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What Strategies do Learners Use to Remember the Spelling of Newly Learned Words?

by

Sofia Logvinenko

A Thesis

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Abstract

Many studies suggest that a native language (L1) may influence the second language acquisition (L2). This study is interested in the possible impact of L1 orthography on the choice of spelling strategies of Chinese, Arabic, and French speaking learners. Data was collected through a short test in which participants were asked to memorize new English words. Afterwards, they reported strategies which were used in order to learn the spelling. After calculating individual and group average of employed strategies, the most commonly used among them were determined for the members of the same language group, and for all participants as a group. I also wanted to identify which language group would be the most successful in spelling orthographically challenging English words. This empirical study provides evidence that regardless of a native language, the same strategies were used most of the time by all participants. The findings related to accuracy of each language group support the influence of L1 on the spelling process in L2. Implications for ESL teachers are discussed.

Key words: L1, L2, spelling strategies, native language, spelling accuracy, ESL

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I would like to deeply thank the members of my committee for their support and advice during the process of writing this paper. Without their constantly provided advice, help, and guidance this project could not have been completed: Dr. Kim, my committee chair, who dedicated a lot of time and energy to go over every little detail of the project; her expertise in conducting research has been an immense inspiration for me which I hope leads me to new interesting linguistic studies; Dr. Mikolchak and Dr. Jarvis whose priceless feedback helped me with editing the final draft and seeing the big picture in the work I have completed for this project.

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Chapter I: Introduction

Learning vocabulary in a foreign language represents one of the most essential and important components of the language acquisition. However, for many people it is also a serious challenge hindering their ability to express thoughts and ideas accurately in a target language. There are some similar actions which efficient students perform in order to learn vocabulary. Research shows (Schmitt, 2000) that successful language learners use a variety of techniques and engage in independent learning in addition to classroom instruction. Thus, being aware of ones' vocabulary learning strategies and efficiently utilizing them become very useful tools which can significantly alleviate the burden of learning new words.

There are various layers of linguistic information involved in knowing a word, such as its form, meaning, and use (Nation, 2013). The form of any given word consists of a spoken and a written component. In other words, every word has its unique pronunciation and spelling. In this study, we will be focusing on the acquisition of spelling.

For the purposes of this research, we will use the following definition of spelling: "Spelling is the ability to produce words, orally or in a written format, by placing the letters of these words in accurate sequence" (Mesmeh, 2012, p. 15). There are different types of information encrypted in a sequence of letters in each word. According to Berninger (2008), there are several codes which are involved in the spelling process: morphological, phonological, and orthographical. Research shows that competent spellers do not solely rely on their knowledge of one of these components, but use variety of them in order to decode word meanings and spelling (Ehri, 2000).

Some teachers believe that the English language spelling system is too irregular and therefore think it does not make sense to spend instructional time on learning how it functions

(Simonsen & Gunter, 2001). However, spelling instruction is important for the development of other language skills, especially reading (Moats, 2005). Perfetti (1992) concluded that spelling knowledge is a crucial element which bolsters reading and writing proficiency. These studies confirm that attention to spelling is a vital step which language learners should perform in order to avoid complications in cultivating their progress in other linguistic skills.

Some studies suggest that the writing experience as a whole is dependent on spelling competence. Graham and Santangelo (2014) noticed that considerable attention to spelling may intervene with successful completion of writing stages, such as brainstorming, or revision. According to these authors, a learner would not be able to pay enough attention and concentrate on the writing process itself if s/he is constantly distracted by the spelling process. Graham & Harris discovered (as cited in Graham & Santangelo, 2014, p. 1704) that struggles with spelling also might alter the choice of vocabulary items in the writing process. A student would avoid using orthographically difficult words which could ultimately negatively affect the content of his message. Moreover, Graham & Santangelo (2014) found that depending on how successful a student is in terms of spelling, his grade significantly fluctuates, even if content and ideas are identical. Therefore, a final grade of a student's paper will be dependent on the number of spelling mistakes. All these studies support the paramount importance of accurate spelling in the writing process.

The problem of learning spelling in English becomes even more challenging for non-native speakers of English than for native learners because we can expect them to transfer some of the phonetic and spelling rules from their L1, which can make the learning process even more complicated. For example, Arabic speakers have shown their tendency to exhibit so-called "vowel blindness" when spelling in English. This fact is attributed to the absence of vowels in

one of the Arabic scripts used in writing (Saigh & Schmitt, 2012). Subsequently, Arabic speakers tend to transfer their processing of vowels into spelling English words.

Other studies also prove that while learning an L2 people continue using their L1 processing strategies of linguistic information (Culter and Norris, 1988; Koda, 1997). De Groot (2006) showed that learning new phonological and orthographical information is easier if it matches the pattern in the L1. He also found that L2 words which are orthographically and phonetically similar to L1 words were less likely to be forgotten in comparison with L2 words which were distinctly different from L1 words (Saigh & Schmitt, 2012). These studies suggest that it is easier to remember L2 words which are somehow similar to L1 words.

As can be concluded from the discussion above, knowledge of spelling is crucial for the development of both productive (writing) and receptive (reading) skills (Saigh & Schmitt, 2012). Therefore, it is extremely important for the second language acquisition. It was proved by some studies which were previously mentioned that L1 has influence over L2 acquisition. Considering the undisputable significance of spelling in L2 acquisition, I found it meaningful for the ESL teaching field to look at spelling strategies which non-native English language learners, namely Arabic, French, and Chinese speakers, use to remember spelling of newly learned English words. I also wanted to examine how the participants' distinctly different L1 orthographies would influence students' success in spelling orthographically challenging words, and their choice of spelling strategies.

Chapter II: Literature Review

Definition of a Vocabulary Learning Strategy

Vocabulary learning strategies are included in the bigger group of language learning strategies. Oxford (2003) defines these as particular actions which learners perform in order to make the learning process easier, more effective and independent. I will adapt the definition of a vocabulary learning strategy proposed by Catalán (2003), “Knowledge about the mechanisms (processes, strategies) used in order to learn vocabulary as well as steps or actions taken by students (a) to find out the meaning of unknown words, (b) to retain them in long-term memory, (c) to recall them at will, and (d) to use them in oral or written mode” (p. 56). Other researchers (Apel et al.,2004) also include visual and etymological knowledge as codes which are pertinent to the spelling process. As we can see, there are various components included in a vocabulary strategy.

Schmitt (1997) distinguished two characteristics of vocabulary learning strategies:

- 1). Many students know that strategies are important for learning new words, and they use those strategies more extensively in comparison with their usage when learning other language skills.
- 2). Strategies which do not require deep processing, such as rote-memorization or repetition are used more extensively than strategies which involve more imagination, such as the keyword technique.

According to Schmitt (2007), strategies can be divided into two groups: “shallow” and ‘deeper” strategies. Repetition and simple memorization belong to the former group. It is said that these strategies do not require extensive and deep analysis. On the contrary, deeper strategies depend upon imagination, and thus employ more profound analysis in comparison with shallow strategies. Schmitt (2007) further concluded that more advanced students prefer using “deeper”

strategies, whereas beginners choose applying more extensively the “shallow” methods. Hulstijn suggested that “deeper” strategies are more effective than “shallow” strategies in terms of retention (as cited in Schmitt, 2000, p. 132).

