

## 2. Methodology

This chapter provides a detailed explanation of the methods used to obtain the data for this study. It describes the process, including revisions, to data collection procedures during the course of the study and the reasons for these changes. This chapter begins with an overview of how the language source components of the three languages involved were determined, followed by a description of the subjects involved. It then moves into a comprehensive account of the instrument designs for both English and German vocabulary and continues with a brief description of the pilot study. This chapter concludes with a report of the actual collection process.

### 2.1 Preliminary stage

Before the empirical study could be conducted it was first necessary to obtain vocabulary source profiles (E-typ) of the three languages involved: Spanish, English, and German. For Spanish and English, this information was gathered from previous studies. Source languages for German vocabulary were calculated by the researcher and the details of this procedure are explained below in section 2.1.2.

#### 2.1.1 Spanish and English Vocabulary Source Profiles

Figures for Spanish language sources were gathered from a previous study (Patterson, 1986) that classified Spanish words according to functional, physical, and chronological classes and their status as borrowed or inherited. In the above study, figures for the occurrences of borrowed and inherited words in Spanish were arrived at using *The Frequency Dictionary of Spanish Words* (Rodriguez & Rodriguez, 1964, as cited in Patterson, 1986) as a corpus. This dictionary covers the 5000 most frequent words in the Spanish language, which account for 90% coverage in any representative Spanish text (Patterson, 1986). As expected, Patterson (1986)

found that Spanish vocabulary derives primarily from Latinate sources with nearly 81% of all vocabulary sampled falling into this category. Germanic source words are counted as part of the 'Other' source language category and represent less than 1.7% of all words in the Spanish language (Patterson, 1986). Another 17% of vocabulary is not accounted for in the Patterson study and no explanation is given for this discrepancy by the researcher. Since the 'Germanic' source category in the Spanish language was not differentiated in the Patterson study, it was also not accounted for separately in this study. This was assumed to have no significant effect on the findings since the numbers of Germanic words are so minimal.

To acquire figures for the English vocabulary source profile, data from a study conducted by Finkenstaedt & Wolff (1973) were consulted. This study consisted of a computerized survey of the 80,000 entries in the *Shorter Oxford Dictionary* (3<sup>rd</sup> ed.) to profile source languages of English language vocabulary. Unlike the study above, frequency was not accounted for here. This survey revealed that English comprises 56.54% Latin origin vocabulary, 25% Germanic source vocabulary, and 13.63% other language source vocabulary (Other) (as cited in Ask Oxford, 2005). Vocabulary language sources for Spanish and English are summarized below in figure 2.1. Proportions of the distribution of vocabulary deriving from the three language sources are represented in percentages.

