, 1974b,
1974c, 1975) stressed the similarities between L1 and L2 acquisition and the irrelevance of behaviourism for language acquisition to the point of denying that transfer existed at all. However, such a view of L1 influence has been hard for many to accept (Faerch 1984; Corder 1983; Schachter 1983; Kellerman 1983), as abundant evidence does seem to suggest that L1 operates on L2 acquisition.

Evidence for the influence of L1 on L2 acquisition is especially quantitative when it comes to lexis. Ringbom (1978) examined the lexical errors made by Swedish and Finnish Finns in learning English, and found that loan translations or extension of the semantic range of lexical items in English could be very clearly related to the L1 - - the majority of errors could be attributed to the meanings of partial translation equivalents being transferred. Harley (1982) reports a study investigating lexicalization of the notions of movement, manner and direction in verbs. She looked at the written French composition of Anglophone students enrolled in an immersion program and of native French-Canadians. She noted that the immersion students relied more heavily on prepositions than the native speakers, as they would in their L1, to express direction as a separate lexicalization outside the verb. English, as Talmy (1975) shows, tends to conflate movements and manner with the verb "she danced into the room", while Romance languages lexicalize movement and direction within the verb (Ella entro al cuarto bailando - She entered the room dancing). In French, unlike in English, the most common prepositions are neutral in terms of direction versus location; in English direction and location are usually indicated by different prepositions. Harley's results show that immersion students tended to use more non-directional movement verbs and prepositions than native speakers, who, if they used such verbs, always did so with an explicitly directional preposition or
prepositional phrase. Take, for example, "courir" (to run), a verb which conflates movement and manner, but not direction - a typical English pattern. Immersion students used this verb far more frequently than the native speakers, and where direction was involved, in conjunction with a preposition(al phrase) like "à" unmarked for direction (le chat courait à la maison). Thus for native speakers, most prepositions drew their directional interpretation from the verb, while for immersion students, direction was frequently carried by the preposition alone.

Another study making use of comparative quantitative data is that of Wong (1983). She investigated the relatively greater number of "make" constructions in the written compositions of Chinese learners of English than in the work of other learners. She claims that the predilection for "make" structures is directly relatable to Chinese, where the relatively few lexicalized causative verbs are literary or technical, and the most frequent structure contains an explicit marker of causation (shi, "make") + complement. Wong's claim is that the absence of lexicalization in Chinese will lead to under-lexicalization in English with resultant unidiomatic usage, such as "They might make their friends get very upset about this", instead of, presumably, "They might upset their friends very much about this", where "to upset" in English is a lexicalized causative.

Research Questions and Hypotheses for the Study

Previous studies in L2 lexical acquisition and language transfer show that native language certainly has an impact on one's learning of a second language. However, because of the transfer phenomenon being in a "fluid" state, that is, sometimes it occurs and can be observed, whereas at some other times it does not occur and can
not be observed, research efforts have to be devoted to specifying the conditions under which transfer occurs. As Kellerman and others have pointed out, native language structure itself may embody a gradience of transferability: some structures and items may be more transferable than others. This native language structure in lexis can be characterized in terms of prototypicality of word senses. Now the questions arise as to whether a relationship can be found between transferability and prototypicality of word senses, and whether some factors can indeed account for native-like performance of L2 word use by L2 learners.

The purpose of this study hence aims to answer these two questions: 1) Is transferability of word senses related to prototypicality of word senses? 2) What factors can help L2 learners achieve native-like performance on the use of L2 words? Based on the literature and studies reviewed in the previous sections, the following hypotheses are made for this study:

1. Transferability is positively related to prototypicality. The more central or prototypical a sense is in the native language, the more transferable it is to a target language.

2. Knowledge about the target language interacts with the knowledge of the native language and together they form the basis for determination of actual transfer of a particular native language item.

3. Some L2 senses may be acquired "free" because of transfer from L1 while other senses may have to be learned.

4. It may be difficult for L2 learners to learn L2 senses that are absent in L1, or non-central and peripheral in L2, and to suppress L1
senses that are highly central and transferable in L1 but unacceptable in L2.

5. Native-like performance on L2 word use may be predicted by factors such as length of stay in the target language culture, amount of daily contact with native speakers, amount of daily L2 use, years of formal L2 study and proficiency in the second language.
CHAPTER 3. METHOD

The first section of this chapter provides a description of the subjects who participated in this study. The second section discusses the tests and other information-gathering instruments used in the collection of the data. The final section describes the procedures used in the study.

Subjects

The subjects participating in this study were 39 Chinese speakers and 23 American English speakers.

The 39 Chinese subjects were drawn randomly from about three hundred Chinese students, visiting scholars, and student spouses who were from mainland China and were living in the Iowa State University community. Of the 39 Chinese subjects, 22 were ISU graduate students of various academic majors, four were visiting scholars, and the remaining 13 were student spouses. The subjects had all received at least a college education in China except for six student spouses who were not college graduates (see Table 3.1). The age of the subjects ranged from twenty-four to fifty-one. The subjects also showed different characteristics in terms of their proficiency in English as measured by an unofficial TOEFL test (Test of English as a Foreign Language), length of residence in the United States, years of formal learning of
Table 3.1: Distribution of Chinese subjects by status and education level

<table>
<thead>
<tr>
<th>Status</th>
<th>Education level</th>
<th>Student</th>
<th>Spouse</th>
<th>Visiting scholar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>College graduate</td>
<td>22</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Non-college graduate</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>22</td>
<td>13</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 3.2: Descriptive statistics on the characteristics of Chinese subjects (n = 39)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Unit</th>
<th>Mean</th>
<th>S. D.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay in the U.S.</td>
<td>year</td>
<td>2.7</td>
<td>1.7351</td>
<td>0.25 - 6+</td>
</tr>
<tr>
<td>Contact with native speaker</td>
<td>hour/day</td>
<td>2.2</td>
<td>1.9846</td>
<td>0.5 - 6+</td>
</tr>
<tr>
<td>Use of English</td>
<td>hour/day</td>
<td>4.0</td>
<td>1.6431</td>
<td>0.5 - 6+</td>
</tr>
<tr>
<td>Years of English course</td>
<td>year</td>
<td>3.0</td>
<td>1.8970</td>
<td>0.5 - 6+</td>
</tr>
<tr>
<td>TOEFL score</td>
<td>X</td>
<td>517.7</td>
<td>73.64</td>
<td>348-610</td>
</tr>
</tbody>
</table>
English, and hours of daily contact with native speakers and use of English. Table 3.2 summarizes this information collected from the subjects. It shows that the subjects had TOEFL scores ranging from 348 to 610, with a mean of 517.7 and a standard deviation of 73.64. The length of stay in the United States ranged from a couple of months to over six years, with an average length of stay of 2.7 years in the United States. The amount of daily contact/conversation with native speakers ranged from less than one hour to over six hours, with a mean of 2.2 hours. The subjects on average reported 4 hours of English use every day, and their years of course work in English before coming to the U.S. ranged from zero to six years. On average the subjects had 3 years of course work in English before they came to the U.S..

The 22 American subjects were undergraduate students from a sophomore level English grammar class at Iowa State University. This sample was drawn to represent the population of native speakers of midwest American English.

Materials

Choice of word for the study

Some explanation of the choice of the word for the study is necessary. Previous experimental investigations of semantic prototypes have dealt exclusively with category names which are directly perceptible physical objects or with perceptual sensations themselves, e.g., colors, fruits, plants and animals, utensils, and furniture. Each of these categories has a number of subordinate members. Coleman and Kay (1981) extended the investigation of semantic prototypes to the lexical domain of verbs - the English verb “lie”. Since documented research and literature indicate that the prototype phenomenon may actually exist in all types of semantic domains,
the present study investigates whether the prototype phenomenon can be found in the semantics of adjectives, namely, the Chinese word "xi" and its English equivalent "thin".

Another consideration for the choice of "xi" in this study comes from the fact that the word is polysemous. Furthermore, it is what I call "a basic word", i.e., a word whose meaning is most likely to be lexicalized in all languages. For example, words like "long", "short", "run", "eat", "sleep", "shoes" or "water" are more likely to find corresponding words in other languages than words like "radio", "xerox", or "program". Such words are also commonly called "simple words" by ordinary speakers of languages. It seems, however, these simple words are not simple at all. In fact, they are often quite complex in the sense that they usually carry more than one meaning and are often associated with figurative expressions and idioms. The phenomenon that "simple words" are polysemous and complex is well explained in Mark Johnson and George Lakoff's work. According to them (Lakoff & Johnson 1980), people understand one thing or experience in terms of another, tending to understand complex and abstract experiences in terms of the simple and concrete. Thus metaphorical thinking and understanding is the base for reasoning. An example is the word "long". The primary meaning of the word according to the Longman Dictionary is "a measuring of good deal from one end to the other", e.g., long hair, or a long dress. Hence, only concrete things like physical objects can be said to be "long". However, we also have the expression "to pull a long face" and "to have a long day" which are usually not taken literally. "To pull a long face" means metaphorically "to get angry", and "to have a long day" does not mean the day is twelve or fifteen hours long but rather that the day is tedious and tiring. Thus the primary meaning of
"long" is metaphorically extended to carry the meanings of "unhappy" and "tedious, tiring". This example shows how a basic primary meaning can be developed into other meanings. If humans understand one thing or experience in terms of the other, and understanding the complex and abstract in terms of the simple and concrete is truly a universal principle, there is reason to believe that a word with roughly the same basic meaning may have totally different extended meanings across two languages.

The word "xi" and its corresponding word "thin" are basic words in both Chinese and English. They are both polysemous in the two languages with different extended meanings and usage (see Table 3.3). This is the kind of word that presents problems for language learners. The present experimental study of the word "xi" and "thin" yields results that address the research questions stated in the previous chapters, and therefore can be applied to the acquisition of a wide range of such "basic words".

**Instruments**

Three principal test instruments were developed by the investigator to elicit data on subjects' intuitive judgements of (1) centrality or prototypicality of word senses, (2) transferability of word senses, and (3) acceptance of instances of word use. Items in these instruments were obtained from pre-surveys of word senses of "xi" in Chinese and of "thin" in English. The first was conducted in Chinese with Chinese college students in mainland China who had never been in an English-speaking culture. This survey elicited data on the most frequently used senses of word "xi". The second survey was conducted with American college students in English to elicit data on the most frequently used senses of "thin". An English proficiency test was given to the
Table 3.3: Comparison of word senses of "xi" and "thin"

<table>
<thead>
<tr>
<th>Senses and Instances of Use of &quot;xi&quot; in Chinese</th>
<th>Senses and Instances of Use of &quot;thin&quot; in English</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) thin; slender: a &quot;xi&quot; rope / &quot;xi&quot; string / &quot;xi&quot; yarn / She is &quot;xi&quot;</td>
<td>1) a. having a small distance between opposite surfaces; not thick: a thin board / thin ice;</td>
</tr>
<tr>
<td></td>
<td>b. (of a round object) narrow in relation to length; fine: thin string / wire;</td>
</tr>
<tr>
<td>2) in small particles, fine: &quot;xi&quot; sand / The corn flour has been ground very &quot;xi&quot;</td>
<td></td>
</tr>
<tr>
<td>3) thin and soft: a &quot;xi&quot; voice;</td>
<td></td>
</tr>
<tr>
<td>4) fine; delicate: &quot;xi&quot; porcelain / china / cloth a baby's skin is &quot;xi&quot;</td>
<td></td>
</tr>
<tr>
<td>5) fine and closely-woven: in &quot;xi&quot; stitches;</td>
<td></td>
</tr>
<tr>
<td>6) small; tiny; fine: &quot;xi&quot; raindrops / &quot;xi&quot; rain;</td>
<td></td>
</tr>
<tr>
<td>7) careful; meticulous; detailed: &quot;xi&quot; work / a &quot;xi&quot; heart / &quot;xi&quot; account.</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3 (Continued)

2) having little fat on the body; not fat: She is thin;

3) (of liquid) watery; flowing easily; weak: thin soup/
The beer is too thin to enjoy;

4) not closely packed; made of a few objects widely separated: thin hair/a thin audience/a thin crowd;

5) easy to see through; not dense: thin mist/thin air/thin smoke;

6) (esp. of a sound or note) lacking in strength:
thin high notes;

7) lacking force or strength; poor: a thin excuse/a thin argument;

8) not having enough; scarce: Food supply is growing thin/my patience is thin;
Chinese subjects at Iowa State to obtain a measure of their proficiency. A personal data form was also given to the Chinese subjects to obtain information about their length of stay in the United States, amount of daily contact/conversation with native speakers, amount of daily use of English (this refers to any use of English except for speaking or talking to native speakers) and the number of years of English study in school before they came to the U.S..

The Pre-survey of word senses  Rosch’s study (1973a) of "focal members" of categories used category names and instances taken from a study done by Battig and Montague (1969), a normative study in which American college students listed instances of categories such as "a flower", "an article of clothing", and the like. The frequency with which each instance was given for the superordinate category name was then computed. However, no such normative study has been done for the senses and instances of the words "xi " and "thin". Therefore, the first step in this study was to decide on the word senses of "xi " and "thin" to be used. Though dictionaries provide a very good summary of the senses of words, the decision can not be made solely by the choices of the semantic entries presented there, as instances of word use are to some extent infinite and no dictionary would possibly have a complete list of all the ways the word can be used. Besides, consideration had to be given to the choice of items so that those used would have rather spreadout response frequencies.

The surveys of the word senses took the form of a questionnaire in which the Chinese students and American students were asked to write four sentences or phrases with "xi " or "thin", respectively. The surveys provided information about which sense in each language would get the most frequent response, and about the different
senses "xi" and "thin" can have in each language (see Appendix A: I & II). It was assumed that the most frequent response given for a sense or an instance would also be the most central or prototypical sense or instance of use for that word.

**Centrality tests** Two centrality tests were developed: one using the word "xi" for Chinese subjects and the other using "thin" for American subjects. The two tests were administered to obtain ratings on the centrality of word senses in each language. Ten test items were chosen from each pre-survey. The word "xi" and "thin" were all adjectives in the tests. Responses in which the word "xi" or "thin" was used in idioms, compound words, or as other parts of speech, such as verbs or adverbs, were not considered for use in the tests. Tables 3.4 and 3.5 show the response frequency each item received from the pre-surveys. The centrality test of the word "xi" was written in Chinese (Appendix B: I), while the centrality test of the word "thin" was written in English (Appendix B: VIII). Each test item was put on a seven-point scale for subjects to rate.

The instructions for completing the centrality tests were as follows:

**Instruction:** In the following, I want your judgements about the use of a word in certain phrases.

Many words can be used in different types of phrases, with a slightly different meaning in each phrase. For example, the word "sharp" can be used as follows:

- a sharp knife
- sharp eyes/ears
- a sharp child
- a sharp turn to the left
- a sharp tongue
- a sharp voice
- a sharp looking soldier
However, people usually think of one meaning as the most central or basic. Children are most likely to learn this central meaning first, and later pick up the other meanings. In the above list, I feel that "sharp" in "a sharp knife" is the most central meaning. What do you think?

In this task, I would like similar opinions from you about ten phrases using the word "thin". For each phrase below, circle one number on the scale of 1-7 to indicate your judgement of the centrality of that meaning of "thin". For example, if you find "thin" in item 1, "a thin excuse", to have the most central meaning of this word, circle (1). If you find this use of "thin" to be the least central meaning of this word, circle (7). If you find this "thin" to be somewhere in between, circle a number from (2) to (6).

Please mark one and only one number for each item. Don't worry about why you feel that something is or is not a central meaning of the word (and don't worry about whether it's just you or people in general who feel that way). Just mark each item the way you feel.

As the concept of centrality or prototypicality may have proved difficult for the subjects to grasp, the centrality of a word sense or instance of use was thus explained in the instructions as the degree to which a sense or use is basic for the word, or the likelihood that it is learned first by a child when he/she learns to speak.