Spelling Strategies

There are three major spelling strategies: using the visual route, using the phonemic route, and using metalinguistic knowledge (James & Klein, 1994). The first strategy relies on retrieving chunks of words which learners memorize visually. When using the phonemic route, learners sound out words in order to produce their spelling. A learner uses his/her knowledge about a target language when applying the third strategy. Indeed, it is much easier to spell such words as <sign> and <signature> if there is an understanding that these words derived from the same root.

Some linguists believe that in order to master spelling in an alphabetic orthography, for example the orthography of English, the most effective strategy to use would be one’s auditory skills, namely the usage of the phonemic route (Holmes & Malone, 2004). Using this method alone would work with rather transparent words, such as <pen>, in which each letter corresponds to one sound. However, homophones, such as <there> and <their> are pronounced identically, while having different spelling. Therefore, this strategy will not work effectively in spelling English words, in which there is no clear letter-to-sound correspondence.

The learners who primarily rely on the phonemic route, which is quite typical for the people coming from alphabetical orthographies, usually have a very good understanding of sound-to-letter correspondences. This situation primes them to commit similar spelling mistakes. For example, a student can produce an incorrect spelling which might sound phonologically correct (<sucess> instead of <success>). It seems that it is rather hard to correctly spell countless number of English words when relying exclusively on the phonemic route.

Even advanced English language learners oftentimes have difficulties when spelling certain words. As Holmes & Malone describe in their article (2004), usually these students “can read the words they cannot spell” (p. 538). The spelling the learners can produce and recognize is not complete and correct, but enough for them to distinguish words and use them especially for receptive skills.

The above-mentioned studies confirm the fact that being proficient in only one strategy, such as using the phonemic route, will not be sufficient to produce the correct spelling in myriad of English. Schmitt (2000) confirms that efficient spellers use a variety of strategies in order to learn spelling in English.

English Orthography

Spelling in English continues to be very difficult and confusing for many learners because of complexity of its writing system. It is not chaotic as many people believe, but based on principles which echo the history of English language (Adoniou, 2014). English adopted a vast number of foreign words which came from French, Latin, Greek, and Germanic languages. This historical event contributed to the fact that English gradually moved away from being a language with a straightforward system of letter-to-sound correspondence because newly-arrived words usually kept their original spelling. As a result, English does have an alphabetic orthography, but it is not a phonetically regular language (Adoniou, 2014). For instance, a phoneme /k/ have a variety of possible spellings: /ch/ as in <schedule>, /c/ as in <picnic>, and /k/ as in <kitchen>. As this example demonstrates, in English one sound can be represented by different graphemes. The pronunciation of the grapheme /gh/ can also be surprisingly different: /g/ in ghost, but /f/ as in laugh (Fender, 2008). In this case, on the opposite, one grapheme is

represented by different sounds. The existence of such inconsistency in a written form versus its pronunciation has long been a subject for debates among educators, linguists, and students.

Why is not it possible to spell words the way they sound? This question has been asked numerous times, and Cummings (1998) answers it by defining two requirements existing in English orthography. First of all, there is a phonetic demand, which requires sounds to be spelled in the same way from one word to another. Second of all, there is a semantic demand, which calls for units of meaning to be spelled consistently. Cummings says that there should be balance between these two requirements. For example, the following two words share the similar meaning: <sign>, and <signature>. Both of them came from the Latin word <signum> which means *to mark*. This mutual etymological history explains the necessity to keep the silent /g/ in the word <sign>, and therefore to preserve the meaning among these words from the same word family. The necessity to maintain balance between phonetic and semantic demand is one of the major reasons for the existing discrepancy between how words are spelled and how they are pronounced in English.

Orthography of Global Languages

A writing system is a complex entity which encrypts spoken communication. There should be shared understanding of encoded symbols between readers and writers of one particular system. Global languages have taken different paths in choosing a specific correspondence between a writing system and spoken utterances.

According to DeFrancis, a language can be assigned to one of the following categories, depending on an item that has been chosen for written mapping: alphabetic, syllabic, or logographic-phonetic (1989). “The alphabetic system selects phonemes, a syllabary system selects syllables, and a logographic system, traditionally considered, selects morphemes or words

to represent spoken language” (Wang & Koda et al, 2003, p. 130). Thus, each language has a unique item which is selected to encode spoken utterances in writing.

Orthography represents a set of writing rules existing in a language, which includes spelling conventions. Therefore, spelling as a language skill is intrinsically intertwined with writing traditions. As Dich and Pederson said (2013), “The way people learn to spell is in part shaped by the characteristics of their native language, and writing system” (p. 52). Consequently, we could expect that learners coming from dissimilar L1 writing systems would approach spelling in English in a different fashion.

The Relationship among Arabic, French, Chinese, and English Writing Systems

Arabic, French, and Chinese have orthographies which are different to some extent from the English writing system. Figueredo (2006) studied how an L1 of ESL learners influenced their spelling experience in English. He analyzed twenty-seven studies which were concerned with the influence of L1 on the acquisition of spelling in English. Figueredo concluded, “Where similarities exist, positive transfer may provide the ESL learner with a knowledge advantage. Where differences exist, negative transfer may temporarily occur until English norms are learned and consistently applied” (p. 899). Thus, we could assume that learners who developed their literacy skills in an L1 orthography which is similar to the English writing system could have a certain advantage in acquiring English spelling over students whose L1 writing system does not have similarities with that of English. Moreover, a negative transfer might occur and make the spelling acquisition even more challenging for this group of students. The characteristics of Chinese, Arabic, French, and English orthographic systems are reported in Table 1 in order to show similarities and differences among these writing systems.

Table 1. Differences between English writing system and Orthographies of Arabic, Chinese, and French

Features of writing systems	Alphabet	Roman Alphabet	Logographic system
English	+	+	-
French	+	+	-
Arabic	+	-	-
Chinese	-	-	+

As we can see from Table 1, the French writing system has two similar characteristics with the English writing system: it also has an alphabet, and it also uses a Roman one for coding phonemic items. French, therefore, has the least distance from English in terms of writing conventions. Even though Arabic speakers use a different script, they also have an alphabetic system, just like English speakers do. Thus, Arabic can be placed farther away from English comparing to French since it does not use Roman alphabet, but has an Arabic script. In its turn, the Chinese writing system is the most distant from English orthography because it does not have any apparent similarities with the English writing system.

We think that these intrinsic characteristics of Chinese, Arabic, and French orthographic systems may influence the choice of participants' spelling strategies as well as their success in accuracy of spelling English words. Therefore, we found it important to look in more detail at the orthographies of Arabic, Chinese and French. Firstly, we will examine alphabetical systems and some variations which exist within this category of writing systems.

Orthography Hypothesis

According to Katz (1992), "Alphabetic writing systems reflect the spoken forms of their respective languages with different degrees of consistency and completeness between letter and phoneme" (p. 149). The orthographic depth hypothesis (ODH) determines the degree of this regularity by discerning between shallow and deep orthographies.

The term “shallow orthography” can be related to such languages as Italian, or Spanish. These languages have transparent correspondence between sounds and letters (Wang & Geva, 2003). For instance, a word <un bambino> in Italian has seven letters, in which each of the letters correspond with one sound. On the opposite end of continuum, there are languages like French, or English, that have so-called «deep orthographies». In this type of orthographies, there are words like <eau>, or <thorough>. The first word is from French, and there are three letters and only one sound as can be seen in its transcription ([o]). The second word is from English, and it has eight letters, and only five sounds ([θɜrɒʊ]). These examples demonstrate that in this type of orthography it is not easy to find clear conformity between the written form and the pronunciation.