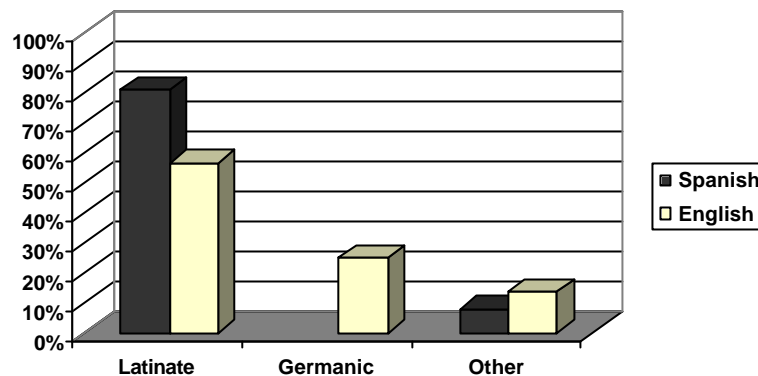


Figure 2. 1: Spanish and English vocabulary source profiles

### 2.1.2 German Vocabulary Source Profiles

Since no data was available regarding vocabulary profiles in German, figures were calculated for this study by randomly sampling 500 dictionary entries from the *Duden: Die deutsche Rechtschreibung* (Drosdowski, Müller, Scholze-Stubenrecht, & Wermke, 1996). Nation (2001) observes that one major problem with dictionary sampling is an overrepresentation of high frequency words. Generally, this occurs because higher frequency words have more entries in the dictionary than lower frequency words. Consequently, if a study uses a spaced sampling method to obtain vocabulary (e.g. selecting every 10<sup>th</sup> word in the dictionary), the incidence of high frequency words is higher resulting in an overestimation of the learner's vocabulary size. For this study, we were not interested in the learner's vocabulary size; rather we were interested in discovering the language sources of the German vocabulary known by the learners so that this could be compared to the profile developed here of the German language as a whole (E-type). Since the vocabulary found in the German is made of low- and high- frequency words to obtain

an accurate E-typ, it was important to obtain a representative sample of German vocabulary without an overrepresentation of high frequency words.

To remedy this problem, the following procedure was adhered to during the German vocabulary sampling process. First, the numbers of words under each letter of the German alphabet were estimated. This was done by taking the total number of words in the dictionary as a reference point and calculating the proportions of words under each letter. Next, using these proportions, the number of words needed from each letter category to meet the 500-word sample was determined. Once these numbers were obtained, the average number of entries on each page of the dictionary was estimated. Each page of the dictionary contains on average 45 entries; thus, the numbers 1 through 45 were randomized. Words in each letter category were selected according to the corresponding number entry on each page.

For example, words beginning with the letter *O* represent 1.6 % of words in the German language. For a sample of 500, 1.6 % would be 8 words. Thus, the numbers 1 to 45 were randomized and the first 8 numbers were chosen: 23, 2, 17, 3, 20, 8, 45, and 25. Page numbers under the *O* entries were then randomly selected and one word from each page was chosen to obtain the eight items. Thus, from the first page selected, the 23<sup>rd</sup> entry *Obliteration* was chosen and from the second page selected, the second entry, *Omelett* was selected. Once the German sample was acquired, the source language for each word was determined using etymological information provided by a German dictionary, *Duden: Die deutsche Rechtschreibung* (Drosdowski, et al., 1996) and a German etymological dictionary, *Kluge: Etymologisches Wörterbuch der deutschen Sprache* (Kluge, 2002).

When considering the etymology of the words, those words that the sources indicated were of English origin were then cross-checked with an English dictionary containing

etymological information to verify their language origins. This was done only in the case of English words because one cannot assume that English words are necessarily of Germanic origin due to extensive borrowing in English from other languages. When German words were found to be of French or Spanish origin, they were listed as Latinate since the greater majority of words in these languages derive from Latin.

Additionally, those words that were found to be compounds were analyzed according to their components. If the separate components of these words were of the same origin, they were listed under the source language of Latinate or Germanic. If the words comprised mixed components, i.e. a Germanic component and a Greek component, they were listed as Other. All other words that did not derive from Latinate or Germanic sources were listed under the 'Other' category (see Figure 3.1 for a comparison of German E-type to Spanish and English E-type profiles).

## 2.2 *Subjects*

Subjects for the two empirical studies, the P-type and the I-type profiles, initially consisted of 49 second semester German students at a private Mexican university. These students were enrolled in the second level of German in order to fulfill their foreign language requirement and had had 64 class contact hours of German study at the time of this study. According to the policy of the university, students must have completed at least university level intermediate English or have achieved at least a score of 500 on the TOEFL exam to enroll in German language classes. It was therefore assumed that the subjects had at least an intermediate level of English. Four intact German classes were tested during their regular class times to determine I-type and P-type profiles. Three classes were tested in one session each and one class was tested over a period of

two class sessions due to time constraints. Six subjects from the class that was tested over two sessions were eliminated from the original subject pool since they did not complete the second phase of the experiment, the vocabulary tests. Additionally, two subjects were eliminated because they did not respond to a minimum of two-thirds of the English vocabulary items presented. This brought the final number of subjects down to 41.