**Transferability test**  The purpose of this test was to obtain ratings on the transferability of the senses of "xi ", i.e., to collect data on how transferable from Chinese to English the subjects believed a given sense or use of "xi " to be. The test was hence written in Chinese and given to Chinese subjects only. The items used in this test were the same as those used in the centrality test of "xi "; however the order in which the items appeared on the test was changed. The instructions for this test
Table 3.4: Response frequency received from the Chinese survey for the items used in the centrality test of the word "xi" \((n = 105)\)

<table>
<thead>
<tr>
<th>Items</th>
<th>Res. Frequency</th>
<th>Items</th>
<th>Res. Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a &quot;thin&quot; heart)</td>
<td>78</td>
<td>(a &quot;thin&quot; pen)</td>
<td>6</td>
</tr>
<tr>
<td>(She is &quot;thin&quot;)</td>
<td>27</td>
<td>(a &quot;thin&quot; voice)</td>
<td>6</td>
</tr>
<tr>
<td>(a &quot;thin&quot; rope)</td>
<td>23</td>
<td>(&quot;thin&quot; hair)</td>
<td>6</td>
</tr>
<tr>
<td>(&quot;thin&quot; rain)</td>
<td>15</td>
<td>(a &quot;thin&quot; account)</td>
<td>4</td>
</tr>
<tr>
<td>(&quot;thin&quot; sand/flour)</td>
<td>8</td>
<td>(&quot;thin&quot; cloth)</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3.5: Response frequency received from the English survey for the items used in the centrality test of "thin" \((n = 127)\)

<table>
<thead>
<tr>
<th>Items</th>
<th>Res. Frequency</th>
<th>Items</th>
<th>Res. Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>She is thin/Her body is thin</td>
<td>106</td>
<td>thin soup</td>
<td>4</td>
</tr>
<tr>
<td>thin ice</td>
<td>17</td>
<td>thin cloth</td>
<td>3</td>
</tr>
<tr>
<td>thin hair</td>
<td>15</td>
<td>a thin rope</td>
<td>2</td>
</tr>
<tr>
<td>thin mist</td>
<td>8</td>
<td>a thin statement</td>
<td>1</td>
</tr>
<tr>
<td>thin patience</td>
<td>4</td>
<td>a thin voice</td>
<td>1</td>
</tr>
</tbody>
</table>
were also different from those given for the centrality test. In this test, the subjects were asked to judge how transferable a sense of "xi" was to the English word "thin". The format of the test followed that of the centrality test, that is, a seven-point scale was also used for each item (Appendix B: II).

Acceptance test  The acceptance test of the uses for the word "thin" consisted of 15 items which were drawn from the two centrality tests. Instances of the Chinese word use "xi" were directly translated into English by the word "thin". Five instances of use were shared by both languages (the meanings conveyed were different for some however), and 10 instances of use were different. The test was administered to both American and Chinese subjects in English. The format of the test was the same as the previous ones and a seven-point scale was used for subjects to rate the acceptability of each item (Appendix B: III & IX). The purpose of the test was to collect data on how the Chinese subjects would differ from the American subjects in the judgements made about the acceptability of the uses of "thin".

Personal data forms  As described at the beginning of the section, four pieces of information were collected in the personal data forms: (1) subjects' length of stay in the U.S.; (2) the amount of daily contact/conversation with native speakers; (3) the amount of daily English use; (4) years of course work in English which subjects had in home country. Each piece of information was asked as a question, and multiple choice answers were provided. Subjects answered the questions by circling the appropriate letters on the personal data form (Appendix B: IV).
Proficiency test The proficiency test used was a TOEFL Model Test adapted from the Barron's Guide to TOEFL (Test of English as a Foreign Language), a multiple-choice test to test English as L2 learners' listening, grammar, and reading abilities (Appendix B: VI). Reliability of the model test with the real TOEFL test is claimed to be high by the publisher of Barron's Guide to TOEFL.

Testing Procedure

In September 1989 the pre-survey of the Chinese senses of "xi" was conducted in Xi'an Jiaotong University and in the Graduate School of the Chinese Academy of Social Sciences, mainland China. As the survey could not be conducted by the investigator of the present study in person, two instructors, one a friend and the other a relative of the investigator who were teaching in the above mentioned institutes, were asked to help collect these data. A cover letter which briefly introduced the study and written instructions for conducting the survey were sent to each instructor. By late October the data collected from 134 students were received by mail. Of the 134 students, 108 were third year college students majoring in sciences and engineering in Xi'an Jiaotong University, and 26 were psychology majors at the Graduate School of the Chinese Academy of Social Sciences.

The pre-survey of the English senses of "thin" was conducted with 143 American students at Iowa State University in a period of one and a half months (October to mid-November). The students who participated in the survey were from six different English classes. Permission and help were obtained from the instructors to conduct the survey in their classes. When the survey was not carried out in person, instructions were given verbally or in written form to the instructors who collected
the data.

Data collection on the principal tests began after the proposal for the present study was approved by the Human Subjects Committee of Iowa State University on November 14, 1989. Data collection for the study was completed by the end of December 1989. The centrality test of "thin" and the acceptance test of word use were given to American subjects in December at one class meeting. Instructions for doing the tests were given in written form and also explained orally before the subjects did the tests. No apparent confusion or misunderstanding of the instructions arose from the subjects, and all subjects finished the tests within the given 15 minutes. Data from Chinese subjects were collected in two steps because of the available time the subjects would have at each meeting. The centrality test for "xi", the transferability test, and acceptance test were given to the subjects in succession at the first meeting, while the proficiency test and personal data forms were completed at the second meeting. Because of the difficulty of gathering all 39 subjects together at a fixed time, data were collected by paying individual house visits to the subjects. In each case the subjects were asked to read the instructions first. Explanation of the instructions was given in Chinese when there was confusion. On average, the subjects spent about 20 to 30 minutes completing the centrality test, transferability test, and acceptance test. Subjects spent at least two hours in completing the proficiency and personal data forms. The subjects were timed for the TOEFL test according to instructions for the real TOEFL.
CHAPTER 4. ANALYSIS AND RESULTS

This chapter details the statistical analysis of the data collected with the tests and other instruments described in the previous chapter. The analysis begins with the descriptive statistics used for the three principal tests. This is followed by the correlation analyses between responses for the centrality test and the transferability test for "xi". A multiple regression analysis with English proficiency, the length of stay in the U.S., amount of daily contact with native speakers, amount of daily English use, and years of course work in English as the predicting factors is presented as the last part of the chapter. These statistical procedures are used to address the main research questions: 1) Is the perceived transferability of L1 word senses related to the centrality of L1 word senses? and 2) What factors account for L2 learners' native-like judgements on the acceptability of English word use, such as phrases with "thin"?

Descriptive Statistics for the Principal Tests

As the format used for the centrality tests, transferability test and acceptance test was the same, that is, subjects were all required to provide their opinions and judgements for each item on a seven-point scale from 1 (the most central or transferable or acceptable) to 7 (the least central or transferable or acceptable), the judge-
ment made for each item yields a numerical value. It is important to mention here that the scale is valid only at the level of ordinality and the mathematical properties of the scale may not actually correspond to psychological reality beyond that of order. The relative magnitudes of scale scores, however, are supposed to represent real psychological distinctions (Coleman & Kay 1981).

Table 4.1 shows the raw scale scores obtained for the centrality test of "xi". Descriptive statistics of the mean scale score for the whole group (n=39) on the judgement of each item, standard deviation and range were also computed. The maximum possible scale score for each item is 273 (= scale score of 7 x 39 subjects), while the minimum possible score is 39.

In Table 4.1 the mean scale score for each word sense indicates the degree to which the subjects as a group considered it to be central. The lower the mean the more central the sense or the use of the word. The over-all results may be better seen by considering a plot of these values along a line from the most central to least central, as shown in Figure 4.1. In that figure, we see "a xi rope" (meaning "a thin rope") ranked first on the scale as the most central sense of "xi", followed by "xi hair" (meaning hair on one's head is soft and the diameter of each hair is small; in Chinese it is possible to say something is as "xi" as a hair), "xi sand" (meaning fine sand granules), "a xi pen" (meaning a fine point pen), and "xi body"(meaning one or one's body is thin). The least central word sense is "a girl's heart is xi" (meaning girls are usually careful; in Chinese, to be "xi" hearted means to be careful), which is closely preceded in rank (a mean difference of 0.03) by "a xi account" (meaning careful bookkeeping).

The results of the transferability test as shown in Table 4.2 reveal a different
Table 4.1: Descriptive statistics for the centrality test of "xi" by Chinese speakers (n = 39)

<table>
<thead>
<tr>
<th>Word Senses and Use</th>
<th>Total Score</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (a &quot;xi&quot; rope)</td>
<td>53</td>
<td>1-6</td>
<td>1.36</td>
<td>0.96</td>
</tr>
<tr>
<td>b. (&quot;xi&quot; sand/flour)</td>
<td>98</td>
<td>1-6</td>
<td>2.51</td>
<td>1.32</td>
</tr>
<tr>
<td>c. (a girl's heart is &quot;xi&quot;)</td>
<td>217</td>
<td>2-7</td>
<td>5.56</td>
<td>1.54</td>
</tr>
<tr>
<td>d. (a &quot;xi&quot; body)</td>
<td>137</td>
<td>1-7</td>
<td>3.51</td>
<td>1.43</td>
</tr>
<tr>
<td>e. (&quot;xi&quot; voice)</td>
<td>196</td>
<td>2-7</td>
<td>5.03</td>
<td>1.40</td>
</tr>
<tr>
<td>f. (a &quot;xi&quot; pen)</td>
<td>115</td>
<td>1-7</td>
<td>2.95</td>
<td>1.38</td>
</tr>
<tr>
<td>g. (&quot;xi&quot; hair)</td>
<td>89</td>
<td>1-7</td>
<td>2.28</td>
<td>1.62</td>
</tr>
<tr>
<td>h. (&quot;xi&quot; rain)</td>
<td>152</td>
<td>1-7</td>
<td>3.90</td>
<td>1.65</td>
</tr>
<tr>
<td>i. (&quot;xi&quot; account)</td>
<td>216</td>
<td>2-7</td>
<td>5.54</td>
<td>1.43</td>
</tr>
<tr>
<td>j. (&quot;xi&quot; cloth)</td>
<td>183</td>
<td>1-7</td>
<td>4.7</td>
<td>1.38</td>
</tr>
</tbody>
</table>
rank order of the ten items. In this test the subjects ranked "a xi body" as the most transferable of the senses of "xi ". It is followed by "a xi rope", "xi hair", and then "a xi pen". "Xi sand/flour" was ranked at the least transferable end of the scale, together with "a xi heart" and "a xi account" (see Fig. 4.2 below). The standard deviations for the judgements of transferability in several cases are also found to be higher than that for the judgements of centrality. This, though expected, clearly indicates that the subjects showed more disagreement on the judgements of transferability than on the judgements of centrality.

The ratings on the centrality test of "thin" by American subjects are presented in Table 4.3. The total possible maximum scale score is 161 ( = scale score of 7 x 23 subjects), and the minimum scale score is 23. Again, the smaller the mean scale score, the more central or prototypical the sense or instance of use is. Table 4.3 shows "she is thin/a thin body" ranked as the most central use for the English word "thin".
Table 4.2: Descriptive statistics for the transferability test of "xi" by Chinese speakers (n = 39)

<table>
<thead>
<tr>
<th>Word Senses and Use</th>
<th>Total Score</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. &quot;a xi rope&quot;</td>
<td>85</td>
<td>1-7</td>
<td>2.18</td>
<td>1.62</td>
</tr>
<tr>
<td>b. &quot;xi sand/flour&quot;</td>
<td>208</td>
<td>3-7</td>
<td>5.33</td>
<td>1.72</td>
</tr>
<tr>
<td>c. &quot;a girl’s heart is xi&quot;</td>
<td>249</td>
<td>2-7</td>
<td>6.38</td>
<td>1.24</td>
</tr>
<tr>
<td>d. &quot;a xi body&quot;</td>
<td>70</td>
<td>1-6</td>
<td>1.79</td>
<td>1.13</td>
</tr>
<tr>
<td>e. &quot;a xi voice&quot;</td>
<td>203</td>
<td>1-7</td>
<td>5.21</td>
<td>1.92</td>
</tr>
<tr>
<td>f. &quot;a xi pen&quot;</td>
<td>132</td>
<td>1-7</td>
<td>3.38</td>
<td>2.12</td>
</tr>
<tr>
<td>g. &quot;xi hair&quot;</td>
<td>97</td>
<td>1-7</td>
<td>2.49</td>
<td>1.75</td>
</tr>
<tr>
<td>h. &quot;xi rain&quot;</td>
<td>189</td>
<td>1-7</td>
<td>4.85</td>
<td>1.71</td>
</tr>
<tr>
<td>i. &quot;a xi account&quot;</td>
<td>251</td>
<td>2-7</td>
<td>6.44</td>
<td>1.17</td>
</tr>
<tr>
<td>j. &quot;xi cloth&quot;</td>
<td>200</td>
<td>1-7</td>
<td>5.13</td>
<td>1.69</td>
</tr>
</tbody>
</table>
Figure 4.2: Illustration of transferability of word senses of "xi"

and "a thin statement" as the least central sense of "thin". It is worth mentioning that the standard deviations of the judgements in Table 4.3 seem to indicate that the American subjects made more homogeneous judgements on the centrality of senses of "thin" than did the Chinese subjects on the senses of "xi". The rank order of the senses of "thin" is plotted in Figure 4.3 below.

In comparing the results of the centrality test of "thin" with the results of the centrality test of "xi", it is interesting to find that though the Chinese word "xi" and the English word "thin" are recognized as equivalent terms and that they do share some of the senses and instances of use, their prototypical or "core" sense and use is actually very different. According to the statistics above, the most central or prototypical sense of "thin" in English is found to be "she is thin" (describing a human body), while the most central or prototypical sense of "xi" is "a thin rope", despite the fact that both "thin" and "xi" have the senses of "she is thin" and "a
Table 4.3: Descriptive statistics for the centrality test of word senses of "thin" by English speakers (n = 23)

<table>
<thead>
<tr>
<th>Word Senses and Use</th>
<th>Total Score</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>she is thin</td>
<td>34</td>
<td>1-3</td>
<td>1.49</td>
<td>0.73</td>
</tr>
<tr>
<td>a thin rope</td>
<td>63</td>
<td>1-5</td>
<td>2.74</td>
<td>1.18</td>
</tr>
<tr>
<td>a thin mist</td>
<td>120</td>
<td>3-6</td>
<td>5.22</td>
<td>0.95</td>
</tr>
<tr>
<td>a thin voice</td>
<td>136</td>
<td>2-7</td>
<td>5.91</td>
<td>1.13</td>
</tr>
<tr>
<td>thin ice</td>
<td>45</td>
<td>1-4</td>
<td>1.96</td>
<td>1.02</td>
</tr>
<tr>
<td>thin hair</td>
<td>59</td>
<td>1-7</td>
<td>2.56</td>
<td>1.47</td>
</tr>
<tr>
<td>my patience is thin</td>
<td>107</td>
<td>3-7</td>
<td>4.65</td>
<td>1.27</td>
</tr>
<tr>
<td>thin soup</td>
<td>112</td>
<td>2-7</td>
<td>4.87</td>
<td>1.58</td>
</tr>
<tr>
<td>thin cloth</td>
<td>88</td>
<td>1-7</td>
<td>3.83</td>
<td>1.73</td>
</tr>
<tr>
<td>a thin statement</td>
<td>156</td>
<td>6-7</td>
<td>6.78</td>
<td>0.42</td>
</tr>
</tbody>
</table>
The last test administered to the subjects was the acceptance test of uses of "thin". Descriptive statistics were obtained for the test results of both the American and the Chinese groups and are presented in Tables 4.4 & 4.5.

According to Tables 4.4 and 4.5, differences were found in the mean scale scores for the acceptance judgements of some of the word uses of "thin" between American subjects and Chinese subjects. The difference between means was as much as two scale scores apart for a given judgement. For example, "thin ice" received a mean acceptance score of 1.22 from the American subjects with a standard deviation of only 0.52 while from the Chinese subjects it received a mean score of 3.46 with a standard deviation of 2.16. The same is true of "my patience is thin", with a mean acceptance score difference of 2.52 (Chinese mean of 5.69 - American mean of 3.17).