Literacy acquisition would be different depending on the type of orthography. Research has shown that learning to read is easier in the shallow than in the deep orthography. Based on this finding, Ziegler and Goswami (2005) have proposed that readers and spellers of opaque orthographies need to memorize correspondences between sounds and spelling not only for individual phonemes, but also for units of larger sizes, such as rhymes, or even whole words. The idea that whole word spelling and reading strategies play a more prominent role for users of opaque orthographies has also been proposed by Katz and Frost (1992). These studies confirm that the nature of a native language orthography may influence a learner’s choice of spelling strategies.

Arabic Orthography

There are several major differences between English and Arabic writing systems which may make the acquisition of spelling rather challenging for Arabic students.

First of all, these two languages use different alphabets. The Arabic primarily uses so-called consonantal alphabet, or *Adjads*, in which only consonants are written. Modern Standard Arabic has 28 consonants written with 28 letters. English on the other hand, has 26 letters with the 24 consonants in English being written by 21 of these letters. The 11 vowels in English (apart from diphthongs) are written by 5 of the letters (Saigh & Schmitt, 2012). We could see that in Arabic only consonants are written, but in English both consonants and vowels are recorded. Also, as was discussed earlier, in English one sound can be represented by different graphemes, and one grapheme can have various pronunciations in English. This kind of inconsistency cannot be seen in Arabic script, and therefore might be difficult to approach for Arabic speakers.

Second of all, sentences in Arabic are written from right to left in a cursive style. According to Al Jayousi (2011), the new writing direction in English oftentimes is the cause of such spelling mistakes on the part of Arabic students as misspelling of letters with mirror shapes (p vs. q; d vs. b). For the same reason, it might be possible for this group of students to confuse the order of letters within a word (e.g. <form> vs. <from>) (Al Jayousi, 2011). Thus, the change of the writing direction is one of the reasons for some of the common spelling errors committed by Arabic speaking learners of English.

There are two types of scripts in Arabic. At first, children learn literacy skills through Modern Standard Arabic which represents a transparent (shallow) orthography, with clear sound to letter correspondence. This script represents a fully-vowelized orthography that is used for the following types of printed materials: poetry, children's books, and the Koran. However, another script is used in magazines, or textbooks, and it is not as phonologically transparent, due to the absence of vowel diacritic information (Fender, 2008). Adults and competent readers read only consonants and guess the vowels (Bowen, 2011). Therefore, Arabic speakers mostly concentrate

their attention on consonants. Some studies suggest that they can transfer the word-recognition skills from Arabic, namely the habit to pay close attention only to consonants, and ignore the presence of vowels. According to Ryan (1997), this group of students might exhibit so-called ‘vowel blindness’ by ignoring vowels while storing vocabulary in English.

As it can be seen, Arabic speakers develop their literacy skills in transparent (shallow) orthography, and later on learn how to use deep orthography. Thus, gradually they learn how to read in the opaque orthographic system (the second script). Even though, Arabic speakers use the opaque script (i.e., unvowelized Arabic), they still can rely on rather direct phoneme-grapheme clues. Some studies suggest that Arabic-speaking learners can utilize the recognition skills of reading an opaque script in learning literacy in other languages (Ryan & Meara, 1992; Ryan, 1997).

French Orthography

French orthography has several similarities with English writing system. It also uses the Roman alphabet, but there are some additional letters with diacritics that are missing in English (e.g. é, è à, â, ç ü). Due to the major historical events, there are numerous cognate words from French in English. Therefore, French-speaking students have a certain advantage in learning vocabulary over other groups of English language learners in this study.

French has a rather inconsistent sound to-letter- correspondence; this is why its orthography belongs to the group of opaque writing systems, just like English orthography does. According to Dish and Pederson, (2013): “Whereas transparent orthography users rely only on phoneme-sized units, opaque orthography users rely on both phoneme size and larger size units, in particular rhymes” (p.54). Considering these findings, we expect French speaking participants to rely on both phoneme size and larger size units when learning spelling in English.

Chinese Orthography

There is one major difference that can be seen among alphabetic systems and their logographic counterparts. The principle of letter-phoneme mapping that is presented in alphabetic systems allows concepts to be gathered from smaller units, such as in this example: /k/-/æ/-/t/. Together, these phonemes represent the concept of a “cat”. This principle does not apply in Chinese, and therefore illustrates the crucial difference in the role that phonology plays in alphabetic and non-alphabetic languages.

In Chinese, the link between a visual correlation and its pronunciation is rather weak. Furthermore, two words that have similar pronunciation, can have little orthographic resemblance. As Wang, Koda and Perfetti found (2003), “Existing Chinese reading models emphasize the importance of a fully specified orthographic representation prior to the activation of phonological and meaning information in reading Chinese “(p. 5). These studies confirm that the link between the orthographic representation of a word and its pronunciation is not strong.

The research of Wang & Geva (2013) concluded that “The Chinese system does not possess the segmental structure that is rudimentary to alphabetic systems” (p. 2). Instead, Chinese uses a logographic-phonetic system having characters as separate morphological units. Each character consists of two parts. A logographic element gives a reader a visual clue, whereas a phonetic element gives some instruction for pronunciation. This instruction, however, is rather limited, and it does not have a clear link to pronunciation.

In non-alphabetic systems, ability to spell is not affected that much by phonological awareness. According to research, students from non-alphabetic L1 background primarily use orthographic information for word identification (Koda, 1987). Hence, logographic readers rely

less on phonological information presented in a graphemic form to access an orthographic representation of a word.

A low level of phonemic awareness has been seen in Chinese ESL adults because of the lack of exposure to an alphabet in learning L1 (Holm & Dodd 1996; Jackson et al, 1994). Alternatively, Chinese learners have more advanced skills in using their visual memory to remember combination of letters. Numerous studies support this statement (Haynes & Carr, 1990; Jackson et al, 1994; Koda, 1987). Wang and Geva (2003) discovered that Chinese learners memorized spelling as whole chunks using their visual skills transferred from L1. The study of Holm and Dodd (1996) confirmed these findings. In the study conducted by O'Malley et al (1985), Asian learners used rote-memorization techniques very effectively, which allowed them to significantly outperform the other group of students. Therefore, we expect that Chinese students will transfer their enhanced visual processing from L1 to learning spelling in English. Subsequently, we suppose that the most common strategies for this group of students might be visual and rote learning strategies.

However, it has to be noted that there are different approaches in teaching phonological awareness in China. In some parts of the country (Mainland China and Taiwan), children do use a phonetic system, which is called Pinyin in addition to learning characters. In contrast, in Hong Kong, there is no such system which would help children to read Chinese (Wang & Geva, 2003). Therefore, our participants from China might differ in their level of phonological awareness depending on the manner of phonics instruction in their schools.

Chapter III: Methodology

Research Questions

The research questions of this study stated as follows:

- (1) Is there any strategy preferred by all learners regardless of the L1 background?
- (2) Do different L1 groups prefer different strategies?
- (3) Do different types of orthographic irregularities (silent letters, uncommon letter to sound mapping) affect speakers of different first languages differently?