### 2.3 *Instruments*

Three instruments were employed in this study: an English vocabulary knowledge instrument, a German vocabulary knowledge instrument, and a psychotypological beliefs instrument. The first two instruments were designed to determine the typology of the L2 and L3 lexical items contained within the subjects' multilingual mental lexicons (I-typ). The purpose of the psychotypological profile instrument used in this study was to determine the subjects' beliefs regarding typological proximity or distance between the three languages (P-typ).

Vocabulary instruments for the study were created using the figures on the proportions of Latinate, Germanic, and Other source words obtained from the language word source profiles (see above). That is, the English and German vocabulary knowledge instruments were designed to reflect the proportions of words taken from Germanic sources and from Latinate sources. For English, the vocabulary instrument also includes the proportion of words obtained from Other sources. This latter category of vocabulary was eliminated from the German instrument because of insufficient numbers of words in this group within the pool of words from which the target vocabulary was selected (see below for further discussion on vocabulary selection).

Furthermore, word frequency was accounted for in both instruments. Previous studies indicate that knowledge of the first 10,000 most frequent words in the English is considered a very broad vocabulary base for L2 learners of English (Schmitt, Schmitt, and Clapham, 2001).

For an L2 learner to know a large number of words above the 10,000 frequency level would be quite exceptional and unlikely for the subject pool of the study and so the target vocabulary is restricted to words that fall within or below this frequency range. Likewise, since the study population comprises beginning learners of German, it is unreasonable to assume that they have knowledge of lower frequency vocabulary since their exposure to German has primarily been through school textbooks. As such, textbooks generally only introduce the higher frequency vocabulary of a language since this is most useful to the language learner.

With the above considerations, the study presented here adapts two versions of the vocabulary levels test of the English language (Schmitt, et al., 2001). Schmitt et al. created the original versions by randomly selecting vocabulary items from frequency counts in Thorndike and Lorge (1944), Kucera and Francis (1967), and the General Service List (West, 1953). Additionally, words for the vocabulary levels test were randomly selected from the University Word List compiled by Xue and Nation (1984) (Schmitt, et al., 2001). For German, since no appropriate instrument for this study could be located, words were randomly selected from the vocabulary index of the textbook used by the subject population, *Berliner Platz 1: Deutsch im Alltag für Erwachsene* (Lemke, Rohrman, & Scherling, 2002). The adaptation of the English instrument and the creation of the German instrument are explained in detail in the next two sections of this chapter.

### 2.3.1 *English Instrument*

As mentioned above, the English vocabulary instrument used in this study is adapted from two versions of the vocabulary levels test developed by Schmitt (2000) and Schmitt, et al. (2001). These tests attempt to measure the breadth of vocabulary knowledge at each of the frequency levels and at the academic word level. The original design of these tests divides

vocabulary according to frequency levels, i.e. according to how frequently these words appear in spoken and written text. These tests include words from the 1000 most frequent words, from the 2000, 3000, 5000, 10,000 frequency levels, and from the academic word level, the latter of which comprises vocabulary taken from the 3000 and 5000 frequency levels (see above for sources). Target words in each word group are ordered alphabetically and each word group contains only one word class.

Further, the vocabulary levels tests maintain the distribution of word classes (for every 3 nouns there are 2 verbs and 1 adjective) found within the stratified sample from which the researchers gathered vocabulary. The design of the tests include features to minimize guessing on the part of the test taker such as ensuring that none of the target items or distractors within each word group has overlap in meaning and by giving definitions that do not begin with the same letter as the target word. However, cognates were not accounted for in the original test design since these tests were developed to be used by learners of English with any native language background.

Because of the careful design and selection of vocabulary in the original versions of the test, word groups were left intact for the adapted instrument; however, since it is the purpose of this study to determine the types of words known by the subjects (I-typ) rather than the amount or the depth of knowledge of vocabulary, some changes were made to the design of the instrument. First, since it is only necessary to test passive knowledge of vocabulary to determine the typological profile of the subjects' L2 and L3 mental lexicons, Spanish synonyms, translation equivalents, or definitions were given in lieu of the English synonyms or definitions provided in the original instrument.