In the case of "a thin pen", the American subjects rated it higher (less acceptable)
Table 4.4: Descriptive statistics for the acceptance test of "thin" by American subjects (n = 23)

<table>
<thead>
<tr>
<th>Instances of Use</th>
<th>Total Score</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a thin rope</td>
<td>49</td>
<td>1-5</td>
<td>2.13</td>
<td>1.10</td>
</tr>
<tr>
<td>thin ice</td>
<td>28</td>
<td>1-2</td>
<td>1.22</td>
<td>0.52</td>
</tr>
<tr>
<td>a pile of thin sand</td>
<td>125</td>
<td>3-7</td>
<td>5.43</td>
<td>1.31</td>
</tr>
<tr>
<td>she is thin</td>
<td>26</td>
<td>1-2</td>
<td>1.13</td>
<td>0.34</td>
</tr>
<tr>
<td>a thin mist</td>
<td>84</td>
<td>1-7</td>
<td>3.65</td>
<td>1.43</td>
</tr>
<tr>
<td>a thin heart</td>
<td>144</td>
<td>4-7</td>
<td>6.26</td>
<td>0.81</td>
</tr>
<tr>
<td>a thin voice</td>
<td>120</td>
<td>2-7</td>
<td>5.22</td>
<td>1.73</td>
</tr>
<tr>
<td>a thin pen</td>
<td>108</td>
<td>2-7</td>
<td>4.70</td>
<td>1.82</td>
</tr>
<tr>
<td>thin hair</td>
<td>45</td>
<td>1-5</td>
<td>1.96</td>
<td>1.11</td>
</tr>
<tr>
<td>thin soup</td>
<td>99</td>
<td>1-7</td>
<td>4.31</td>
<td>1.74</td>
</tr>
<tr>
<td>thin rain</td>
<td>130</td>
<td>2-7</td>
<td>5.65</td>
<td>1.40</td>
</tr>
<tr>
<td>my patience is thin</td>
<td>73</td>
<td>1-6</td>
<td>3.17</td>
<td>1.72</td>
</tr>
<tr>
<td>thin cloth</td>
<td>82</td>
<td>1-6</td>
<td>3.57</td>
<td>1.78</td>
</tr>
<tr>
<td>a thin statement of what has happened</td>
<td>147</td>
<td>4-7</td>
<td>6.39</td>
<td>0.89</td>
</tr>
<tr>
<td>to keep a thin account</td>
<td>135</td>
<td>1-7</td>
<td>5.87</td>
<td>1.66</td>
</tr>
</tbody>
</table>
Table 4.5: Descriptive statistics for the acceptance test of "thin" by Chinese subjects (n = 39)

<table>
<thead>
<tr>
<th>Instances of Use</th>
<th>Total Score</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a thin rope</td>
<td>97</td>
<td>1-7</td>
<td>2.49</td>
<td>1.89</td>
</tr>
<tr>
<td>thin ice</td>
<td>135</td>
<td>1-7</td>
<td>3.46</td>
<td>2.16</td>
</tr>
<tr>
<td>a pile of thin sand</td>
<td>186</td>
<td>2-7</td>
<td>4.77</td>
<td>1.96</td>
</tr>
<tr>
<td>she is thin</td>
<td>56</td>
<td>1-3</td>
<td>1.44</td>
<td>0.72</td>
</tr>
<tr>
<td>a thin mist</td>
<td>152</td>
<td>1-7</td>
<td>3.90</td>
<td>1.94</td>
</tr>
<tr>
<td>a thin heart</td>
<td>232</td>
<td>1-7</td>
<td>5.95</td>
<td>1.72</td>
</tr>
<tr>
<td>a thin voice</td>
<td>196</td>
<td>2-7</td>
<td>5.02</td>
<td>1.74</td>
</tr>
<tr>
<td>a thin pen</td>
<td>123</td>
<td>1-7</td>
<td>3.15</td>
<td>1.83</td>
</tr>
<tr>
<td>thin hair</td>
<td>94</td>
<td>1-7</td>
<td>2.41</td>
<td>1.67</td>
</tr>
<tr>
<td>thin soup</td>
<td>199</td>
<td>1-7</td>
<td>5.10</td>
<td>1.98</td>
</tr>
<tr>
<td>thin rain</td>
<td>209</td>
<td>2-7</td>
<td>5.36</td>
<td>1.60</td>
</tr>
<tr>
<td>my patience is thin</td>
<td>222</td>
<td>2-7</td>
<td>5.69</td>
<td>1.54</td>
</tr>
<tr>
<td>thin cloth</td>
<td>156</td>
<td>1-7</td>
<td>4.00</td>
<td>2.10</td>
</tr>
<tr>
<td>a thin statement of what has happened</td>
<td>216</td>
<td>2-7</td>
<td>5.54</td>
<td>1.67</td>
</tr>
<tr>
<td>to keep a thin account</td>
<td>227</td>
<td>3-7</td>
<td>5.82</td>
<td>1.30</td>
</tr>
</tbody>
</table>
than the Chinese subjects by 1.55 points (mean 4.70 - mean 3.15). These differences are interesting, when we consider the fact that "thin ice" and "my patience is thin" are senses of "thin" lacking in the Chinese word "xi ", whereas "a thin pen" is a direct translation of the Chinese expression of "a xi pen", which means "a fine point pen" in English. The statistical significance of the mean difference between the two groups for each judgement is discussed in a later section.

In order to better grasp the differences of the acceptance test results between American subjects and Chinese subjects, the percentage of those accepting each use of "thin" was computed for both groups (as shown in Table 4.6). For the purposes of this analysis, scores of 1-3 were regarded as representing judgements of "acceptable", while scores of 5-7 were interpreted as "unacceptable". A possible danger in this analysis is that if subjects gave only, say, 1 to 4 or 3 to 7 ratings for every judgement, the data would be misinterpreted. To ensure that the above procedure is indeed appropriate, raw data for both groups were checked beforehand and no one was found to rate on such a narrowly skewed scale for this test. The results of this analysis are shown in Table 4.6.

**Relationships Between Centrality and Transferability of Word Senses and Instance of Use**

The first main research question the present study seeks to answer is whether the perceived transferability of word senses is related to their centrality. To address this question, correlation analyses were done between the results of the centrality test and the transferability test of word uses of "xi ". The data were first analyzed by using the Pearson product moment correlation and a coefficient was obtained for
Table 4.6: Comparison of percentage of acceptance between American group (n = 23) and Chinese group (n = 39) on the instances of word use of "thin"

<table>
<thead>
<tr>
<th>Instances of Use&lt;sup&gt;a&lt;/sup&gt;</th>
<th>% Acceptance (Ameri.)</th>
<th>% Acceptance (Chi.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) a thin rope</td>
<td>91%</td>
<td>77%</td>
</tr>
<tr>
<td>2) thin ice</td>
<td>100%</td>
<td>53%</td>
</tr>
<tr>
<td>3) a pile of thin sand</td>
<td>8%</td>
<td>33%</td>
</tr>
<tr>
<td>4) she is thin</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>5) a thin mist</td>
<td>39%</td>
<td>51%</td>
</tr>
<tr>
<td>6) a thin heart</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td>7) a thin voice</td>
<td>17%</td>
<td>23%</td>
</tr>
<tr>
<td>8) a thin pen</td>
<td>34%</td>
<td>66%</td>
</tr>
<tr>
<td>9) thin hair</td>
<td>91%</td>
<td>79%</td>
</tr>
<tr>
<td>10) thin soup</td>
<td>35%</td>
<td>26%</td>
</tr>
<tr>
<td>11) thin rain</td>
<td>9%</td>
<td>15%</td>
</tr>
<tr>
<td>12) my patience is thin</td>
<td>57%</td>
<td>7%</td>
</tr>
<tr>
<td>13) thin cloth</td>
<td>39%</td>
<td>46%</td>
</tr>
<tr>
<td>14) a thin statement of what has happened</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td>15) to keep a thin account</td>
<td>13%</td>
<td>5%</td>
</tr>
</tbody>
</table>

<sup>a</sup>1), 3), 4), 6), 7), 8), 11), and 15) are direct translations of Chinese "xi" senses and uses. Corresponding Chinese phrases of 8), 9), 13) and 15) with "xi" have different meanings from English phrases.
Table 4.7: Pearson Product Moment Correlation between centrality and transferability scores (n = 39)

<table>
<thead>
<tr>
<th>Word Sense and Use</th>
<th>Correlation Coefficient ($r$ observed$^a$)</th>
<th>Significance (yes or no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a &quot;xi&quot; rope)</td>
<td>0.0082</td>
<td>No</td>
</tr>
<tr>
<td>(&quot;xi&quot; sand/flour)</td>
<td>0.0968</td>
<td>No</td>
</tr>
<tr>
<td>(a girl's heart is &quot;xi&quot;)</td>
<td>0.5428</td>
<td>Yes</td>
</tr>
<tr>
<td>(a &quot;xi&quot; body)</td>
<td>0.0506</td>
<td>No</td>
</tr>
<tr>
<td>(a &quot;xi&quot; voice)</td>
<td>0.3782</td>
<td>Yes</td>
</tr>
<tr>
<td>(a &quot;xi&quot; pen)</td>
<td>0.2503</td>
<td>No</td>
</tr>
<tr>
<td>(&quot;xi&quot; hair)</td>
<td>0.1083</td>
<td>No</td>
</tr>
<tr>
<td>(&quot;xi&quot; rain)</td>
<td>0.3019</td>
<td>Yes</td>
</tr>
<tr>
<td>(a &quot;xi&quot; account)</td>
<td>0.5662</td>
<td>Yes</td>
</tr>
<tr>
<td>(&quot;xi&quot; cloth)</td>
<td>0.4015</td>
<td>Yes</td>
</tr>
</tbody>
</table>

$^a$r critical value = 0.26 (P < .05)

each sense and instance of use. Table 4.7 shows the result of this analysis.

According to Table 4.7, there are only five word uses which obtained significant correlations when P < 0.05. These five word uses also happen to be those with a low degree of centrality. "Xi account" and "a girl's heart is xi" have the first and second highest correlations and they also ranked the ninth and tenth on centrality. "Xi cloth", "a xi voice", and "xi rain" whose correlations are third, fourth and fifth highest, respectively, are ranked with respect to centrality in almost the same order.
(the seventh, eighth, and sixth). What this means is that the subjects scored more consistently with the less central senses on the transferability test than they did with the more central senses and use. In contrast, "a xi rope", "xi sand", "xi hair" and "a xi body" all obtained very poor correlations. Such results suggest there is not a very strong relationship between centrality and transferability of word senses and use.

However, the Pearson product moment correlation measures the relationship between two sets of scores, that is, the actual scale scores that each subject gave to a word sense on the centrality test and the transferability test are used. If some subjects used different scales to indicate their ratings on two tests, the correlation coefficient is likely to be depressed. The raw data of the transferability test indeed reveal this problem; some subjects made no rating or very narrow ratings on this test (a few gave "7" for every word use or "3" and "2" for every word use). In order to avoid the misinterpretations of the data because of the possible pitfalls of this analysis procedure, the data were re-analyzed by using the Spearman rank order correlation, which measures the relationship between the rank orders of centrality and transferability of word senses. As has been stated at the beginning of this chapter, the centrality test and transferability test both used a format that subjects were asked to provide their answers on a seven-point scale, which is valid only at the level of ordinality and the mathematical properties of the scale may not actually correspond to psychological reality beyond that of order, the Spearman rank order correlation analysis indeed seems to be a more appropriate measure to address the question. For this analysis, the items are ranked according to the magnitudes of the mean scale scores that each item received from the 39 subjects as a group. The result is shown in Table 4.8.
Table 4.8: Spearman Rank Order Correlation between centrality and transferability test

<table>
<thead>
<tr>
<th>Word Senses and Use</th>
<th>Rank (centrality)</th>
<th>Rank (transferability)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a &quot;xi&quot; rope)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(&quot;xi&quot; hair)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>(&quot;xi&quot; sand/flour)</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>(a &quot;xi&quot; pen)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>(a &quot;xi&quot; body)</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>(&quot;xi&quot; rain)</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>(&quot;xi&quot; cloth)</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>(a &quot;xi&quot; voice)</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>(a &quot;xi&quot; account)</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>(a girl's heart is &quot;xi&quot;)</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

Spearman rho observed = 0.71; Spearman rho critical = 0.56, P < .05 (with N = 10).
A Spearman rho of 0.71 was found for the re-analysis. The rho is significant at $P < .05$ with 10 cases (rho critical = 0.56), which indicates that a moderate relationship exists between the rank order of the ten items on the centrality test and the rank order of the same items on the transferability test. Table 4.8 reveals "a xi body" and "xi sand/flour" have the biggest mismatch of rank. The former ranked fifth on the centrality test, but emerged as the most transferable item. The latter, however, ranked second on the centrality test but fell to eighth position on the transferability test. The rearrangement of the order of the ten items on the transferability test is very interesting, especially in the above two cases, since the results of the centrality test for "thin" has revealed that "thin" as used to describe a human body or a human being, is the most central sense. The meaning of the Chinese word "xi" as in "xi sand/flour" is, however, absent in the meanings of English word "thin".

**Predicting Native-like Judgements on the Acceptance of Some Word Uses of "thin"**

The second research question that this study tries to answer is what learning factors will predict native-like judgements on the acceptance of instances of the English word "thin". In the section of "Descriptive Statistics on the three principal tests", the results of the acceptance test revealed that the Chinese subjects and American subjects made different judgements on the instances of word use of "thin", as shown in the mean scale score (Table 4.4 & 4.5) and the percentage of acceptance (Table 4.6) that an instance of word use received from both groups. However, as variance of judgements may occur randomly between any two groups, it is necessary to test the significance of the difference before drawing any conclusions. For this purpose,
an analysis of variance (ANOVA) was carried out comparing the judgements of acceptance on each instance of word use by the American subjects and by the Chinese subjects. The results are shown in Table 4.9 and summarized in Table 4.10.

According to Table 4.10, the difference of the judgements between the American subjects and the Chinese subjects is statistically significant for five instances of use of "thin", with $P < .05$ and degree of freedom of 1 and 60. The most significant difference of judgements are on "My patience is thin", "thin ice" and "a thin pen", which, according to Table 4.6, also have the greatest difference in terms of percentage of acceptance.