Setting and Participants

This study took place in a U.S. university during the spring semester. Total of thirty-seven students (N= 37) took part in the study: eleven native Arabic speaking students (N= 11), fifteen native Chinese speaking students (N= 15), and eleven native French speaking students (N= 11).

Even though proficiency in English was not controlled for, all our participants had approximately the same competence in English, namely intermediate, or upper-intermediate level. However, there were some participants whose proficiency in English was advanced.

For this study, students who were enrolled in various programs of study were selected. Some of them were taking classes in IEP, while the others were already studying in degree programs. Approximate age of the participants was in the following range: 18-38 years old.

Materials

Target words. Fifteen words were preselected for this study which were subsequently divided into three categories correlated with orthographic and phonological complexity. Each of them was either transparent (direct letter to sound link), or nontransparent (no direct link between a letter and a sound). There were two types of nontransparency: a word either had a

silent letter(s), or uncommon letter-to-sound segments. The full list of words is reported in Table 2.

Table 2. Target Words

Category ID	Word	Category	Description
(Direct)	Calomel, falarica, scabiosa, polybolos, zufolo	Transparent	The words have direct letter- to-sound link.
(Silent)	Mistletoe, dinghies, ignimbrite, lagniappes, isthmuses	Nontransparent	The words have a silent letter(s).
(Uncommon)	Xiphosura, thoroughwort, gypshophila, sciaenid, arachnid	Nontransparent	The words have uncommon letter-to-sound segments.

A silent letter(s), or uncommon letter-to-sound mapping in Silent and Uncommon categories appeared in the middle of the selected words. In order to assure that the chosen segments from Uncommon category were similar in terms of their frequency of use we used a phoneme-grapheme frequency count conducted by Edward Fry (2004). All of the selected segments were either rare, or unusual in their frequency of use.

These words were further distributed into five sets of three words. Each set consisted of words from different categories. The following additional criteria were applied in order to choose the target words:

- (a) All the words consist of three to four syllables;
- (b) The words were chosen from low - frequency lists of words, and therefore it was expected that students would not be familiar with them.
- (c) Only concrete nouns were selected. This condition was necessary in order to show a corresponding picture for every word.

A slide show. The preselected words were compiled into a slide show. Several types of slides were developed:

- 1). “Remember the spelling slide (Content Slide)”. Each slide showed three words from different categories. A picture showing a word was placed next to each target word in order to create a word-meaning link.
- 2). “Write down the spelling slide (Spelling Slide)”. Each slide displayed only one picture describing a target word.
- 3). “Interference slides”. After each Content Slide and before each Spelling Slide, Interference Slides were displayed to participants. On these slides, students saw math tasks (See Appendix A).
- 4). “Practice slide”. Before beginning the experiment, practice slides were provided for participants to become familiar with the procedure.

In order to record participants’ answers when they were asked to write down spelling of the target words a response sheet was developed (See Appendix B). During interviews, an audio recorder was used in order to collect the data on the strategies employed by participants. These conversations were transcribed. The transcript of one of the participants can be found in Appendix C.

Procedure

All of the language groups completed the same task. The researcher met with each participant individually. Each participant saw the same slide-show with the same sequence of words (Note. The slide show was not randomized. See details in limitations).

The procedure was divided into several steps:

- 1). Memorizing spelling. Participants were shown the words using Content Slides (three words at a time). For each such set, 50 seconds were given to memorize the spelling. These slides were shown to the participants in order to remember the spelling of each word using any strategies participants wanted to utilize. At this point, they did not write the words down.
- 2). Solving an interfering task. Participants saw a math task on an Interference slide. They tried to solve the problem during 20 seconds. If a participant could not get the right answer, s/he reported his best guess and moved on to the next slide.
- 3). Writing down the spelling. Participants used the handout to write down spelling of target words which they remembered (20 seconds per word).

The above-mentioned steps were repeated five times, so that total of fifteen words (three new words on each Content Slide) were displayed throughout the study.

- 4). Interview. After completion of the above-mentioned steps, an interview was conducted. One major question was asked: which strategies did a participant use in order to recall spelling of newly learned words? What happened in his/her mind which helped him/her to remember spelling? On average, each interview took 10 - 15 minutes. If a participant stopped speaking during the interview, which happened often, the researcher prompted him/her to continue describing his actions. If a participant said “I just remembered it”, “I don’t know how”, the researcher asked him/her for more information.

Analysis

In order to learn which strategies were the most commonly used by the participants, percentage of individual and group average for each reported strategy was calculated.

I also wanted to assess the overall accuracy of each participant and each language group. In order to capture even the smallest increments in accuracy of produced sequences of correct

spellings, the method of counting correct letter sequences (CLS) was used. This approach gives partial credit to words which are misspelled, and thus detects growth in spelling competency more accurately than binary assessment does (Mather, N., Wendling, B. J., & Roberts, R, 2009). The number of CLS for any word equals to the number of letters in the word + 1. By using this formula, the bordering letters and spaces (for the first and the last letter) of each letter are counted. An example of application of this technique can be seen in Table 3.

Table 3. Counting CLS

Produced spelling	Word	Number of correct letter sequences	CLS
Correct spelling	Thoroughwort	<u>1</u> T <u>2</u> h <u>3</u> o <u>4</u> r <u>5</u> o <u>6</u> u <u>7</u> g <u>8</u> h <u>9</u> w <u>10</u> o <u>11</u> r <u>12</u> t <u>13</u>	13
Incorrect spelling	Toroughwor	<u>1</u> T <u>0</u> r <u>3</u> o <u>4</u> u <u>5</u> g <u>6</u> h <u>7</u> w <u>8</u> o <u>9</u> r <u>10</u> t	10

Here is a more detailed description of the counting CLS for <thoroughwort>:

- 1). Is there space + /t/? – 1 point;
- 2). Is there /t+/h/? – 1 point;
- 3). Is there /h/ + /o/? - 1 point;

This process continued until all borders for each letter were counted. Subsequently, in order to check whether the results were statistically significant, One-way ANOVA and T-test were used.

Chapter IV: Results

Preferred Strategies

First, we will discuss the results of the study referring to the first two research questions:

- (1) Is there any strategy preferred by all learners regardless of the L1 background?
- (2) Do different L1 groups prefer different strategies?

Sixteen distinct strategies emerged as a result of transcription of the interviews. Some of the strategies were adapted from Holmes & Malone's study (2004). They were subsequently grouped into the broader categories of major spelling strategies:

- I. Using rote-memorization;
- II. Using the phonemic route;
- III. Using metalinguistic knowledge;
- IV. Using the visual route.

The strategies are listed in Table 4.