Likewise, cognate translation equivalents were avoided to minimize guessing. In lieu of cognates, brief descriptions or definitions of the target vocabulary were provided. The use of one- to several- word definitions is consistent with the format of the original vocabulary test, which also offers one- to several- word definitions. To ensure accuracy of the translations, a native Spanish speaker who was fluent in English checked all Spanish translations. To maintain the formatting of the original instruments, definitions were also ordered according to length with the shortest definition or translation equivalent appearing first.

Next, care was taken to ensure that the instrument contained the same proportions of Latinate, Germanic and Other vocabulary as found in the E-typ profile so as to be a more representative sample of English vocabulary in general (see table 2.1 below). Since the vocabulary levels tests closely represent the vocabulary language source proportions for English found in other studies, version 1 of the vocabulary levels test (Schmitt, 2000) was used as the basic instrument. However, the academic vocabulary in the original instrument was eliminated since it is not of interest to this study to measure academic word knowledge and since this category is comprised primarily of Latin-based vocabulary.

In place of the academic word level groups, intact word groups were chosen from the 3000, 5000, and 10,000 word frequency levels of version 2 of the vocabulary levels test (Schmitt, et al., 2001). These word groups were chosen according to word class and the number of Latinate, Germanic, and other source language target words they contained so that the final instrument would maintain, as closely as possible, the word class proportions (5 nouns for every 3 verbs for every 2 adjectives) of the original instruments. Thus, of the total number of 50 word groups in the final instrument, 25 were noun groups, 16 were verb groups, and 9 were adjective

groups. Finally, test instructions and examples were provided in Spanish so that the subjects would have a clear idea of what they were expected to do for the vocabulary tests.

**Table 2.1: English vocabulary instrument language source distribution**

Language Sources	Proportions	English language E-type profile proportions
Latinate	57% (86 words)	56.54%
Germanic	28% (42 words)	25%
Other languages	15% (22 words)	13.63%

### 2.3.2 German Instrument

The design of the German vocabulary instrument was modeled on the English vocabulary instrument since no appropriate instrument from other studies was located. For word selection, random sampling of the dictionary proved to be inadequate for the study since the majority of words tended to be of low frequency and the subjects, as new learners of German, would not have had exposure to these words previously. Using the German translations for the target words in the English instrument was likewise not feasible, again because of the level of German the learners had acquired. Based on these considerations and since it was expected that the majority of the subject pool had taken both levels of German within the university, the word lists at the end of the German textbook used in the first two levels of German at the institution were used for random sampling of vocabulary.

Initially, the plan was to use the same number of target words as in the English instrument. Thus, random selection consisted of assigning each word in the textbook word list a number and randomizing the list. Once this process was completed, the first 150 numbers

randomly selected, and their corresponding words, were chosen as target vocabulary. Target vocabulary word origins were then verified using a German dictionary (Drosdowski, et al., 1996) and a German etymological dictionary (Kluge, 2002). This check revealed that the majority of words selected from the word list (67%) have Germanic origins while Latinate sources account for 27% of all words and the remaining 6% fall into the Other category.

This textbook vocabulary survey contradicted the E-typ results from the dictionary survey. In the dictionary survey, of the 500-word sample, 51% derived from Latinate sources, 21.4% from Germanic sources, and 28% from Other sources (see Figure 3.1 in the next chapter). Consequently, the idea of using 150 target words was reconsidered since it was assumed that continued random sampling of the word list would provide the same ratios of language sources and it was pertinent that the proportions found in the E-typ profile be maintained. Moreover, since the subjects for the study had had only 64 contact hours of German language study, it is unreasonable to assume that the breadth of their vocabulary knowledge in German would equal that of their vocabulary knowledge in English.

The above considerations prompted a change in the number of target items from 150 to 60 in the German vocabulary instrument. The decision to use 60 was based on the idea that the amount of vocabulary acquired by the German learners would be less than half of the vocabulary attained in English. Also, previous studies indicate that providing a minimum of 30 target items in a vocabulary test is sufficient for assessing learners' word knowledge (Nation, 2001). However, to provide as much data as possible, and since the level of proficiency for the subjects was greater in English than in German, the original number of 150 target items was kept for the English instrument.