The differences in judgements on the acceptance of word use between the American subjects and the Chinese subjects leads naturally to the question of the degree to which the following five factors predict native-like performance by the Chinese subjects on the acceptance test: 1) proficiency of English (measured by the TOEFL Model Test); length of stay in the U.S.; 3) amount of daily contact/conversation with native speakers; 4) amount of daily English use; and 5) years of English course taken before coming to the U.S. A multiple regression analysis was used to address this question with native-like performance on the acceptance as the dependent variable. The mean scale scores given by the American subjects on the acceptance test "thin" served as the norm for the native speaker judgement for each instance of word use. The closeness to native-like judgements for a Chinese subject is taken to be the sum of absolute values of the score differences between the mean scale score of each instance of use as given by the American subjects and the scale score given by the Chinese for this instance of word use. The smaller the absolute value of the score difference a subject receives from this computation, the closer the judgements are to
Table 4.9: ANOVA analysis between the judgements of acceptance by American subjects and by Chinese subjects

1. Analysis of Variance for "a thin rope"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>1.84</td>
<td>1.84</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>162.35</td>
<td>2.71</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>164.19</td>
<td></td>
</tr>
<tr>
<td>F-ratio = .68047</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Analysis of Variance for "thin ice"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>72.86</td>
<td>72.86</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>183.61</td>
<td>3.06</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>256.47</td>
<td></td>
</tr>
<tr>
<td>F-ratio = 23.81054</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Analysis of Variance for "a pile of thin sand"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>6.41</td>
<td>6.41</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>182.58</td>
<td>3.04</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>188.98</td>
<td></td>
</tr>
<tr>
<td>F-ratio = 2.10608</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Analysis of Variance for "She is thin"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>1.35</td>
<td>1.35</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>22.20</td>
<td>.37</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>23.55</td>
<td></td>
</tr>
<tr>
<td>F-ratio = 3.64876</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Analysis of Variance for "a thin must"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>.87</td>
<td>.87</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>188.81</td>
<td>3.15</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>189.68</td>
<td></td>
</tr>
<tr>
<td>F-ratio = .27656</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Analysis of Variance for "a thin heart"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>1.41</td>
<td>1.41</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>126.33</td>
<td>2.11</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>127.74</td>
<td></td>
</tr>
<tr>
<td>F-ratio = .66953</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 4.9 (Continued)

<table>
<thead>
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<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>.53</td>
<td>.53</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>180.89</td>
<td>3.01</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>181.42</td>
<td></td>
</tr>
<tr>
<td><strong>F-ratio</strong></td>
<td></td>
<td><strong>.17645</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>34.39</td>
<td>34.39</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>199.95</td>
<td>3.33</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>234.34</td>
<td></td>
</tr>
<tr>
<td><strong>F-ratio</strong></td>
<td></td>
<td><strong>10.32043</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>2.98</td>
<td>2.98</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>132.39</td>
<td>2.21</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>135.37</td>
<td></td>
</tr>
<tr>
<td><strong>F-ratio</strong></td>
<td></td>
<td><strong>1.34987</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>9.22</td>
<td>9.22</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>216.46</td>
<td>3.61</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>225.68</td>
<td></td>
</tr>
<tr>
<td><strong>F-ratio</strong></td>
<td></td>
<td><strong>2.55515</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>1.24</td>
<td>1.24</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>140.19</td>
<td>2.34</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>141.44</td>
<td></td>
</tr>
<tr>
<td><strong>F-ratio</strong></td>
<td></td>
<td><strong>.53230</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>91.76</td>
<td>91.76</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>155.61</td>
<td>2.59</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>247.37</td>
<td></td>
</tr>
<tr>
<td><strong>F-ratio</strong></td>
<td></td>
<td><strong>35.37988</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.9 (Continued)

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>2.73</td>
<td>2.73</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>237.65</td>
<td>3.96</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>240.39</td>
<td></td>
</tr>
<tr>
<td>F-ratio = .69049</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Analysis of Variance for "a thin statement of what has happened"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>10.52</td>
<td>10.52</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>123.17</td>
<td>2.05</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>133.69</td>
<td></td>
</tr>
<tr>
<td>F-ratio = 5.12605</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. Analysis of Variance for "to keep a thin account"

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>Within groups</td>
<td>60</td>
<td>124.35</td>
<td>2.07</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>124.39</td>
<td></td>
</tr>
<tr>
<td>F-ratio = .01680</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.10: Summary table for the F ratio of the word uses

<table>
<thead>
<tr>
<th>Instance of Word Use</th>
<th>F observed</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>a thin rope</td>
<td>0.68</td>
<td>No</td>
</tr>
<tr>
<td>thin ice</td>
<td>23.81</td>
<td>Yes</td>
</tr>
<tr>
<td>a pile of thin sand</td>
<td>2.10</td>
<td>No</td>
</tr>
<tr>
<td>she is thin</td>
<td>3.65</td>
<td>No</td>
</tr>
<tr>
<td>a thin mist</td>
<td>0.28</td>
<td>No</td>
</tr>
<tr>
<td>a thin heart</td>
<td>0.67</td>
<td>No</td>
</tr>
<tr>
<td>a thin voice</td>
<td>0.18</td>
<td>No</td>
</tr>
<tr>
<td>a thin pen</td>
<td>10.32</td>
<td>Yes</td>
</tr>
<tr>
<td>thin hair</td>
<td>1.35</td>
<td>No</td>
</tr>
<tr>
<td>thin soup</td>
<td>2.56</td>
<td>No</td>
</tr>
<tr>
<td>thin rain</td>
<td>0.53</td>
<td>No</td>
</tr>
<tr>
<td>my patience is thin</td>
<td>35.38</td>
<td>Yes</td>
</tr>
<tr>
<td>thin cloth</td>
<td>0.69</td>
<td>No</td>
</tr>
<tr>
<td>a thin statement of</td>
<td>5.13</td>
<td>Yes</td>
</tr>
<tr>
<td>what has happened</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to keep a thin account</td>
<td>0.02</td>
<td>No</td>
</tr>
</tbody>
</table>

a $F$ critical = 4.00 df = 1. 60 $P < 0.5$. 
the native speakers' judgements on the acceptance of instances of use of "thin". The independent variables are the five factors listed above.

Table 4.11 shows the results of this multiple regression analysis, which was run by using a stepwise forward selection procedure for the independent variables. When this procedure is used in doing the multiple regression analysis, the computer is given the power to select the most important independent variables to be entered into the regression analysis and it does so by entering them one by one according to their importance of effect on the F value. According to Table 4.11, the first entered variable was the years of formal English study before coming to the United States, the next entered variable was the amount of daily contact with native speakers, and the last entered variable was the TOEFL score. The other two variables, the length of stay in the U.S. and the amount of daily English use, were not entered into the regression analysis for they did not meet the .05 significance level for entry into the computer model. This means the variance accounted for by these two variables could be accounted for by entering the other three variables, and entering them again would be redundant, as no new information was provided.

According to Table 4.11, when the years of English course taken was entered alone, it accounted for variance at the P=.029 level of significance. After the amount of daily contact was entered, the observed F-value became lower but it is still significant. The entry of the TOEFL score into the regression did not change the F-value very much and the contribution of the three factors together in accounting for variance is at the significant level (P=.028). The summary table for the forward selection procedure also reveals that, among the three variables entered into the regression, the years of formal English study accounted for variance at the P=.029 level of signifi-
Table 4.11: Multiple regression analysis showing effect of predictors of native-like judgements by Chinese speakers

**FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE**

<table>
<thead>
<tr>
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<td></td>
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<tr>
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<td>Sum of Squares</td>
</tr>
<tr>
<td>Regression</td>
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<tr>
<td>Error</td>
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<td>703.9940</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>802.5757</td>
</tr>
</tbody>
</table>

<table>
<thead>
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</tr>
<tr>
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<td>DF</td>
<td>Sum of Squares</td>
</tr>
<tr>
<td>Regression</td>
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</tr>
<tr>
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<tr>
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</table>

<table>
<thead>
<tr>
<th>Step</th>
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</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source of Variation</td>
<td>DF</td>
<td>Sum of Squares</td>
</tr>
<tr>
<td>Regression</td>
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<td>182.2812</td>
</tr>
<tr>
<td>Error</td>
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<tr>
<td>Total</td>
<td>38</td>
<td>802.5757</td>
</tr>
</tbody>
</table>

**SUMMARY OF FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE**

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable Entered</th>
<th>Number</th>
<th>Partial R Square</th>
<th>Model R Square</th>
<th>F</th>
<th>Prob&gt;F</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Course</td>
<td>1</td>
<td>0.1228</td>
<td>0.1228</td>
<td>5.181</td>
<td>0.0287*</td>
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<tr>
<td>2</td>
<td>Contact</td>
<td>2</td>
<td>0.0561</td>
<td>0.1789</td>
<td>2.460</td>
<td>0.1255</td>
</tr>
<tr>
<td>3</td>
<td>TOEFL</td>
<td>3</td>
<td>0.0482</td>
<td>0.2271</td>
<td>2.182</td>
<td>0.1486</td>
</tr>
</tbody>
</table>

P < .05.
cance. The amount of daily contact with native speakers, and the TOEFL score both accounted for variance but the contributions are not at an acceptable level of significance (P=.126 for the amount of daily contact and P=.149 for the TOEFL score).

The result that the years of formal English learning had a greater contribution to the variance than the TOEFL score is surprising, as logically English proficiency should account for more of the variance of the performance on the acceptance test of English word use than the years of English course work that subjects had before they came to the United States, since TOEFL is a measurement of one's proficiency, which itself is not a learning factor, but may be the effect of many other learning factors. The question arises as to whether the variable of the years of formal English study is depressing the contribution by the TOEFL score because of a relationship between the two. Pearson correlations were calculated between all pairs of variables, and the resulting matrix is presented in Table 4.12. It was found that of all the variables, TOEFL correlated best with the years of English course taken before coming to the U.S., which demonstrated a relationship between the two variables though it is not a strong one, the observed r being 0.44. This relationship thus seems to suggest that amount of variance accounted for by the TOEFL score on the performance of the acceptance test is depressed because of the entry of the years of English study before coming to the U.S. into the regression as the first variable. Thus a second regression was run excluding years of English taken. Table 4.13 reveals that length of stay and amount of daily English use were again not entered into the regression by the computer for the re-analysis. Therefore, only two variables were entered in the regression: the first was the TOEFL score and the second was the amount of daily contact with native speakers, the reverse of the order found in the previous
regression. The re-analysis shows that the TOEFL score contributed to variance at an acceptable significance level (P = .032), while the amount of contact did not reach the significant contribution level (P = .126). The amount of daily contact with native speakers and the TOEFL score together, however, accounted for variance at an acceptable significance level of P = .032.

The results of the two regression analyses also showed that the predictors chosen for native-like judgements on the acceptance test were not powerful enough. The amount of variance accounted for by years of English taken, amount of contact with native speakers, and TOEFL score is only 23 percent (R square = 0.227), and by TOEFL score and amount of contact with native speakers is only 18 percent (R square = 0.175). This suggests that there are other variables accounting for the variance that are not entered into the regression. What these variables are needs further investigation.

Summary

In this chapter, the procedures used in analyzing the data and the results of the analyses are described and presented. From the descriptive statistics it was found that the most central and prototypical meaning and instance of use of the Chinese word senses of "xi" were different from that of the English word of "thin", though "xi" and "thin" share some of the meanings and have been regarded as equivalent terms. The Chinese subjects ranked "a xi rope" to be the most central and prototypical meaning and use of "xi", while the American subjects ranked "She is thin" as the most central and prototypical. With regard to the relationship between the centrality or prototypicality of word senses and the transferability of word senses, the Spearman
Table 4.12: Pearson correlation matrix for all variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stay</th>
<th>Contact</th>
<th>Use</th>
<th>Course</th>
<th>TOEFL</th>
<th>Score</th>
</tr>
</thead>
<tbody>
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<td>Stay</td>
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<td>0.0971</td>
<td>-0.0141</td>
<td>0.2980</td>
<td>0.2044</td>
<td>-0.1620</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.556</td>
<td>0.932</td>
<td>0.065</td>
<td>0.212</td>
<td>0.325</td>
</tr>
<tr>
<td>Contact</td>
<td>0.0971</td>
<td>1.0000</td>
<td>-0.1763</td>
<td>-0.0513</td>
<td>-0.0525</td>
<td>-0.2186</td>
</tr>
<tr>
<td></td>
<td>0.556</td>
<td>0.000</td>
<td>0.283</td>
<td>0.757</td>
<td>0.751</td>
<td>0.181</td>
</tr>
<tr>
<td>Use</td>
<td>-0.0141</td>
<td>-0.1763</td>
<td>1.0000</td>
<td>0.2283</td>
<td>0.3253</td>
<td>-0.0719</td>
</tr>
<tr>
<td></td>
<td>0.932</td>
<td>0.283</td>
<td>0.000</td>
<td>0.162</td>
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<td>0.664</td>
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<td>0.2283</td>
<td>1.0000</td>
<td>0.4403</td>
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<tr>
<td></td>
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<td>0.757</td>
<td>0.162</td>
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<td>0.029</td>
</tr>
<tr>
<td>TOEFL</td>
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<td>0.3253</td>
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</tr>
<tr>
<td></td>
<td>0.212</td>
<td>0.751</td>
<td>0.043</td>
<td>0.005</td>
<td>0.000</td>
<td>0.032</td>
</tr>
<tr>
<td>Score</td>
<td>-0.1620</td>
<td>-0.2186</td>
<td>-0.0717</td>
<td>-0.3505</td>
<td>-0.3442</td>
<td>1.0000</td>
</tr>
<tr>
<td></td>
<td>0.325</td>
<td>0.181</td>
<td>0.664</td>
<td>0.029</td>
<td>0.032</td>
<td>0.000</td>
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</table>
Table 4.13: Multiple regression re-analysis with the score of native-like judgements as the dependent variable and the four factors as the independent variables

<table>
<thead>
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<th>Step 1</th>
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<td>Error</td>
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<tr>
<td>Total</td>
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</table>

<table>
<thead>
<tr>
<th>Step 2</th>
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<th>R Square = 0.175</th>
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</thead>
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<td>Source of Variation</td>
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<td>Regression</td>
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</tr>
<tr>
<td>Error</td>
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<tr>
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<td>38</td>
<td>802.5757</td>
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SUMMARY OF FORWARD SELECTION PROCEDURE FOR DEPENDENT VARIABLE

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable Entered</th>
<th>Number</th>
<th>Partial R Square</th>
<th>Model R Square</th>
<th>F</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.1185</td>
<td>4.973</td>
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<tr>
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<td>0.0562</td>
<td>0.1746</td>
<td>2.450</td>
<td>0.1263</td>
</tr>
</tbody>
</table>

P < .05.
rank order correlation analysis found a P value of 0.71 which is significant at the .05 level, indicating a fairly strong relationship between the rank orders of the two tests. Statistically significant differences in the judgements of Chinese and American subjects on the acceptance of some word uses of "thin" were also found by using the ANOVA analysis procedure. The question of whether the five factors (proficiency of English, length of stay in the U.S., amount of daily contact/conversation with native speakers, amount of daily English use, and years of course work in English) predict native-like judgements by Chinese subjects on the acceptance of uses of "thin" was addressed by the multiple regression analysis. A stepwise forward selection procedure was used in doing the analysis, and the results showed that the years of English taken before coming to the United States was the most powerful predictor of performance. However, when the years of English course work taken before coming to the United States was excluded from the independent variables, the TOEFL score emerged as the most powerful predictor of performance.
CHAPTER 5. DISCUSSION AND CONCLUSION

This chapter provides a discussion of the results of the data analysis. The chapter is divided into three sections. The first section includes an interpretation of the statistical results and a discussion of the major findings in relation to the research questions asked. The second section discusses more general findings in relation to the general topics of cross-linguistic semantics and lexicalization, L2 lexical acquisition, and research methods. The limitations of the present study are discussed in the third section, followed by the conclusions drawn from the study.

Interpretation of Results and Major Findings

Descriptive statistics on the measurement of centrality and transferability of Chinese senses of "xi", centrality of English senses of "thin", and acceptance of instances of "thin" have provided a basis for addressing the two major research questions: 1) Is the centrality of word senses related to their transferability? and 2) What learning factors may help L2 learners in becoming native-like language users especially in the area of word use and understanding? The first question is answered positively by the results of the Spearman rank order correlation analysis, and a fairly strong relationship was found between the centrality and transferability of word senses. The second question was addressed by a regression analysis with the performance score on the
acceptance test as the dependent variable and length of stay in the U. S., amount of daily contact with native speakers, amount of daily English use, years of English taken in home country, and TOEFL score as the independent variables. The results of the analysis revealed that years of English taken, contact with native speakers, and proficiency of English were the most powerful factors (out of the five chosen) that accounted for one's achievement of native-like knowledge of word senses and use. All together, however, they accounted only for less than 25 percent of the variance.

Interpreting the relationship between centrality and transferability of word senses and use

One of the reasons for investigating the relationship between centrality and transferability of word senses and use is, as Kellerman (1977, 1979, 1982) has stated, to characterize the strategy of transfer in second language learning by estimating and specifying the exact nature and extent of native language influence so as to resolve the heated argument over the transfer phenomenon "Now you see it, now you don't" (see Gass & Selinker, 1983; Hakuta, 1986; Kellerman, 1983). Kellerman (1977, 1978) has demonstrated experimentally with similarity ratings that native language intuitions about word senses and use could be used as a source of predictions about transferability, and that "closeness to the core" did seem to be related to transferability. The present study obtained similar findings by a different method. However, the positive relationship found between centrality and transferability should not be interpreted as meaning that centrality of word senses and use always predicts actual transfer behavior. That is, it can not be said from the results that an individual will actually transfer the most central sense or instance of use in the native language.
to that of English. Rather, the relationship found indicates only a general tendency among second language learners to regard the more central or prototypical sense and instance of use also as the more transferable sense or instance of use of that word.