Table 4. Strategies Reported by the Participants

Broad Category	Strategy ID	Strategy	Target word	Example
I. Using rote-memorization	1	Letter rehearsal (when participants rehearsed all or some of the letters of a word).	Scabiosa Scabiosa	"<Biosa> without /i/ means "kiss" in Arabic. I was repeating [Ska] and then [bosa] + /i/ before /o/. "I was just saying each letter at a time like this :[ʒs -sɪ - ʒɪ - bɪ - ʌɪ - ʊ - ʒs - ʒɪ]"
II. Using the phonemic route	2	Overpronunciation (when a student was pronouncing every letter, and was not following IPA)	Sciaenid	"I was pronouncing it as [ʒsɪ-ʌ-ə-nɪd]"
	3	Pronouncing while dividing into parts	Mistletoe	"I do it like syllables, so the

		(syllables). (when a student pronounced a word, or a segment of this word following IPA)		<i>first one is [misl] and then [toe], this is how I memorized it. I was repeating it as [misəl-too]</i> ”.
	4	Pronouncing while dividing into parts (syllables_ partially) (when a participant pronounced a word partially following graphemes, partially following IPA, and dividing it into parts)	Ignimbrite	<i>“I was saying [Ignim- brət]”</i> ”.
	5	Inappropriate pronunciation (when pronouncing a word, a participant would use incorrect sounds, not following IPA)	Thoroughwort	<i>“I was saying [Chro-wort]”</i> ”.
	6	Pronunciation (when a student was pronouncing a word, or a segment of this word following IPA without dividing it to parts (syllables)	Gypsophila	<i>“[sofila] just pronouncing like this.</i>
	7	Mnemonic sentence (When a participant thought of a mnemonic phrase or a sentence and repeated it)	Gypsophila Polybolos Arachnid Isthmuses	<i>“I said Sophia wants <Geb>. In Arabic the car <Jeep> in Egypt we say /Geb/. So, I connected to myself.”</i> <i>“I was flying around isthmuses with my polybolos, and on the islands there were a lot of arachnids”</i> ”.
III. Using metalinguistic knowledge	8	Word analogy (when a participant mentioned a word which sounded or looked similarly to a target word, or a phrase).	Calomel Isthmuses	<i>“Sounds like a word <kalomina>”</i> ”. <i>/Th/, it is like in the word <theme>”</i> ”.

	9	Inflectional or Derivational morphology	Dinghies Scabiosa	<i>"<I consider <dinghy> as a one word, and then I know it is plural, so it is + /es/".</i> <i>"This is a flower right? So, I think /bio/ is the root, I am not quite sure, so I consider /sa/ as a suffix, and /sca/ as a prefix."</i>
	10	Word in a word (a participant finds a word inside a target word)	Dinghies	<i>"<Ding> is a word which I have heard of".</i>
IV. Using the visual route	11	Imagining (printing) letters	Sciaenid	<i>"I was also printing all letters in my head like this: S-C- I-E-N-C-E".</i>
	12	Picture a word in a native alphabet	Polybolos	<i>"I was writing these letters in Arabic alphabet."</i>
	13	Dividing to parts (Visual)	Mistletoe	<i>"I was visualizing by parts: Mist-le- toe"</i>
	14	Picture a word or a letter	Xiphosura	<i>"Totally forgot it, I know the initial /xia/ that is all, just visual, I have this picture in my mind, and it starts with an /x/"</i>
	15	Word origin (when a student was mentioning the origin of a word).	Gypsophila	<i>I know that /phila/ means "love" in Greek".</i>
No reported strategy	16	None	Thoroughwort	<i>"I have no idea, I totally forgot."</i>

Secondly, we looked at the distribution of preferred strategies which were used by all participants (N=37). At this point, we looked at the three categories of words together (Direct+ Silent + Uncommon = 15 words). The results are listed in Figure 1.

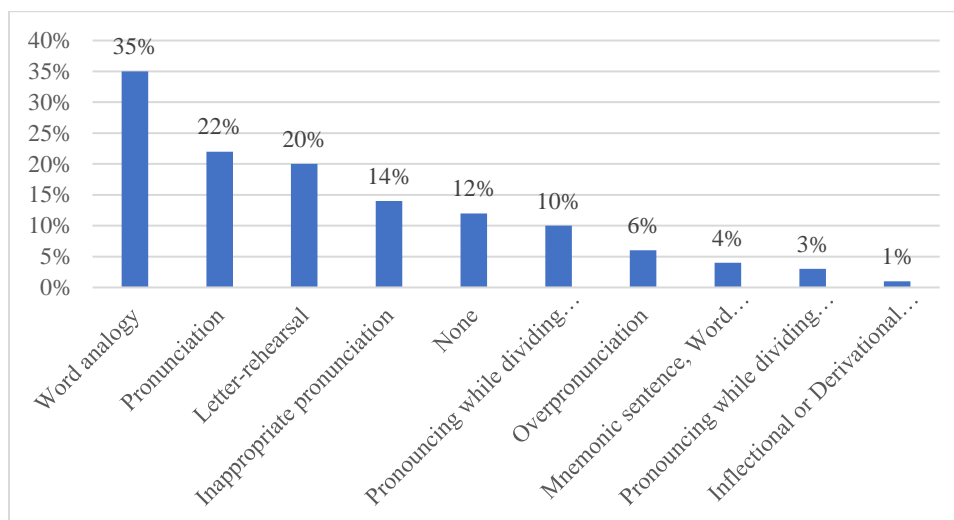


Figure 1. Frequency of Using Strategies

As it can be seen in Figure 1, among all available strategies, word analogy (№ 8) was used in order to remember the spelling more times than any other strategy by the participants as a group. Word analogy can be traced back to the third broad spelling strategy, namely “Using metalinguistic knowledge”. The second most commonly used strategy was Pronunciation (№ 6). It was used 22 % of the time, and it is included in the second broad spelling strategy – “Using the phonemic route”. The third most commonly used strategy was letter rehearsal. It was used 20 % of the time and is included in the broad spelling category – “Using rote-memorization”.

It was also observed that participants preferred different strategies for different categories of words. These results are depicted in Figure 2.