Consequently, 60 target items were selected from the pool of 150 words previously chosen. Selection decision was based on the source language of each word in an effort to match as closely as possible the word origin profiles found in the dictionary sample. Because the numbers of Other words was insignificant in the textbook random sample, this category was eliminated from the German instrument. However, this caused the textbook random sample to be incompatible with the E-typ profile. To correct this disparity, an adjustment in the calculation of the E-typ profile was needed.

To adjust the proportions in the E-typ profile, the Other category was eliminated from the 500-word dictionary sample. This change resulted in the total word count in the dictionary sample to be reduced from 500 to 362 words, all of Latinate or Germanic origin. Of these 362 words, 255 derived from Latin (66%) and from 107 German (33%). These figures became the proportions for the revised E-typ profile.

Once the E-typ profile was revised, vocabulary items were selected for the German instrument while maintaining the proportions in the adjusted E-typ profile as accurately as possible. Thus, since the majority of words needed to be from Latinate sources to fit the E-typ profile, all 40 of the Latin origin words from the original textbook random word list sample were kept for the final instrument and 20 Germanic words were randomly chosen (see table 2.2). As with the English instrument, care was taken to ensure that the German vocabulary instrument also contained the word class ratios reflected in the textbook vocabulary list (7 nouns: 1 verb: 4 adjectives). Therefore, the final instrument contained 13 word groups containing 6 nouns each, 3 word groups containing 6 verbs each, and 4 word groups containing 6 adjectives each (see Figure 2.3 for an example of a noun word group in the English and German instruments).

**Table 2.2: German vocabulary instrument language source distribution**

Language Sources	Vocabulary instrument proportions	Revised German language E-typ profile proportions
Latinate	66% (40 words)	66%
Germanic	33% (20 words)	33%

As with the English instrument, the German instrument is an attempt to test passive vocabulary knowledge. Hence, definitions of the target items were presented in Spanish. This was accomplished with the aid of a native German-speaking teacher of German who is fluent in Spanish. Additionally, a native Spanish speaker who was fluent in German checked all Spanish translations to ensure accuracy in the L1. Again, to minimize guessing, all cognate translation equivalents were avoided and definitions or descriptions were offered in their place. Definitions, as in the English instrument, were ordered by length and instructions and examples were also provided in Spanish in order to ensure that the subjects understand fully the nature of the task. (See Appendixes 1 and 2 for complete depictions of the English and German vocabulary instruments).

### 2.3.3 *Psychotypological Survey*

The psychotypological survey was taken from another previous study (Hall, et al., 2004) and was designed to reveal subjects' beliefs regarding the proximity of the three languages involved in the study. The survey consisted of five multiple-choice questions that asked subjects about their opinions regarding similarity between the three languages, the ease of learning of the languages involved for both native English and native Spanish speakers, and the historical relationship of the three languages. (See Appendix 3 for psychotypological instrument).

## 2.4 *Pilot Study*

The English and German vocabulary instruments were piloted prior to the experiment to assess the quantity of time subjects would need to complete the tasks and to determine if there were any errors in design. The psychotypological instrument was not piloted since it had been used in another, related study at the same institution the previous year.

Six volunteer subjects from level 3 German classes participated in the pilot. As an incentive, these students received one extra point on their participation grade for the class. One of these students was a native English speaker and was therefore given the German instrument to pilot. The fact that she was not a native Spanish speaker presented no problem for the pilot since the purpose here was to assess the feasibility of the study, rather than the I-type of each subject. Of the remaining five subjects, two more received the German instrument and three of the students were given the English instrument.

Subjects were instructed to complete the vocabulary tests as quickly as possible and to leave blank any item that they did not know the answer to. Those who were taking the English vocabulary test were told they had 30 minutes to complete the task. This corresponds with the amount of time given to subjects for the same task in the study conducted by Schmitt, Schmitt and Clapham (2001). Since the German vocabulary test was one-third the size of the English test, subjects were given 20 minutes to complete the task. Each subject was timed individually to assess the amount of time necessary to finish the tests.