The above relationship can be best expressed as follows (see Kellerman 1986): if a word sense or instance of word use of X is more central or prototypical than a word sense or instance of word use of Y in one's native language, and if no other source of judgements on the use or word sense in the target language is available, then the probability of this word sense and use of X in one's native language being transferred to the target language will also be greater than that of Y. In the present study "a xi rope" is found more central than "xi hair". If learners happen to know that "xi hair" is possible in English, then there is a higher probability that they will also confidently regard "a xi rope" to be possible in English. However, the reverse of this generalization does not hold.

The results of the rank order analysis shows that knowledge about one's native language could have two effects on the actual transfer. On the one hand it can encourage transfer of the highly central senses which are not acceptable in the target language. On the other hand, it might suppress those peripheral or non-central senses and instances of word use which are yet acceptable in the target language. In addition, the study showed that knowledge about target language seemed to constrain the actual transfer of word senses and instances of word use of native language. As shown in Table 4.8, "a xi body" ranked the fifth on the centrality of word senses of "xi ", which, according to the above discussion, should be less transferable than "a xi rope", "xi hair" and "a xi pen", but it ranked as the most transferable word sense and instance of use by the English word "thin". The opposite happened to the word
sense and instance of use of "xi sand/flour", which is highly central but ranked not very transferable. A possible explanation for this is that the subjects seemed to have some knowledge of centrality of English word senses and use of "thin", which, as the study has found out, has "She is thin" describing a human body as the most central sense, while "thin sand/flour" as a not very acceptable sense of "thin" (as a matter of fact, this sense of "xi" in Chinese is absent from the senses and use of "thin"). Thus knowledge of the target language interacts with the knowledge of the native language, with the former serving as a filter for the transfer.

So, the statistical results on the relationship between centrality and transferability of word senses and use of "xi" support Kellerman's notion of transferability, and indicate that centrality of word senses and instances of use is indeed related to the transferability of word senses and instances of word use. However, knowledge about one's native language interacts with knowledge of one's target language, and together they form the basis for judgements of transferability.

Accounting for the native-like judgements about acceptance of instances of English word use

The present study chose five factors as predictors of native-like judgements about acceptability of instances of English word use. Apart from the TOEFL score, which is actually the effect of other learning factors, length of stay in the United States, amount of daily contact/conversation with native speakers, amount of daily English use, and years of English taken before coming to the United States can all be counted as learning factors that may contribute to the achievement of native-like judgements of acceptability of word use, and should contribute to proficiency in the target lan-
The results of the regression analysis revealed that years of English taken before coming to the U.S., contact with native speakers, and TOEFL score were the most predictive factors. The result that amount of daily contact/conversation with native speakers is a more powerful predicting factor than length of stay and amount of daily English use is a logical one, as one can not assume that the longer an individual stays in the United States, the better one's performance on the judgments of acceptability of English word use will become. The same holds true for the amount of daily English use. One may read all kinds of English language magazines, newspapers, or even textbooks everyday, and watch T.V. eight hours a day, and still not be able to grasp the idiomatic, figurative, or colloquial language use of the native speakers. Misunderstanding and misinterpretation arise as a result of cross-linguistic differences in the senses and use of so-called equivalent terms. The misunderstandings and misinterpretations may stay with the learners for a lifetime if conscious clarification and correction are not made. The situation is a subtle one, as the listener and the speaker during communication have no way of knowing what the intended meaning of the speech is. All one can do is to make intelligent guesses about what is going on in the other's mind based upon common linguistic and sociolinguistic rules. If the rules are different for each participant, and neither is aware of it, misunderstanding is doomed to occur without being noticed. It is only when the rules are violently broken that doubt may be cast about the interpretation and clarification of the intended meaning of the speech may occur. This is perhaps why person-to-person contact and conversation is a more important factor in predicting native-like judgements of acceptability than length of stay and amount of daily English use. As a matter of fact, isn't it true that the idiomatic and figurative language
in our native language is more frequently "picked up" than learned?

The above is not, however, against the statistical results which show years of English taken before coming to the U. S. as the most significant contributor to variance on the judgements of acceptability of English word use. Formal learning seems to give learners the chance to master the basic, central meanings and instances of use, leaving the non-central or prototypical senses for learners to "pick up". These non-central senses and instances are often idiomatic and figurative language expressions, or idiosyncratic expressions. In order to achieve native-like knowledge and use of L2 words, formal learning and contact with native speakers are therefore two indispensable means for L2 learners.

The re-analysis of the regression with the four variables, length of stay, contact with native speakers, amount of English use, and TOEFL score, further enhances the findings. It was expected that proficiency would predict native-like judgements on the acceptability test, since it is the effect of several learning factors, some of which may not be on the list of the present study. The TOEFL score is a measurement of one's proficiency, and it is not a learning factor.

In summary, it can be said years of English taken and contact with native speakers did seem to account for native-like performance on the acceptance of word use. However, they accounted for only 18 percent of the variance, suggesting there are other factors that also account for native-like performance on the acceptability test. These factors may include one's sensitivity to linguistic phenomena, one's field of specialization, the degree of curiosity for new things, or perhaps, the ability to integrate into a new culture. As some of these factors are difficult to assess, new techniques will have to be developed in future studies.
Other Findings

Cross-linguistic differences in centrality of word senses and their impact on learning

The investigation of centrality of the senses of "xi" and "thin" revealed differences in the centrality structure for Chinese and English. Not only were the senses and instances of use associated with the two "equivalent" terms different, but also the centrality structure of the terms. This agrees with Whorf’s notion that different cultures segment world events and experiences in different ways (Whorf 1956), but at the same time it is also consistent with Rosch’s claims (Rosch 1977). Rosch points out that the universal part of the prototype theory is the principle of categorization (in terms of prototype effects); however the content of categorization is not necessarily universal but may well be culturally relative (1974, 1975b, 1975c).

The study found through direct rating and production of examples (see Lakoff 1987) that "xi" and "thin" share many common senses and uses, but the centrality structure is different. In Chinese, the most central use and sense of "xi" is as in "a xi rope" while in English the most prototypical sense and use is as in "She is thin". The categorization of the word senses is also different. In Chinese, "xi" refers only to long, narrow, fine things. The extension of its meaning to other senses can be boldly speculated here. When a large number of things that are extremely long in comparison with their width and height are put together, they tend to form a smooth surface, hence they are fine. A typical use of this is in "xi hair", "xi fur", or "xi cloth" (if the yarn used to weave the cloth is long and narrow, the cloth woven is going to be fine). "Xi skin" (meaning tender, smooth, fine skin, usually of a human being)
perhaps is also extended along this line of thought. As "xi" can be used to describe fine things like "sand" or "flour", the use is extended to the use of "xi porcelain" (the material used to make porcelain is fine, hence the product can be said to be xi.). "Xi rain/raindrops" and "xi pen" are metonymic extensions of the sense "long, narrow, fine". "Drizzle" is imagined here as long soft threads. Since "xi thread" is possible, so should be "xi rain/raindrops". "Xi pen" refers to the lines written by the pen which is thin and fine. Here the tool stands for its products, or perhaps, the whole stands for the part (see Lyons 1977). Through this the sense is extended. The expression of "a xi heart" is interesting. It can be speculated that because when there are many "xi" objects together, they are complex, detailed, and hard to distinguish from each other, they require extra care and attention. "A xi heart" and "xi work" are therefore also metaphorical extensions of the central sense as in "xi rope/string".

As has been mentioned in the "Choice of Words", the English word "thin" includes several senses that Chinese word "xi" lacks. English does not lexicalize "short between opposite surfaces" and "narrow in diameter" in two words as Chinese does. So a piece of paper and a string can both be said to be "thin". The meaning extensions of the word are thus different. An example of this is as in "a thin mist/thin air/thin smoke". When something is "thin", it can be easily seen through, hence "mist", "air", and "smoke" can all be "thin". Because loosely packed things are easily seen through, they are scarce and lack substance. Accordingly, a crowd, an audience, soup and hair can all be said to be "thin". The generalization can go on and on. The point here is that because of the differences in centrality structure of the equivalent terms, the meaning extensions are naturally different. The generative power of central or prototypical senses is much greater than the non-central ones.
People seem to use considerable amount of metaphorical reasoning in extending word use.

The differences in centrality structure and word meaning extensions and use have impact on learning a second language. The present study found that if a more central sense in Chinese was proved to be possible in English, the other less central senses and instances of use which are extended meanings and use of this sense might be assumed possible in English without positive evidence. For example, "a xi rope" is a highly central sense and use of "xi". When the learners happen to know through positive evidence that the equivalent translation "a thin rope" is acceptable in English, they then would assume "thin hair", "a thin pen", "thin rain" and "thin cloth" also be acceptable without noticing the differences of the meanings intended. The ANOVA analysis (as shown in Table 4.9) revealed that Chinese subjects and American subjects made significantly different judgements on the acceptance of "a thin pen" in English. More people in the former group rated it as acceptable while more people in the latter group rated it as unacceptable.

The study also found that learners seemed to learn word senses and instances of use that were already in their native language much more easily than those senses and instances of use that were unique in the target language. Also it seems that learners tend to grasp and learn the highly central senses and instances of word use in the target language first. The ANOVA analysis (cf. Table 4.10 & Table 4.6) showed that for many Chinese subjects "thin ice" and "my patience is thin" were unacceptable. This may suggest that learners do not master those target language unique senses, such as "thin ice", as easily as those shared senses. Those non-core and peripheral senses in English, such as "my patience is thin" and "thin soup", may
be more difficult to grasp.

Rosch in her color studies with Dani Speakers found that prototype effects seemed to have an influence on memory. She taught two groups of Dani speakers the arbitrary names for colors (Dani has only two words for colors.). One group was taught eight focal color names, the other group eight nonfocal color names. What she found was the names for focal colors were learned more easily (Rosch 1973b) and remembered better than the nonfocal ones (Heider 1972b). Though such a conclusion can not be drawn from this study, the fact that the peripheral meanings and instances of word use are always harder for learners to master is interesting in light of Rosch's findings.

Measuring centrality or prototypicality of word senses

In investigating prototype effects in categorization several techniques have been established by researchers. These techniques include 1) direct rating; 2) production of examples; 3) reaction time; 4) generalization, and 5) family resemblances (see Lakoff 1987, pp. 41-43). Rosch et al. found that frequency of response for listing or drawing examples of category was a good indicator of centrality or prototypicality. When subjects were given the category name "bird" and asked to draw or list an example, "robin" turned out to be the most frequent response. "Robin" was then regarded as the prototype for the category of "bird". The same result was also found through direct rating in which subjects were given several bird names to rate as the best example of "bird". "Robin" again was rated as the best fit of the category.

However, the present study found the frequency of response for listing instances of word use did not agree with the result of direct rating in the case of Chinese
subjects. A "xi heart" received the most frequent response by the method of production of examples but was rated as the least central or prototypical sense of "xi" by direct rating. The only explanation that can be found for this is that the method of production of examples tended to elicit the most frequent use of the word sense, while in direct rating subjects tended to rate according to the instruction given, that is, to rate the most central, basic, and best instance of use. Frequency of response has been proven as a good indicator of prototypicality of members of a category in Rosch’s studies, but did not seem to indicate prototypicality and centrality of word senses here.

The Limitations of the Study

For beginning researchers it is always tempting to conclude and interpret more than what is actually found in the study. The conclusions drawn must be checked with the research method used, as well as the results of the data analysis. The present study has certain limitations and weaknesses. The following are some reflections of these.

Firstly, because of the limited number of people who were able to serve as subjects, and because of the difficulty of conducting such a study with a large number of subjects, the number of subjects used in the study is relatively small. Any finding based on such a small number of subjects should be checked before definite conclusions can be drawn. Of the two samples used, American sample was taken primarily from college students, whose knowledge and use of language may be different from other groups of people, as factors like age, experiences, and profession do have influence on the way in which people use their language. The collection
of data from college students only may have limited some of the findings of the study. Secondly, the administration of the study was not strictly controlled. In many cases the tests were administered at subjects' homes and all kinds of distractors may have influenced the data collected. Thirdly, some weaknesses were observed in the research design, namely, the scaled form of response. Some subjects had difficulty with differentiating their responses. For example, some subjects used only the two ends of the scales in rating, which equals either "yes" or "no". Thus their answers did not provide the kind of scale ratings that the others’ did, which slightly influenced the results of the data analysis. Finally, it should be pointed out that only one pair of "equivalent" terms was used in the study; thus the results may not be generalizable. Further studies with other semantic categories and domains should be conducted in order to confirm the conclusions drawn in this chapter.

Conclusions

The findings of this study of centrality and transferability of word senses and instances of use of the Chinese word "xi" can be summarized as follows:

1. Transferability of word senses and instances of word use can be predicted to some degree by centrality of the word senses and instances of word use in learners' native language.

2. Transfer behavior of native language instances of word use is constrained by the centrality or prototypicality structure of word senses in the target language.

3. Second language learners seem to master the word senses and instances of use that are shared by the native and target languages more easily than those senses
that are unique to the target language. This suggests that transfer does seem to occur in L2 learning. Some L2 word senses and instances of use may be acquired "free" as a result of native language transfer, while other L2 senses and instances of use will have to be learned.

4. The degree of centrality of L2 word senses seems to have an impact on learning. The more central or prototypical a sense is, the earlier it seems to be learned by second language learners.

5. Native-like lexical competence and performance is associated with years of English taken, amount of contact with native speakers, and proficiency levels. Those highly central or prototypical L2 word senses and use seem to be more likely to be learned through formal learning, while the non-core or peripheral senses seem to be more likely to be "picked up" through contact and conversation with native speakers.
BIBLIOGRAPHY


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APPENDIX A. PRE-SURVEYS OF WORD SENSES OF "xi" AND "thin"

I. Word Senses of Chinese "xi":

密麻的细字。
心细的人能做大事。
毛细雨。
她有一条细辫子。
办事仔细、认真。
细长树枝。
细眉毛。
他做事很细致。
细水长流。
他是个粗中有细的人。
细脖子。
细如发丝。
细腰。
细胞。
长短、粗细。
细丝、品味。
纤细。
细微的错误。
气息细如游丝。
细丝头发象稻草。
工艺品作工精细。
细身材。
声音细/声音细若蚊鸣。
纤细
细急。
腿细
细线/细绳。
门外长着棵细树。
细腻感情。
沙子细/沙沙手。
笔细
细粮
细杆子
细小(人)
市场细气化。
明细账目。
细嫩的小手。
细条
细看
细妹子
细密的纹路。
细风细雨。
针细/针脚细
竹子细
眼睛细。
细面条
细活
小王课上得太细。
重点要细
细如牛毛
细嚼慢咽
螺钉很细
布料细密
细肠子
细丝的月光
她的手指很细。
II. Word Senses of English "thin":