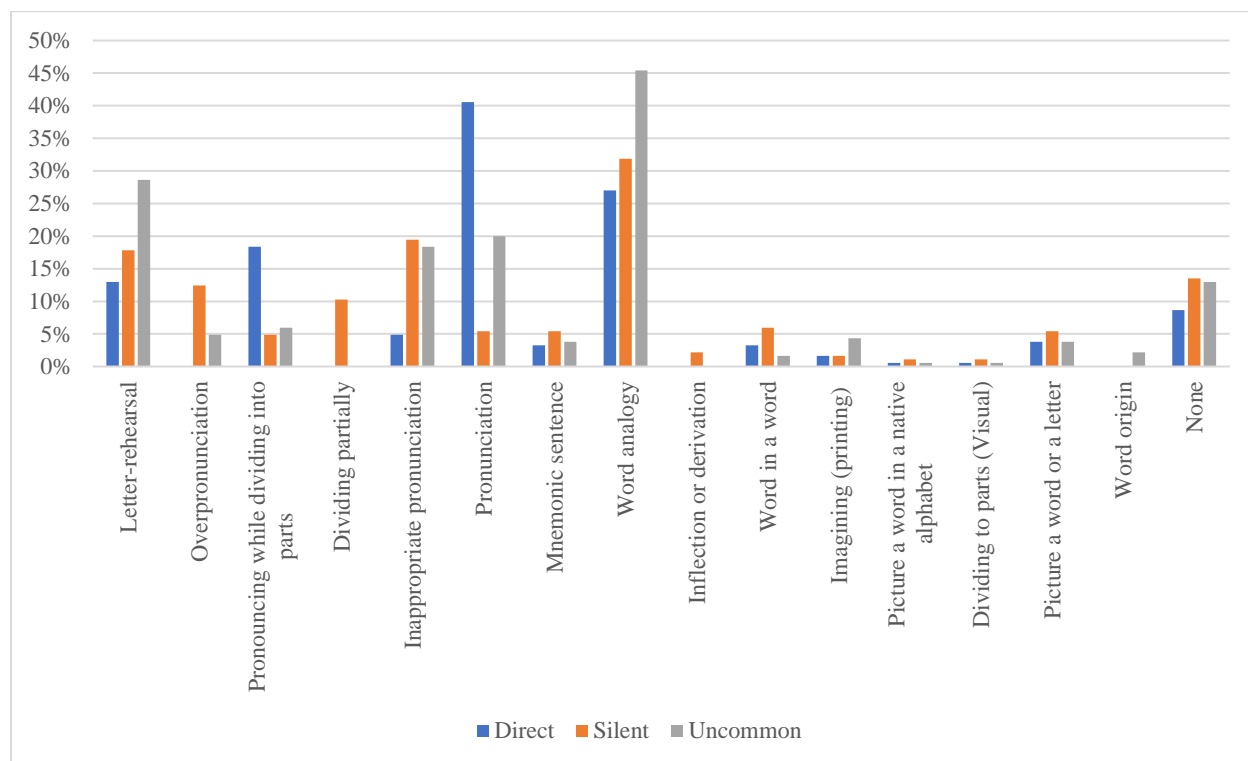


Figure 2. Difference among the Choice of Strategies used for Direct, Silent, and Uncommon Categories

In general, three top strategies which include word analogy, letter-rehearsal, and pronunciation, were used more heavily in comparison with other strategies. Forty-five percent of the time, word analogy was used to remember the words from Uncommon category. To learn the words from Silent category this strategy was used 32 % of the time. Strategy № 6 (Pronunciation) was used 41 % of the time for the words from Direct category.

Thirdly, we looked at each language group to determine which strategy was preferred among its members. The results for the Chinese participants are depicted in Figure 3.

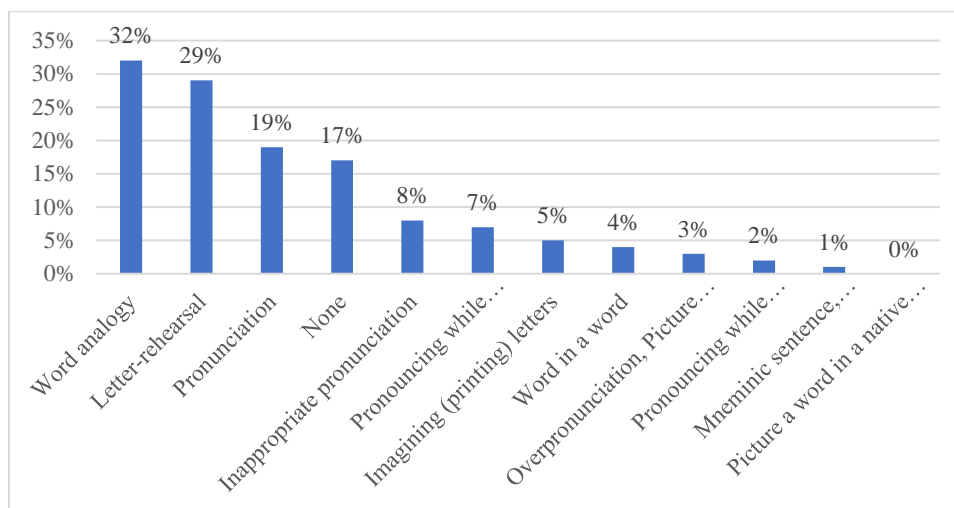


Figure 3. Frequency of Using Strategies (Chinese-speaking Participants)

The rank of the most commonly used strategy has slightly changed within this language group. However, the most commonly used strategy was still № 8 (32 % of the time). The second most common strategy was letter rehearsal, which was used 29 % of the time, and the third most common strategy was № 6 (19 % of the time).

For the Arabic speaking participants, the rank is offered in Figure 4.

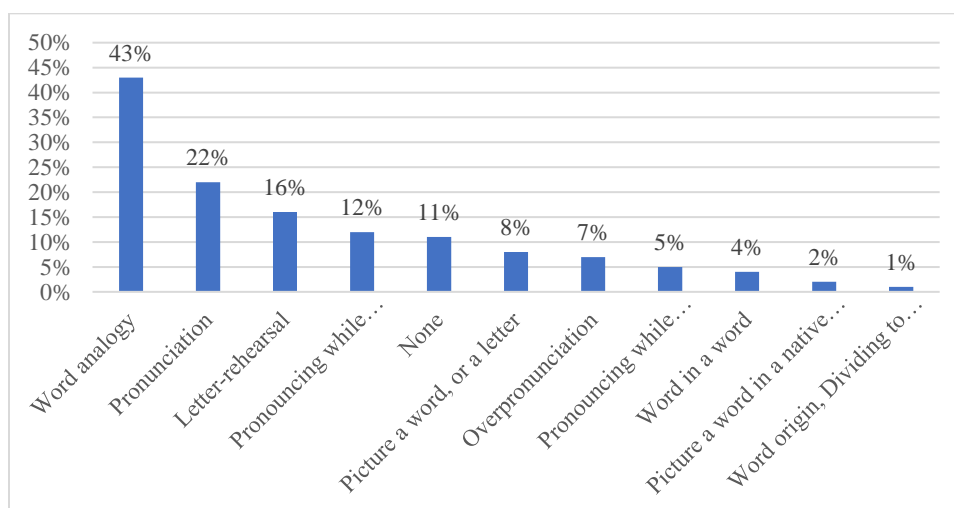


Figure 4. Frequency of Using Strategies (Arabic-speaking Participants)

Within this language group, the same order of ranking the most commonly used strategy which we determined for the whole group of participants is preserved. The three top strategies in a descending order are: Word analogy (№ 8); Pronunciation (№ 6), and Letter-rehearsal (№ 1).

For the French speaking participants, the rank is offered in Figure 5.

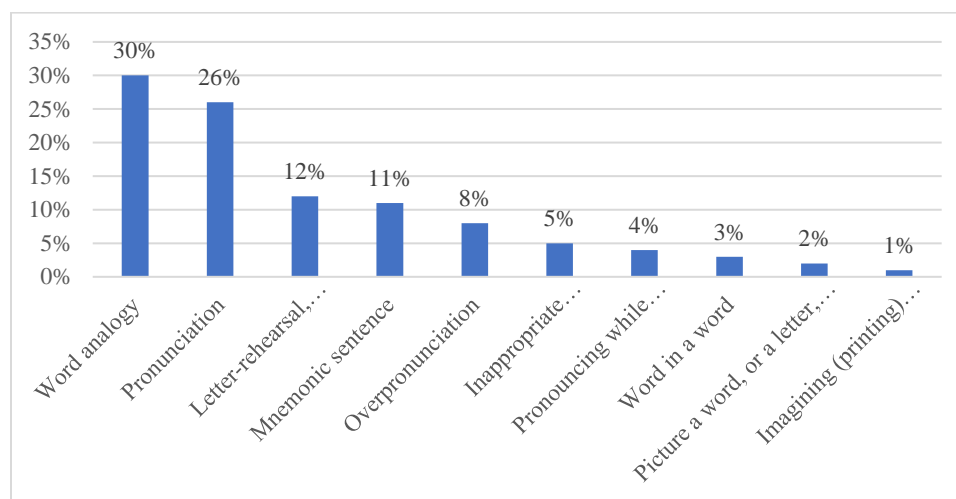


Figure 5. Frequency of Using Strategies (French-speaking Participants)

For this language group, the top three strategies remained almost the same. However, French speaking participants also chose to use the strategy № 3 (Pronouncing while dividing into parts (syllables)), which was the top third commonly used strategy along with letter-rehearsal.