All subjects completed the vocabulary tests much more quickly than expected. Average time for completion of the English test was 15.6 minutes, while the German instrument was completed on average in 7.3 minutes. The average number of correct answers for the English vocabulary test for the three subjects was 116 words (77%), while the average number of correct

responses for the German was 52 words (87%). Consequently, the decision was made to give subjects in the final experiment 20 minutes to complete the English instrument and 10 minutes to complete the German instrument, for a total of 30 minutes for both instruments.

For English, one problem in the test, a vocabulary translation, was identified. The English word *impudent* was translated as *barbaján* in the original test. Due to the difficulties this word presented, the meaning was checked, determined to be incorrect, and the translation was changed to *insolente* for the final instrument. The German instrument presented no identifiable problems and was therefore left intact for the final test instrument.

## 2.5 Procedure

Before beginning the experiment, subjects were told orally that this study was part of a larger study being conducted at the university to explore the acquisition of third language vocabulary. They were also told that their participation was anonymous and voluntary and that if they did not wish to participate, they were not required to. All students present in the class sessions participated in the experiment.

The experiment consisted of two phases: the psychotypological survey and the vocabulary exams. In all cases the psychotypological instrument was applied first to ensure that subjects were not influenced by the word familiarity task of the English and German vocabulary instruments. The psychotypological survey consisted of five multiple choice questions designed to assess the language beliefs of the subjects. The questions addressed subjects' beliefs regarding the proximity of Spanish, English, and German; which language, English or German, was easier for a native Spanish speaker to learn; which language, Spanish or German, was easier for a native English speaker to learn; and what historical relationship there was between the three languages. Students were given five minutes to complete the survey and surveys were collected

before the application of the vocabulary instruments (see Appendix 3 for the psychotypological survey).

For the second part of the experiment, six versions of the vocabulary tests were evenly distributed to the subject pool. Three began with the English vocabulary instrument and three began with the German vocabulary instrument. Within the English and German instruments, blocks of words were rotated so that the words that some subjects would see first were seen last by other subjects. The rotation of English and German instruments and the vocabulary was done with the consideration that some subjects may tire during the testing process and either not complete the tests or rush through the last part in order to finish. Rotation ensured that all words would get equal attention overall by the subjects.

For the vocabulary portion of the experiment, subjects were instructed to answer the vocabulary tests as quickly as possible and not to try to guess any of the answers. If there was a response that they did not know, they were to leave the answer space blank. They were also told that they had 30 minutes to finish the vocabulary tests. Questions regarding the meaning of words were not answered and subjects were told again that if they did not know the answer to leave the space blank.

The vocabulary tests consisted of groups of six words, three of which had translation equivalents in Spanish. Students were asked to write the number of the English or German word that corresponded to each of the translations next to the translation. They were also told in the instructions that not all six words had a translation in the test. An example was given at the beginning of both the English and the German tests that showed the initial block and the correct answer. Figure 2.3 gives an example of an English and a German vocabulary group as they appear on the vocabulary instruments.



1 arsenal	___ apuro	1Kasten	___ error
2 barracks	___ clérigo de iglesia	2Fehler	___ aceite
3 deacon	___ satisfacción, alegría	3Öl	___ parada de transporte público
4 felicity		4Aufgabe	
5 predicament		5Station	
6 spore		6Juli	

**Figure 2. 2: English and German vocabulary translation tasks**

One student in the first testing session noticed, and brought to the researcher's attention, a typographical error with a Spanish translation. The word *herbívoro* was written as *hebivero* and had escaped the notice of the researcher, pilot participants, and the native Spanish speakers consulted during the design phase of the instrument. Students in consequent testing sessions were informed of this error prior to the test. This error had no effect on the responses given, most likely because the two spellings were so close as to be easily overlooked. The item was therefore not eliminated from the data analysis.