My little brother is thin for his size.
Trying to thin out her figure, Mary goes jogging everyday.
The thin waitress took my order.
I ate a wheat thin this morning.
The thin brawn dog was in a fight with the heavier black dog.
What's the difference between skinny and thin?
It is not smart to ice skate on thin ice.
The beautiful model is very thin.
I want the ham sliced into thin pieces.
To be thin is the ultimate goal of people who are in weight watchers.
The thin sheet of ice fooled many of the ice fishermen.
The fabric is thin.
People always said he was thin-skinned.
His hair was very thin.
The girl's waist was thin.
You must thin the paint before using it.
Once I go on a diet, I will be thin.
I would like a thin piece of paper, not a thick one.
The boy was as thin as a pencil.
The girl's ideas were thin compared to most of the group's.
There is a thin line one must not cross between hatred and love.
The lady in the picture was too thin.
Whole milk is not as thin as skim milk.
The stack of papers he handed in was very thin.
The cows looked rather thin.
The gravy was more on the thin side than the thick.
My coat linen was just too thin to keep me warm.
Her legs are so thin.
I don't like stew when it's too thin.
Today the park rangers will thin some of smallest trees out of the forest.
People who model for a living tend to be rather thin.
His pocketbook was thin.
The air is thin.
Thin out the pudding.
She has a thin stomach.
Her personality is so thin that you can see through her.
He has a thin idea.
The soup is thin, as opposed to thick.
The artist used thin, black lines to show detail in the painting.
Mary looked through the magazine and decided that she wanted to be thin like the model.
His money supply is growing thin.
Thin pancakes.
The soup is rather thin and runny.
The woman has long, thin fingers.
His hair was thinning.
The thin clouds passed by quickly, leaving the sky blue.
The basis for his argument was thinly supported, because he did not use many facts.
I like lunch meat that is thin-cut, so that I can see light through it.
My patience grows thin while waiting to enter my English classroom.
There is too much powder in the dough, you must thin it out.
The space between the crack was very thin.
His face was thin, showing that he hadn't been eating.
The batter was very thin and so we added more flour.
The lines I draw can be thick or thin.
The pavement markings were thin rather than fat.
This is a very thin statement.
My sense of humor is wearing thin.
There is a thin line between love and hatred.
The brain has a thin protective layer.
There was a thin crack in the window.
The bread was cut into thin pieces.
I'll take a thin and crisp pizza with extra cheese.
The little elderly lady pointed her thin bony finger at me.
The smoke came out as a thin whisper of black and grey.
Comparing the two, the thin line exaggerated the picture.
People want to be thin, so that their image is good.
The walls in our dorm are paper thin.
You need to thin the paint.
The team looked thin since the coach backed off 10 players.
The thin flower was bending to the ground in the storm.
Our English teacher gave us a thin book to read.
My mother always told me "you are walking on thin ice."
In America these days, it is fashionable to be thin.
I took the thin piece of string and tied it in a knot.
The long path was very thin and steep, but we still made it.
The road was very thin and narrow.
Her body was like a feather looking light and thin.
Society today enforces a thin attitude, especially among teenage girls.
If you exercise and maintain a balanced diet, you will become thin.
You can never be too rich or too thin.
The population of the city needs to be thinned out.
The countryside was thinly populated.
His argument was thin, because he didn't supply any evidence.
The feathers were so thin you could not notice them.
I thinned out the weeds in the garden.
The table was thin; there was hardly any food on it.
The audience was quite thin considering the rave reviews the movie had been getting.
The artist used very thin colors.
The scientist thinned out the solution with water.
His patience was thin.
Mom had to thin the gravy on Thanksgiving.
Her lie was incredibly thin and unbelievable.
I prefer pizza with thin crust.
The board was so thin, it broke under overweight.
My dad's hair continues to thin.
The turkey I had for dinner was sliced very thin.
There was a thin margin of error between the two numbers.
The man sitting next to me is thin in appearance.
Hunting is a way to thin out the population of a given species.
The man's intellectual ability appears to be thin.
Due to the strict diet she is on, she remains rather thin.
The hair stylist thins my hair by cutting off the excess strands.
Their money was running thin when it came to the end of the year.
How thin can a person get before becoming sick?
That object is thin.
The idea which you presented was thin in evidence compared to my idea.
Paula was thin when it came to others in her class.
The sandwich had two thin slices of bread on it.
John put a thin coat of wax on his car.
Most people today are obsessed with the thought of being thin, rather than being heavy.
I prefer to eat thin wafers rather than thick wafers.
The material of the jeans began to wear thin at the knees.
The paint was watery and thin.
My wallet is pretty thin after Christmas.
Please thin the hedges.
That is a thin excuse for being late.
Give me the wheat-thins.

Tear me off a thin piece of tape.

The hole between the door and wall is very thin.

Either it is getting colder or my skin is getting thinner.

The pencil that I am writing this with is rather thin.

He spread a thin layer of oil on each piston.

Not only did John's jeans no longer fit him, they had worn thin from use.

Through thick and thin, we struggled on with our mission.

The thin woman fit through the crack in the door easily.

The thin slice of ham tasted just right.

The cake batter is too thin.

The crowd was really thinned out.

The thin girl squeezed between the two parked cars.

The wood shop teacher cut the board real thin.

I love to eat thin pancakes.

The hardy boys made a thin escape.

There was a thin margin between the percentage of "A" students and "B" students.

We have been through thick and thin.

I had to thin the paint.

The batter for the cake is too thin.

The air was thin on top of the building.

The guilty looking boy gave a thin excuse.

The sheet of paper was so thin that you could see through it.

The thin envelope fell through the crack.
The gravy needs to be thinned, otherwise we might hurt someone's teeth.

My grade are on a very thin line between terrible and disgusting.

There are definitely some very thin people in the audience.

The economy these days seems to be running pretty thin.

Your efforts this year in the student council seem pretty thin compared to last year's efforts.

The company survived despite a thin period when profits were down.

Thin windows are inefficient as they allow heat to escape easily.

The doctor said my blood was a bit too thin.

Bob's temper was becoming very thin.

The boy's free time after school was very thin when he received three Fs.

It seems as though people in America are always striving to become thin.

The girl's mind is likely to be thin.

I will thin out the sauce by heating it.

The group was very popular, but the crowd was very thin at the beginning of the concert.

They had a choice between thin or thick wafers.

Cut the piece of metal into four squares.

Tough courses in college are used to thin out the weaker students.

His reason was stretched very thin.

As he got older, the man's hair thinned so much that he had a bald spot.

"I'm very sorry! I didn't mean to do it." he said thinly, trying to look meek.
APPENDIX B. TEST INSTRUMENTS

1. 中心意的判断

说明：在本测试中，我想请您就一个词在某些短语中的含意做一判断。

在语言中一个词常常会有许多种不同的含意。这些不同的含意往往体现在不同的词组或短语中。例如，形容词“厚”的几种含意就反映在下面几个词组中：
1) 厚木板  2) 厚脸皮  3) 厚礼  4) 厚道

人们认为有的含意比其它含意要基本、中心；小孩学说话时一般也是先学会这些最基本、最中心的含意，例如，上面“厚木板”中“厚”的含意就比“厚脸皮”中“厚”的含意要基本、中心，而后者又比“厚礼”、“厚道”中“厚”的含意要基本。等等。

下面请您做的是对形容词“细”的几种用法做一比较，看哪一种用法所代表的“细”的含意是最基本、最中心的含意（原意），或较基本、较中心的含意。...在每一种“细”的用法下面附有一个刻度表，上有7个刻度。最左端为刻
度1，代表含意最基本、最中心；最右端为刻度7，代表含意最不基本、最不中心；在介于1和7之间的刻度中，越靠左的刻度表示含意越基本、中心，越靠右的刻度表示含意越不基本、不中心。

您可根据自己的直觉对每一个“细”的用法打分。您认为含意最基础的就在刻度1上划圈，较基础的就在刻度2、3或4上划圈，……，最不基本的就在刻度7上划圈。请不要在一个刻度上划两次圈。如果没有问题的话，请您现在开始做下面的测试。

形容词“细”含意的中心性判断

1) 一条细线/细绳子

\[
\begin{array}{ccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 \\
\text{（最中心）} & & & & & & \text{（最不中心）}
\end{array}
\]

2) 一堆细沙/细面粉

\[
\begin{array}{ccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 \\
\text{（最中心）} & & & & & & \text{（最不中心）}
\end{array}
\]
3) 女孩的心很细

4) 细身材

5) 声音细/细噪音

6) 笔细/笔迹细

7) 细发/细如发丝
8) 毛毛细雨

(最中心)  (最不中心)

9) 细账目

(最中心)  (最不中心)

10) 细布料

(最中心)  (最不中心)
Ⅱ. 可翻译程度的判断
（中文：细 英文：thin）

说明：下面所列仍然是前面有关形容词“细”的用法（同样附有一个刻度表）。请您判断（在刻度表上划圈）中文“细”的哪一种用法或含意可用英文中的“thin”来表达。左端刻度1表示“肯定可以”用“thin”表达，右端刻度7表示“肯定不可以”；从刻度2到刻度6，“可以”的程度逐步递减（刻度4为转折点，表示不肯定“可以”或“不可以”。注意请不要在同一刻度表上划两个圈。您不用担心您所给答案是否正确，也不用管别人怎么答的，您可以完全凭自己的直觉做判断。

1) 女孩的心细

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2) 毛毛细雨

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3) 细身材

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4) 线细 / 线如发丝

5) 声音细 / 妖嗓音

6) 一条线细 / 线绳子

7) 线细目

8) 一堆细沙 / 细面粉

9) 笔细 / 笔迹细
(0) 细布料

(肯定可以)  (肯定不可以)
III. 英文“thin”的用法的判断

说明：下面是英文词“thin”的一些用法。有些用法很好理解，其含义也十分清楚，而有的用法及含义听起来很怪，很别扭，使人抓不住它的意思，英文中似乎也很少这么说。当然，您的判断有可能不一样。也许您觉得这些用法在英文中都是很好的用法，都是可以被接受的。

下面请您要做的的是对英文词“thin”的这些用法做一判断，看哪些用法在英文中是可以接受的，哪些用法是不可以接受的。和前面的测试一样，每一短语下都有一个刻度表。左端刻度1代表最可以接受的用法，右端刻度7代表最不可以接受的用法。
INSTANCES OF THE WORD USE "thin"

1. a thin rope

2. thin ice

3. a pile of thin sand

4. She is thin

5. a thin mist

6. a thin heart

7. a thin voice
8. a thin pen

9. thin hair

10. thin soup

11. thin rain

12. My patience is thin

13. thin cloth

14. a thin statement of what has happened
15. A good accountant should keep his account thin and accurate.

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the most acceptable the least acceptable
VI. CONSENT FORM (for Chinese Subjects)

My name is Rue Yuan, and I am a graduate student of English at Iowa State University, majoring in Teaching English as a Second Language.

I am inviting you here to participate in a research study on second language acquisition processes. You will be asked to give your answers to three questionnaires concerning your knowledge of the English and Chinese languages, to fill out a personal data form, and to take an English language proficiency test.

Each questionnaire and the personal data form should take approximately ten to fifteen minutes to complete, and the English language test will take about 2-2 1/2 hrs to complete.

Here I am requesting your permission to use your answers on the questionnaires, your personal data, and the result of your English proficiency test in this research study.

Your responses will be used for research purposes only. Your name will never be used in reports of this research.

You can stop participating in this study any time you want.

If you are interested, you may know the results of this research study after it is completed. (My office is in 418 Ross Hall, English Department, ISU. You can call me at either (515) 294-3026 (Office) or (515) 296-7991 (Home) asking for Rue Yuan (my name) to arrange a time for discussion.)

I agree to allow the researcher to use my responses to the questionnaires, my personal data, and my proficiency test result in this research study on second language acquisition.

I understand my responses and my test results will be used for research purposes only and that my name will never be used in reports of this research.

I also understand that I can drop out of this research study any time if I do not wish to continue.

Signed ________________________

Date ________________________

Print your name here ________________________
V. PERSONAL DATA FORM

INSTRUCTIONS: Please provide your answers to the following questions by checking ( ) the line beside the appropriate letter.

1. How long have you been in the United States?
   a. --- 0 to 6 months        e. --- 3 to 4 years
   b. --- 6 months to 1 year   f. --- 4 to 5 years
   c. --- 1 to 2 years         g. --- 5 to 6 years
   d. --- 2 to 3 years         e. --- over 6 years

2. How much contact do you have with native speakers per day?
   a. ___ 0 to 1 hour          e. ___ 4 to 5 hours
   b. ___ 1 to 2 hours         f. ___ 5 to 6 hours
   c. ___ 2 to 3 hours         g. ___ over 6 hours
   d. ___ 3 to 4 hours

3. How much time per day do you use English? (e.g. watch TV, read newspapers or magazines, listen to lectures given by native speakers, etc.)
   a. ___ 0 to 1 hour          e. ___ 4 to 5 hours
   b. ___ 1 to 2 hours         f. ___ 5 to 6 hours
   c. ___ 2 to 3 hours         g. ___ over 6 hours
   d. ___ 3 to 4 hours

4. How many years of course work did you do in studying English before you came to the United States?
   a. ___ 0 to 1 year           e. ___ 4 to 5 years
   b. ___ 1 to 2 years          f. --- 5 to 6 years
   c. ___ 2 to 3 years          g. --- over 6 years
   d. --- 3 to 4 years
IV.

SECTION 1
LISTENING COMPREHENSION

In this section of the test, you will have an opportunity to demonstrate your ability to understand spoken English. There are three parts to this section, with special directions for each part.

Part A

Directions: For each question in Part A, you will hear a short sentence. Each sentence will be spoken just one time. The sentences you hear will not be written out for you. Therefore, you must listen carefully to understand what the speaker says.

After you hear a sentence, read the four choices in your test book, marked (A), (B), (C), and (D), and decide which one is closest in meaning to the sentence you heard. Then, on your answer sheet, find the number of the question and fill in the space that corresponds to the letter of the answer you have chosen. Fill in the space so that the letter inside the oval cannot be seen.

Example I

You will hear:

You will read:

You will hear: (A) Mary outswam the others.

You will read: (B) Mary ought to swim with them.

You will read: (C) Mary and her friends swam to the island.

You will read: (D) Mary's friends owned the island.

The speaker said, "Mary swam out to the island with her friends." Sentence (C), "Mary and her friends swam to the island," is closest in meaning to the sentence you heard. Therefore, you should choose answer (C).

Example II

You will hear:

You will read:

You will read: (A) Please remind me to read this book.

You will read: (B) Could you help me carry these books?

You will read: (C) I don't mind if you help me.

You will read: (D) Do you have a heavy course load this term?

The speaker said, "Would you mind helping me with this load of books?" Sentence (B), "Could you help me carry these books?" is closest in meaning to the sentence you heard. Therefore, you should choose answer (B).
1. (A) Did you see the parade?
   (B) Was there a parade?
   (C) I saw you at the parade.
   (D) You ought to go to the parade.

2. (A) The weather was as warm as had been predicted.
   (B) The weather wasn’t supposed to change.
   (C) The weather was expected to be different.
   (D) It was the weather forecast that was wrong.

3. (A) Only Roger knew the material.
   (B) He knew that it mattered to Roger.
   (C) Roger was convinced that he knew him.
   (D) Roger believed he knew the material.

4. (A) This term she isn’t teaching.
   (B) She’s only teaching this term.
   (C) It’s her turn to teach.
   (D) She hasn’t done any teaching here.

5. (A) Allison got married on the West Coast.
   (B) Allison and her husband now live in California.
   (C) Allison lived in California before she got married.
   (D) Allison and her husband plan to move out of the state.

6. (A) I don’t like the food.
   (B) I don’t have anything else to eat.
   (C) I have already eaten more than enough.
   (D) I’m going to take a dinner break.

7. (A) When we got there, she was leaving.
   (B) She arrived as we were leaving.
   (C) She left before we got there.
   (D) She was ready to go when we arrived.

8. (A) I spoke to someone else this morning.
   (B) Would you mind calling back in the morning?
   (C) I believe we spoke to each other a few hours ago.
   (D) Are you called Marilyn?

9. (A) I’ll probably take some movies of the trip.
   (B) The movie is all about travel.
   (C) My camera is too heavy to carry.
   (D) I think this trip is too long.

10. (A) The children certainly behave well.
    (B) How many children are well behaved?
    (C) Are the children well behaved?
    (D) The children don’t know how to behave.

11. (A) I don’t think Harriet is present.
     (B) I don’t know who to believe now.
     (C) We don’t usually go in that room.
     (D) You probably aren’t acquainted with my cousin.

12. (A) He has a positive attitude.
     (B) He’s a very intelligent man.
     (C) He isn’t very sincere.
     (D) He prefers a well-lit room.
13. (A) You ought to get a cab
immediately.
(B) It's better to take a cab.
(C) A fast cab would be better.
(D) I think you will find a cab right
away.

14. (A) Marie took her mail to the post
office.
(B) The new post office was near
Marie's house.
(C) The post office has moved to a
new address.
(D) Marie's mail was delivered to her
new home.