Number of Strategies per Word

Although the variation among the three groups was not big, there were noticeable differences in the number of strategies used per word. For example, Arabic speakers used an average of 1.48 strategies per word, which is higher than the average scores of both French speakers ($M=1.36$) and Chinese speakers ($M=1.34$). In Figure 6 we can see the average number of strategies used by each language group for each category of words.

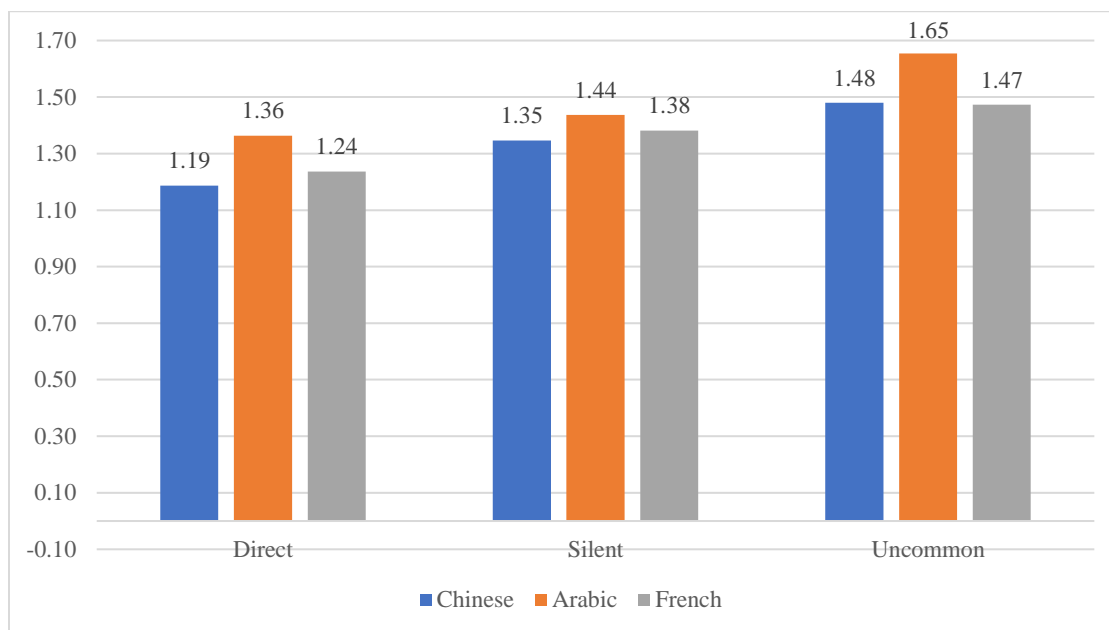


Figure 6. Number of Strategies Used by the Three Language Groups for each Category of Words

In addition, I checked whether words from different categories (Direct, Silent, Uncommon) required a different number of strategies. The results are presented in Figure 7.

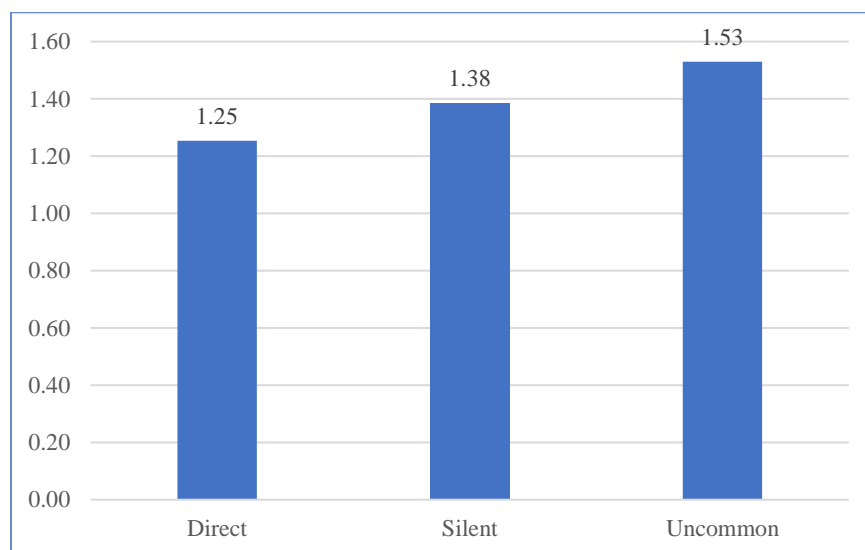


Figure 7. Number of Strategies for Words from Different Categories

Even though the difference is not substantial, there is a clear upward trend in the number of strategies applied for each category of words. On average, words from the first category (Direct) required students to use less strategies (1.25) than the words from the second category (1,38). For the third category of words (Uncommon), participants used the highest number of strategies (1.53).

Accuracy score

When I analyzed the sequence in which the target words were presented to the participants, a statistically significant difference ($t=-2.985$ [36]; $p<.01$) was observed thereby signifying a significant order effect (See limitations for more details).

In Direct category of words, on average French speakers produced 85.2 % of accurate words, which is higher than Arabic ($M=76.2$ %) and Chinese ($M=57.9$ %) speakers did. One-way ANOVA showed a statistically significant difference ($F=5.583$; $p<.01$) among the three language groups. The post-hoc test LSD showed a statistically significant difference ($p<.05$) between Chinese and Arabic groups as well as a statistically significant difference ($p<.01$) between Chinese and French groups ($M=85.3$).

In Silent category of words, the same trend stayed consistent. On average, French speakers produced 77.1 % of accurate words, comparing to Arabic ($M=3.9\%$) and Chinese speakers ($M=57.5\%$). Although one-way ANOVA showed no overall significant statistical difference, the post-hoc test LSD showed that the difference was significant ($p<.05$) between Chinese and French group.

In Uncommon category of words, French speakers again outperformed other language groups producing an average of 76.5 % of correct words, comparing to Arabic speakers ($M=72.2\%$) and Chinese speakers ($M=55.9\%$). One-way ANOVA showed a statistically

significant difference ($F=3.803$; $p<.05$) among the three language groups. The post-hoc test LSD showed a statistically significant difference ($p<.05$) between Chinese and French language groups.

Because the three categories of words behaved in a similar way when compared separately with the language groups, word categories were combined into one group of words. The results showed the same outward trend which was seen before: French speakers produced an average of 79.6% of accurate words which is higher than Arabic speakers did ($M=70.8\%$) who in their turn outperformed Chinese speakers ($M=57.1\%$). One-way ANOVA showed a statistically significant difference ($F=4.851$; $p<.05$) among the three language groups. The post-hoc test LSD showed a statistically significant difference ($p<.01$) between Chinese and French language group. The results can be seen in Figure 8.