15. (A) Joe is never able to go along.
(B) Joe usually disagrees with Roy.
(C) Joe won't see Roy alone.
(D) Joe usually goes by himself.

16. (A) Only Elaine passed the medical
examination.
(B) Elaine was in the hospital when I
took the examination.
(C) I passed the test only because
Elaine helped me.
(D) I helped Elaine with some of the
patients.

17. (A) Mark just set out for the station.
(B) The bus left the station only a
few minutes ago.
(C) The bus was left in the station
only briefly.
(D) Mark was stationed to the left of
the bus.

18. (A) I've only seen her once.
(B) I saw her only when I won the
prize.
(C) I didn't see her very often in the
past.
(D) I see her less frequently now.

19. (A) Stan needs to speak to you.
(B) Stan was busy all week.
(C) Stan tried to hold the meeting.
(D) Stan got your message this week.

20. (A) Cynthia has submitted her
project.
(B) Cynthia projects herself very well.
(C) Cynthia opened her purse.
(D) Cynthia participated in this
effort.
Part B

Directions: In Part B you will hear short conversations between two speakers. At the end of each conversation, a third person will ask a question about what was said. You will hear each conversation and question about it just one time. Therefore, you must listen carefully to understand what each speaker says. After you hear a conversation and the question about it, read the four possible answers in your test book and decide which one is the best answer to the question you heard. Then, on your answer sheet, find the number of the question and fill in the space that corresponds to the letter of the answer you have chosen.

Look at the following example.

You will hear:  
You will read:  (A) Present Professor Smith with a picture.  
(B) Photograph Professor Smith.  
(C) Put glass over the photograph.  
(D) Replace the broken headlight.

From the conversation you learn that the woman thinks Professor Smith would like a photograph of the class. The best answer to the question "What does the woman think the class should do?" is (A), "Present Professor Smith with a picture." Therefore, you should choose answer (A).

21. (A) Her translations are good.  
(B) She isn't around today.  
(C) She can't see very well.  
(D) It would take her two days to do it.

22. (A) She'll repeat what she said.  
(B) She'll tell the man how she feels.  
(C) She agrees with the man.  
(D) She plans to stay.

23. (A) She couldn't get the right-sized jacket.  
(B) The skis were sold.  
(C) She wouldn't go outside without a jacket.  
(D) The shop was closed.

24. (A) He hasn't eaten any sandwiches.  
(B) He's too thirsty to eat another sandwich.  
(C) He thinks the first sandwich was better than this one.  
(D) He'd like the same kind of sandwich as the last one.

25. (A) There won't be enough chairs left.  
(B) They don't need any more chairs.  
(C) They're buying only what they need.  
(D) There is enough room for them both.
26. (A) She isn’t sure he really wants to go.
    (B) She expects it to continue snowing for quite some time.
    (C) She doesn’t know if Albert is at home.
    (D) She thinks he should wait a while before leaving.

27. (A) He received the approval easily.
    (B) His new class schedule isn’t very manageable.
    (C) He hasn’t received his advisor’s approval.
    (D) His advisor’s opinion hadn’t mattered before.

28. (A) Repairman.
    (B) Bank teller.
    (C) Chemistry teacher.
    (D) Photographer.

29. (A) Make a decision before applying.
    (B) Decide on an order of preference.
    (C) Attend the university that accepts her first.
    (D) Apply to several universities now.

30. (A) Selecting paint.
    (B) Asking directions.
    (C) Trying on clothes.
    (D) Looking for something he lost.

31. (A) He does nothing but work on his thesis.
    (B) He works only part-time.
    (C) His thesis is right on schedule.
    (D) He has been writing about thirty pages a day.

32. (A) Pull out her tooth.
    (B) Wait a little longer.
    (C) See the dentist for a while.
    (D) Think about where she put the file.

33. (A) Eating a meal.
    (B) Answering the doorbell.
    (C) Attending a court session.
    (D) Watching a tennis match.

34. (A) It’s as glamorous as it sounds.
    (B) It’s taken up too much of her time.
    (C) It’s only in the early stages.
    (D) It’s already led to a few job offers.

35. (A) Daniel writes more often when he’s upset.
    (B) She hasn’t read Daniel’s letter yet.
    (C) It’s possible they drew false conclusions from Daniel’s letter.
    (D) They should write to Daniel about his living situation.
Part C

Directions: In this part of the test, you will hear short talks and conversations. After each of them, you will be asked some questions. You will hear the talks and conversations and the questions about them just one time. They will not be written out for you. Therefore, you must listen carefully to understand what each speaker says.

After you hear a question, read the four possible answers in your test book and decide which one is the best answer to the question you heard. Then, on your answer sheet, find the number of the question and fill in the space that corresponds to the letter of the answer you have chosen.

Answer all questions on the basis of what is stated or implied in the talk or conversation.

Listen to this sample talk.

You will hear:

Now look at the following example.

You will hear: (A) They are impossible to guide.
(B) They may go up in flames.
(C) They tend to leak gas.
(D) They are cheaply made.

The best answer to the question “Why are gas balloons considered dangerous?” is (B), “They may go up in flames.” Therefore, you should choose answer (B).

Now look at the next example.

You will hear: (A) Watch for changes in weather.
(B) Watch their altitude.
(C) Check for weak spots in their balloons.
(D) Test the strength of the ropes.

The best answer to the question “According to the speaker, what must balloon pilots be careful to do?” is (A), “Watch for changes in weather.” Therefore, you should choose answer (A).

36. (A) It’s crowded with people.
(B) It’s full of computers.
(C) Lunch is being served there.
(D) The music is loud there.

37. (A) Trying to telephone someone.
(B) Attending a concert.
(C) Waiting in line.
(D) Canceling reservations.

38. (A) Before breakfast.
(B) Late morning.
(C) Midafternoon.
(D) Late evening.

39. (A) They both felt sick.
(B) They grew tired of waiting.
(C) They didn’t like the program.
(D) They didn’t have a credit card.
40. (A) She's impressed with the ticket sellers.
    (B) She's pleased about the man's purchase.
    (C) She's uncertain about the change in plans.
    (D) She's resigned to the situation.

41. (A) By writing a personal check.
    (B) By paying with cash.
    (C) By charging them to their home phone.
    (D) By using two credit cards.

42. (A) Stay where he is.
    (B) Go home to telephone the order.
    (C) Try to get the tickets elsewhere.
    (D) Return after lunch.

43. (A) A journalist.
    (B) A tour guide.
    (C) An accountant.
    (D) A business leader.

44. (A) Farmers.
    (B) Clerks.
    (C) Members of Congress.
    (D) Members of labor unions.

45. (A) To put the bill on a senator's desk.
    (B) To write the bill.
    (C) To vote for the bill.
    (D) To send the bill to the President.

46. (A) A clerk.
    (B) A bill.
    (C) A box.
    (D) A vote.

47. (A) Surprise.
    (B) Skepticism.
    (C) Disgust.
    (D) Alarm.

48. (A) They're extremely shiny.
    (B) They're very strong.
    (C) They can store heat.
    (D) They can absorb water.

49. (A) The weight.
    (B) The shape.
    (C) The chemical composition.
    (D) The color.

50. (A) Two.
    (B) Four.
    (C) Seven.
    (D) Ten.

THIS IS THE END OF THE LISTENING COMPREHENSION SECTION OF THE TEST.

THE NEXT PART OF THE TEST IS SECTION 2. TURN TO THE DIRECTIONS FOR SECTION 2 IN YOUR TEST BOOK, READ THEM, AND BEGIN WORK.
DO NOT READ OR WORK ON ANY OTHER SECTION OF THE TEST.
This section is designed to measure your ability to recognize language that is appropriate for standard written English. There are two types of questions in this section, with special directions for each type.

Directions: Questions 1-15 are incomplete sentences. Beneath each sentence you will see four words or phrases, marked (A), (B), (C), and (D). Choose the one word or phrase that best completes the sentence. Then, on your answer sheet, find the number of the question and fill in the space that corresponds to the letter of the answer you have chosen. Fill in the space so that the letter inside the oval cannot be seen.

Example I

Vegetables are an excellent source _______ vitamins.
(A) of
(B) has
(C) where
(D) that

The sentence should read, "Vegetables are an excellent source of vitamins." Therefore, you should choose answer (A).

Example II

_______ in history when remarkable progress was made within a relatively short span of time.
(A) Periods
(B) Throughout periods
(C) There have been periods
(D) Periods have been

The sentence should read, "There have been periods in history when remarkable progress was made within a relatively short span of time." Therefore, you should choose answer (C).

After you read the directions, begin work on the questions.

1. Clinical experiments have shown that children generally relate to other children's strengths and abilities, rather than _______.
(A) to one weak
(B) a weakness is
(C) to their weaknesses
(D) theirs is a weak one

2. _______ are found in virtually every country in the world.
(A) Swamps and marshes which
(B) When swamps and marshes
(C) Swamps and marshes
(D) Now that swamps and marshes
3. Effective teachers _______ and understand the needs of their students.
(A) subjects are thoroughly known
(B) know their subjects thoroughly
(C) thoroughly know their subjects are
(D) their subjects are thoroughly known

4. The number of judges on the United States Supreme Court is fixed by Congress, _______ by the Constitution.
(A) nevertheless
(B) instead
(C) despite
(D) not

5. Muscles _______ bones by pulling on tendons.
(A) of moving
(B) move
(C) moving
(D) to move

6. _______ the genets and the civets, the mongoose does not climb trees or have scent glands.
(A) Does not like
(B) It is unlikely
(C) It is not like
(D) Unlike

7. Milk is pasteurized by raising the temperature to about 63° Centigrade for thirty minutes, rapidly cooling it, and then _______ it at a temperature below 10° Centigrade.
(A) to store
(B) store
(C) be stored
(D) storing

8. _______ of the seven continents were placed in the Pacific Ocean, there would still be room left for another continent the size of Asia.
(A) Each
(B) If each
(C) Were each
(D) Since each

(A) a great agricultural chemist
(B) was a great agricultural chemist
(C) for whom a great agricultural chemist
(D) a great agricultural chemist who

10. The last half of the nineteenth century _______ the steady improvement of the means of travel.
(A) witnessing
(B) was witnessed
(C) witnessed
(D) to witness

11. Of the 300 languages that were once spoken by Native American people, an estimated _______ today.
(A) exist 150
(B) 150 exist
(C) there are 150
(D) existing are 150

(A) Raise her
(B) Raised
(C) Raising
(D) She was raised

13. A loan _______, a promissory note, or a mere promise to repay.
(A) to the bond may acknowledge
(B) in acknowledgement of a bond
(C) may be acknowledged by a bond
(D) being acknowledged by a bond
14. Janet Collins' struggle to make a place for herself in ballet is the kind of life story ——— a fascinating novel might be written.
   (A) of  
   (B) by  
   (C) for whom  
   (D) about which

15. ------ begun to understand that the air and the oceans act as a single fluid when they exchange heat and gases.
   (A) In the past decade have only meteorologists  
   (B) Only in the past decade have meteorologists  
   (C) The only meteorologists in the past decade  
   (D) Only in the past decade meteorologists

Directions: In questions 16-40 each sentence has four underlined words or phrases. The four underlined parts of the sentence are marked (A), (B), (C), and (D). Identify the one underlined word or phrase that must be changed in order for the sentence to be correct. Then, on your answer sheet, find the number of the question and fill in the space that corresponds to the letter of the answer you have chosen.

Example I

A ray of light passing through the center of a thin lens keeps its original direction.

Sample Answer

A B C D

The sentence should read, “A ray of light passing through the center of a thin lens keeps its original direction.” Therefore, you should choose answer (C).

Example II

The mandolin, a musical instrument that has strings, was probably copied from the lute, a much older instrument.

Sample Answer

A B C D

The sentence should read, “The mandolin, a musical instrument that has strings, was probably copied from the lute, a much older instrument.” Therefore, you should choose answer (D).

After you read the directions, begin work on the questions.
16. About one person on ten is a potential sufferer of hay fever.

17. A gallon of ordinary sea water container about a quarter of a pound of salt.

18. Mentality ability and aptitudes often vary greatly among members of the same family.

19. Standardized units, the determinate quantities of currency, time, surface, volume, and to weight, are vital to the functioning of human society.

20. The three-note chord on which the Western harmonic scale has been build is called a triad.

21. Taxonomy deals with the classify of all living things.

22. Traces of financial and numerical records can found for nearly every civilization with commercial interests.

23. Elmira College was one of the earliest American colleges for woman.

24. Many Black poets having had their works distributed by Broadside Press, a New York publishing house headed by the poet Dudley Randall.

25. Dogs possess hearing abilities far superior to those that of their owners.

26. The Pilgrims was English settlers who came to America in 1620 seeking religious freedom.
27. The number of aeronautical engineers required meeting air transportation needs is rapidly increasing.

28. Perhaps the most popular types of literature, the novel is a long fictional story written in prose.

29. In 1978 astronomers made the startling discovered of a moon orbiting the planet Pluto.

30. No other beverage comes even close to rivaling coffee as the more widely drunk refreshment in the world.

31. Anna Maxwell's gift for organization was exemplified by her service while the Spanish-American War in 1898.

32. The lobster comes out its hiding place at night and walks along the ocean bottom looking for food.

33. The Great Lakes have significantly influenced the economic growth of the United States, especially in the steel industrial.

34. The colors striking often observed at sunrise and sunset are caused by dust and water particles in the atmosphere.

35. The human nose, with some five millions olfactory receptor cells, is remarkably sensitive.

36. Bauxite ores differ considerably physical appearance, according to their impurities and structural compositions.
37. Most decisions about practical matters have to be made on the base of incomplete information.

38. In addition to providing antibodies against bacteria, the immune system recognizes and destroys abnormally or foreign cells.

39. G. Stanley Hall was the first education to apply results of child-psychology experiments to teaching.

40. Not until the Centennial Exposition of 1876 in Philadelphia did the acquisition of antique furniture become a serious endeavor for American collectors.
SECTION 3
VOCABULARY AND READING COMPREHENSION
Time — 45 minutes

This section is designed to measure your comprehension of standard written English. There are two types of questions in this section, with special directions for each type.

Directions: In questions 1-30 each sentence has an underlined word or phrase. Below each sentence are four other words or phrases, marked (A), (B), (C), and (D). You are to choose the one word or phrase that best keeps the meaning of the original sentence if it is substituted for the underlined word or phrase. Then, on your answer sheet, find the number of the question and fill in the space that corresponds to the letter you have chosen. Fill in the space so that the letter inside the oval cannot be seen.

Example

Passenger ships and aircraft are often equipped with ship-to-shore or air-to-land radio telephones.
(A) highways
(B) railroads
(C) planes
(D) sailboats

The best answer is (C) because “Passenger ships and planes are often equipped with ship-to-shore or air-to-land radio telephones” is closest in meaning to the original sentence. Therefore, you should choose answer (C).

After you read the directions, begin work on the questions.

1. Ornette Coleman was enormously influential in introducing elements of Black folk music into jazz.
   (A) appropriately
   (B) uniquely
   (C) tremendously
   (D) decidedly

2. Tours are generally arranged by travel agents to satisfy the interests of those who are most likely to take such trips.
   (A) planned
   (B) explained
   (C) studied
   (D) discarded

3. The atmosphere, a narrow band of gases surrounding the Earth, is maintained by gravitational pull.
   (A) clear
   (B) freezing
   (C) thin
   (D) poisonous

4. In 1790, after a bitter debate, the United States government decided to situate its capital on the banks of the Potomac River.
   (A) war
   (B) argument
   (C) election
   (D) competition
5. Booth Tarkington's novels draw a sympathetic picture of the easygoing life in the Midwest during the early 1900's.

(A) frontier
(B) boring
(C) farming
(D) relaxed

10. Needlepoint has always been an elegant and ______ form of embroidery.

(A) expensive
(B) beautiful
(C) popular
(D) complicated

11. Most university career offices furnish students with resources to help them in their job searches.

(A) supply
(B) impress
(C) protect
(D) advise

12. The World Assembly on Aging has confirmed the need to address issues pertinent to older workers in industry and agriculture.

(A) training
(B) salaries
(C) subjects
(D) benefits

13. Erosion is a general term for the processes by which the top layer of soil is constantly being worn away.

(A) instantly
(B) continually
(C) rapidly
(D) accidentally

14. The city of New Orleans showed its appreciation for Eleanor McMain's work in social reform by giving her the Times-Picayune award for outstanding service in 1920.

(A) demonstrated
(B) published
(C) repeated
(D) postponed
15. Compared with large aircraft, small airplanes are not as streamlined and hence are less efficient.
(A) at a glance
(B) to a measurable degree
(C) in most cases
(D) as a result

16. Since antiquity there have been many attempts, some quite fanciful, to explain how the cosmos came into being.
(A) familiar
(B) imaginative
(C) apparent
(D) logical

17. The history of the exploration of Antarctica recounts many tales of perseverance and suffering.
(A) endurance
(B) skill
(C) generosity
(D) disturbance

18. Modern nursing practices not only hasten the recovery of the sick, but also promote better health through preventive medicine.
(A) permit
(B) determine
(C) accelerate
(D) accompany

19. Solitary most of the year, foxes do not live in dens except during the breeding season.
(A) Alert
(B) Restless
(C) Alone
(D) Fearless

20. Ships passing on the high seas exchange salutes by lowering and raising their flags once.
(A) information
(B) ceremonies
(C) greetings
(D) privileges

21. The Gettysburg Address, Abraham Lincoln's most famous speech, concisely expressed many of the ideals and principles of democracy.
(A) powerfully
(B) positively
(C) freely
(D) succinctly

22. The prehistoric art of inscribing figures and designs on rock surfaces seems to have slowly disappeared with the advent of agriculture, which required a large amount of time and energy.
(A) coming
(B) arrest
(C) financing
(D) stability

23. Crayfish, small freshwater crustacea similar to lobsters, are consumed by inhabitants of the Mississippi River Basin.
(A) bred
(B) caught
(C) eaten
(D) supplied

24. According to the American Red Cross, blood and plasma donors are urgently needed after natural disasters or other catastrophes.
(A) typically
(B) conceivably
(C) tentatively
(D) desperately
25. A piece of iron dipped in liquid air becomes so brittle that it will shatter if dropped.
   (A) immersed momentarily
   (B) dried thoroughly
   (C) thrown
   (D) floated

26. Diamonds that are flawed or are too small for jewelry are used to cut very hard metals.
   (A) tiny
   (B) imperfect
   (C) lustrous
   (D) crude

27. At the zenith of her career in the 1930's, Dorothy Thompson was one of the best known journalists in the United States.
   (A) completion
   (B) pinnacle
   (C) outset
   (D) decline

28. Seamounts, conical elevations formed beneath the ocean, are the most prominent formations on the ocean bottom.
   (A) battered
   (B) ancient
   (C) mysterious
   (D) conspicuous

29. Leaves are not distributed haphazardly on a plant stem, but are arranged in a very precise way that assures them the maximum light.
   (A) dangerously
   (B) densely
   (C) randomly
   (D) linearly

30. In the United States, the provisions of the constitution of any state may not conflict with those of the federal Constitution.
   (A) stipulations
   (B) interrelations
   (C) jurisdictions
   (D) interpretations

GO ON TO THE NEXT PAGE
Directions: In the rest of this section you will read several passages. Each one is followed by several questions about it. For questions 31-60, you are to choose the one best answer, (A), (B), (C), or (D), to each question. Then, on your answer sheet, find the number of the question and fill in the space that corresponds to the letter of the answer you have chosen.

Answer all questions following a passage on the basis of what is stated or implied in that passage.

Read the following passage:

The rattles with which a rattlesnake warns of its presence are formed by loosely interlocking hollow rings of hard skin, which make a buzzing sound when its tail is shaken. As a baby, the snake begins to form its rattles from the button at the very tip of its tail. Thereafter, each time it sheds its skin, a new ring is formed. Popular belief holds that a snake’s age can be told by counting the rings, but this idea is fallacious. In fact, a snake may lose its old skin as often as four times a year. Also, rattles tend to wear or break off with time.

Example I

A rattlesnake’s rattles are made of

(A) skin
(B) bone
(C) wood
(D) muscle

Sample Answer

According to the passage, a rattlesnake’s rattles are made out of rings of hard skin. Therefore, you should choose answer (A).

Example II

How often does a rattlesnake shed its skin?

(A) Once every four years
(B) Once every four months
(C) Up to four times every year
(D) Four times more often than other snakes

Sample Answer

The passage states that “a snake may lose its old skin as often as four times a year.” Therefore, you should choose answer (C).

After you read the directions, begin work on the questions.
Questions 31-37

That colorful figure, the cowhand or cowboy, was the master of the long drive and the roundup. Mexican Americans were the first cowhands. These vaqueros invented almost all the tools of the cowhand’s trade, from the broad-brimmed felt hat and the rope lariat to the special western saddle.

A cowhand’s life was a hard one. Cowhands worked sunup to sundown and received lower wages than most factory workers. Their legs became bowed from long days in the saddle. They developed permanent squints from peering into the glaring sunlight of the treeless plains.

Every item of the cowhands’ clothes and equipment served a necessary function. The wide brim of the “ten-gallon hat” could be turned down to shade the eyes or drain off rainfall. The bandana could be tied over the nose and mouth to keep out the dust raised by the pounding hooves of countless cattle. The bandana also served as a towel, a napkin, a bandage, and a handkerchief. Cowhands sometimes wore leather trousers, called chaps, over regular overalls. They protected the riders’ legs from injury if they fell from their horses or when they had to ride through cactus, sagebrush, or other thorny plants.

31. What is the main topic of the passage?
(A) Inventors of the rope lariat
(B) Famous cowhands of North America
(C) Driving cattle across the country
(D) Equipment and clothing used by cowhands

32. It can be inferred from the passage that in the average day cowhands worked from
(A) dawn until noon
(B) noon until dusk
(C) dawn until dusk
(D) dusk until midnight

33. According to the passage, what generally happened to the cowhand’s eyes?
(A) They became red and swollen.
(B) They became permanently squinted.
(C) They lost the ability to see colors.
(D) They developed the ability to spot faraway objects.

34. It can be inferred that the cowhands mentioned in the passage worked primarily
(A) in the mountains
(B) in the forests
(C) on the beaches
(D) on the plains

35. According to the passage, bandanas were used as all of the following EXCEPT
(A) towels
(B) napkins
(C) bandages
(D) trousers

36. According to the passage, what did cowhands wear to protect themselves from cactus?
(A) Chaps
(B) Hats
(C) Handkerchiefs
(D) Saddles

37. It can be inferred from the passage that cowhands did all of the following as part of their jobs EXCEPT
(A) work in factories
(B) round up cattle
(C) ride horses
(D) drive cattle
Questions 38-43

Most animals use more than one species as food. Therefore, the term "food web" is a better description of food relationships than "food chain." A food web is a complex feeding system that contains several food chains. For example, mice, rabbits, and deer eat plants.

Owls eat mice and rabbits. Mountain lions eat rabbits and deer. These five species are parts of food chains that together form a food web.

The first link in a food chain is always a green plant. Only organisms with chlorophyll, such as green plants, can make food. For example, the first link in aquatic food chains is algae. Most algae are microscopic green plants that produce food by photosynthesis. In photosynthesis, energy from sunlight converts carbon dioxide and water to sugar. Tiny fish in lakes, streams, and oceans eat algae. In turn, these tiny fish are eaten by larger fish. The larger fish are eaten by still larger fish. The food supply for fish is made by algae. This food is then passed through the food chains as one animal eats another.

Organisms may be divided into three groups based on how they obtain food. These groups are producer, decomposer, and consumer. Organisms containing chlorophyll are producers. Thus, green plants are producers. Animals that eat other animals and plants are consumers. Microbes, one-celled organisms that cause the decay of dead plants and animals, are decomposers. Since decomposers cannot make their own food, they are also consumers.

38. The main purpose of the passage is to
   (A) determine which food chain is the most efficient
   (B) describe the food network among plants and animals
   (C) explain the process of photosynthesis in green plants
   (D) appeal to conservationists to protect endangered plant species

39. According to the author, what is a "food web"?
   (A) A complicated system of several food chains
   (B) A society that distributes food
   (C) The relationship of one green plant to another
   (D) The device that spiders use to catch food

40. Which of the following would most likely be the first link in a food chain?
   (A) Termites
   (B) Fish
   (C) Lions
   (D) Grass

41. As used in line 12, the word "passed" could best be replaced by which of the following?
   (A) moved
   (B) approved
   (C) attempted
   (D) relinquished

42. The author divides organisms according to
   (A) how they use up energy
   (B) how they obtain food
   (C) how much energy they require in order to move
   (D) whether they live on the land or in the sea

43. Which of the following organisms could NOT be a consumer as described in the passage?
   (A) A microbe
   (B) A rabbit
   (C) A tree
   (D) A fish
Questions 44-48

The railroad was not the first institution to impose regularity on society, or to draw attention to the importance of precise timekeeping. For as long as merchants have set out their wares at daybreak and religious services have begun on the hour, people have been in rough agreement with their neighbors as to the time of day. The value of this tradition is today more apparent than ever. Were it not for public acceptance of a single yardstick of time, social life would be unbearably chaotic: the massive daily transfers of goods, services, and information would proceed in fits and starts; the very fabric of modern society would begin to unravel.

44. What is the main idea of the passage?
   (A) In society we must make more time for our neighbors.
   (B) The traditions of society are timeless.
   (C) An accepted way of measuring time is essential for the smooth functioning of society.
   (D) Society judges people by the times at which they conduct certain activities.

45. The word “draw” in line 1 can best be replaced by
   (A) bring
   (B) infer
   (C) formulate
   (D) sketch

46. In lines 4-5, the phrase “this tradition” refers to
   (A) the practice of starting the business day at dawn
   (B) cordial relations between neighbors
   (C) the railroad’s reliance on time schedules
   (D) people’s agreement on the measurement of time

47. The author implies that which of the following is a consequence of the greater complexity of today’s society?
   (A) Agreement on the measurement of time is more important.
   (B) The role of the railroad has become more vital.
   (C) People agree about time more readily.
   (D) Traditional values are of greater importance to the society’s well-being.

48. What did the paragraph preceding the passage most probably discuss?
   (A) The times at which religious services used to be held
   (B) The regulatory effect of the railroad on society
   (C) The need to regulate the railroads
   (D) The sale of clocks and timepieces by merchants
Questions 49-54

A revolution in our understanding of the Earth is reaching its climax as evidence accumulates that the continents of today are not venerable landmasses but amalgams of other lands repeatedly broken up, juggled, rotated, scattered far and wide, then crunched together into new configurations like ice floes swept along the shore of a swift-flowing stream.

After considerable modification this became the now largely accepted concept of “plate tectonics,” explaining much of what is observed regarding our dynamic planet. Some oceans, such as the Atlantic, are being split apart, their opposing coasts carried away from one another at one or two inches per year as lava wells up along the line of separation to form new seafloor. Other oceans, such as the Pacific, are shrinking as seafloor descends under their fringing coastlines or offshore arcs of islands.

The Earth’s crust, in this view, is divided into several immense plates that make up the continents and seafloors, and that all float on a hot, plastic, subterranean “mantle.” What causes these plates to jostle each other, splitting apart or sliding under one another at their edges, is still a mystery to geologists: it may be friction from circulating rock in the Earth’s mantle, or it may be an effect produced by gravity.

49. What is the author’s main purpose in the passage?
(A) To dispel any misconceptions about the rotation of the Earth
(B) To praise geologists for their explorations and discoveries
(C) To compare and contrast the Atlantic and Pacific oceans
(D) To explain the theory of plate tectonics

50. The author implies that people used to believe the continents were
(A) frozen chunks of ice
(B) rotating masses of rock
(C) hardened crusts of lava
(D) immobile bodies of land

51. In the first paragraph, the author mentions ice floes in order to
(A) illustrate the concept of how continents shift
(B) show where they are located in relation to continents
(C) verify what the weather was like thousands of years ago
(D) explain their movement and the speed at which they travel
52. The word “swept” as used in line 4 could best be replaced by which of the following?
   (A) won
   (B) cleaned
   (C) carried
   (D) removed

53. According to the passage, the Pacific Ocean is changing in which of the following ways?
   (A) It is growing warmer.
   (B) It is getting smaller.
   (C) It is being split apart.
   (D) It is filling up with lava.

54. According to the passage, one possible cause of the movement of the tectonic plates is
   (A) wave motion
   (B) gravitational pull
   (C) the position of the Moon
   (D) the expansion of the oceans
CONSENT FORM (for American Subjects)

My name is Rue Yuan, and I am a graduate student of English at Iowa State University, majoring in Teaching English as a Second Language.

I am inviting you here to participate in a research study on second language acquisition processes. You will be asked to complete two questionnaires concerning your judgements about the uses of English.

Each questionnaire should take approximately ten to fifteen minutes to complete. Here I am requesting your permission to use your answers on the questionnaires in this research study.

Your answers will be used for research purposes only. Your name will never be used in reports of this research.

You may stop participating in this study any time you want.

If you are interested, you may know the results of this research study after it is completed (My office is in 418 Ross Hall, ISU campus. You can call me either at (515) 294-3026 (Office), or at (515) 296-7991 (Home) asking for Rue Yuan (my name) to arrange a time for discussion).

I agree to allow the researcher to use my responses to the questionnaires in this research study on second language acquisition.

I understand my responses will be used for research purposes only and that my name will never be used in reports of this research.

I also understand that I can drop out of this research study any time if I do not wish to continue.

Signed ____________________________

Date ____________________________

Print your name here ____________________________
VIII.

Centrality Judgement
(for American subjects)

Instructions: In the following, I want your judgements about the use of a word in certain phrases.

Many words can be used in different types of phrases, with a slightly different meaning in each phrase. For example, the word "sharp" can be used as follows:

- a sharp knife
- sharp eyes/ears
- a sharp child
- a sharp turn to the left
- a sharp tongue
- a sharp voice
- a sharp looking soldier

However, people usually think of one meaning as the most central or basic. Children are most likely to learn this central meaning first, and later pick up the other meanings. In the above list, I feel that "sharp" in "a sharp knife" is the most central meaning. What do you think?

In this task, I would like similar opinions from you about ten phrases using the word "thin." For each phrase below, circle one number on the scale of 1-7 to indicate your judgement of the centrality of that meaning of "thin." For example, if you find "thin" in item 1, "a thin excuse," to have the most central meaning of this word, circle (1). If you find this use of "thin" to be the least central meaning of this word, circle (7). If you find this "thin" to be somewhere in between, circle a number from (2) to (6).

Please mark one and only one number for each item. Don't worry about why you feel that something is or is not a central meaning of the word (and don't worry about whether it's just you or people in general who feel that way). Just mark each item the way you feel.
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<th>Instances of Usage</th>
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<tbody>
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<td>1  She is thin</td>
<td>1 2 3 4 5 6 7</td>
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<td>2  a thin rope</td>
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IX. Acceptance Judgement  
(for American Subjects)

INSTRUCTIONS: The following are some English phrases with the word "thin". Some of them I find easy to understand while others are very strange. Of course my judgement might be very different from yours, and you might find all of the phrases acceptable and not "strange" or "funny" to your ears. The purpose of this task is for you to judge on a scale of 1-7 (1 is the least acceptable, and 7 is the most acceptable) how acceptable each instance of the word "thin" is. You can indicate your answer by circling one and only one of the numbers on each scale. Make your judgement according to your intuitions about the English language.
# INSTANCES OF THE WORD USE "thin"

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1. a thin rope

2. thin ice

3. a pile of thin sand

4. She is thin

5. a thin mist

6. a thin heart

7. a thin voice
8. a thin pen

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9. thin hair

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10. thin soup

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11. thin rain

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the most acceptable

12. My patience is thin

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the most acceptable

13. thin cloth

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the most acceptable

14. a thin statement of what has happened

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the most acceptable
15. A good accountant should keep his account thin and accurate.

\[1----2----3----4----5----6----7\]

the most acceptable

the least acceptable