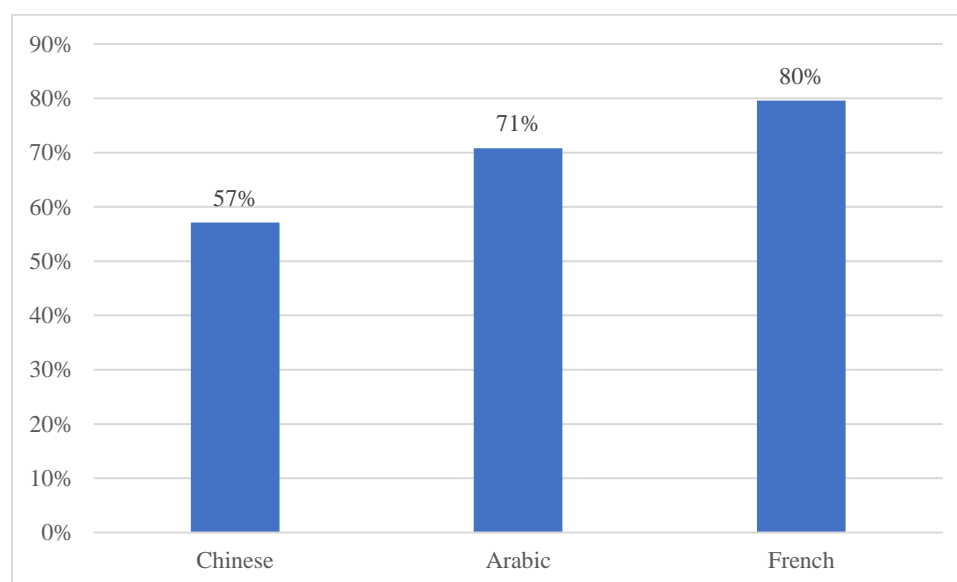


Figure 8. Percentage of Accurately Produced Words (All Categories)

In order to address the last research question (Do different types of orthographic irregularities (silent letters, uncommon letter to sound mapping) affect speakers of different first languages differently?) a T-test was conducted. When I examined each language group's

performance on the three categories of words, a statistically significant difference ($t=2.376$ [10]; $p<.05$) was observed only between direct ($M=76.2$) and silent ($M=63.9$) words for Arabic speakers.

Chapter V: Discussion and Pedagogical Implications

The findings of this study showed that an L1 writing system seemed to influence the spelling process in L2 acquisition. There were variations in the choice of spelling strategies which were observed among participants from different language groups. The accuracy score of each group also suggested that similarities between L1 and L2 writing systems might provide advantage to learners in terms of acquiring spelling.

Top Common Strategies Used by all Language Groups

This study revealed some interesting tendencies about spelling strategies used by the Chinese, Arabic, and French participants. The results showed that word analogy (ID № 8), pronunciation (ID № 6), and letter-rehearsal (ID № 8) were used more times than any other strategies by the participants as a group. Our findings suggest that regardless of the native language, word analogy was used 35 % of the time, pronunciation was used 22 % the time, and letter-rehearsal accounted for 20 % of the time. Thus, we found that word analogy was the most commonly used strategy among participants from all language groups.

This is what the process of using word analogy looked like. When employing this strategy, students usually thought of some other words or phrases which were similar (either phonologically or orthographically) to the target word. For example, this answer was coded as a word analogy: “This is kind of like a word <science>” (talking about <sciaenid> from Uncommon category). Here is one more case of using the strategy: “This sounds like <kalomina>, it is a word in Arabic” (talking about <calomel> from Direct category).

There are two important distinctions to be made about the responses coded as a word analogy. First of all, they can be at least two types: visual (the spelling of the target word is similar to the spelling of another word), or phonemic (the target word sounds like some other

familiar word). As we assume, two of these types draw on different major categories of spelling strategies: the former class is using the visual route, and the latter class is using the phonemic route.

During interviews, the participants sometimes provided rather straightforward explanations about the nature of their analogy, so we had no doubt if they used their visual skills or phonemic ones. However, some of the participants' answers were unclear. I tried my best to ask additional questions in order to code their answers according to the nature of analogy. Unfortunately, the majority of the participants did not provide clear answers, and since precautions of not giving any potential clues for possible strategies were taken, one spelling strategy was created for both types of analogies: phonemic and visual ones.

There is one more distinction in word analogy which stood out during the coding process, namely the origin of the word which participants thought was similar to the target word. The overwhelming majority of participants used English as the language they draw their analogies from. However, there was a small number of learners who found some similar words in their native language, or other foreign languages they were familiar with. Since almost all of the participants were making analogies based on English words, it was not found useful to divide this major strategy into two sections based on the origins of the analogy words.

Research shows that memory is best when information is encoded in a meaningful and structured manner (Bower, Clark, Lesgold & Winzenz, 1969). It was observed that while using word analogy or mnemonic sentences, participants were trying to create some kind of logical clues which would help them to remember the spelling. They were memorizing a word by looking for familiar chunks in the target words and were trying to make sense of strings of letters instead of learning each separate letter. For instance, a large number of participants were

memorizing the word <sciaenid> by using the word <science>. One more example of such meaningful encoding of spelling can be illustrated through the following answer (Strategy № 7. Mnemonic sentence): “I also used a story to remember: we were on dinghies, and we left the scabiosa on island, and there were xiphosuras in the water”. This student connected all three words from one set into one narrative which was repeated in order to remember the spelling. We think that these results can be partly explained by the above-mentioned findings about the memory and encoding processes.

We could also see which strategies were rejected by the participants. Ten out of sixteen strategies were used less than 10 % of the time. Among these strategies we can define bigger categories, namely visualization and using knowledge of etymology. Only about 4 % of the time, the participants used visualization techniques, and 1 % of the time they used their knowledge of origins of the words.

Top Common Strategies Used within each Language Group

The results showed that the rank of the most commonly used strategies among the participants in one language group was almost the same for the Chinese, Arabic, and French speaking groups, and therefore resembled the ranking for all language groups together. The top three most frequently used strategies in descending order were (for three groups together): word analogy (№ 8), pronunciation (№ 6), and letter-rehearsal (№ 1).

For the Chinese group of students, the ranking of the strategies was slightly changed with word analogy remaining in the first place (32 %), and letter-rehearsal (29 %) being used more often than pronunciation (19 %). This finding confirms the results of other studies which we previously mentioned (Koda 1987; Holm & Dodd 1996; Jackson et al, 1994). It was noticed that

logographic readers do not heavily rely on phonological information, and thus it was not surprising for us that they used the phonemic route less than other two top strategies.

However, our results also showed something was not anticipated. I expected this group of students mostly to use their enhanced visual memory. It was found that Chinese learners transfer this ability from their L1 (Koda, 1987, Wang & Geva, 2003). Yet, the results showed that Chinese-speaking participants used the visual route only 5 % of the time. At the same time, the findings of this study cannot clearly attest the lack of visual strategies since the word analogy strategy could be mostly visual for this group of students. Unfortunately, it was not clear in this research' results since there was no distinction between phonemic and visual word analogy.

I also expected this group of students to rely on rote-memorization strategies. Research confirms that this type of techniques is quite popular among Chinese students (Wang & Geva, 2003). I found that, indeed, the letter rehearsal strategy, which is included in a broad category of rote-memorization, is the second most commonly used strategy for this group (29 %). Other language groups did not use this strategy as much as the Chinese group did: Arabic-speaking participants used letter rehearsal 16 % of the time, whereas French-speaking learners used it only 12 % of the time. Therefore, it was discovered that Chinese speakers relied on rote-memorization more often than the other participants, which may be attributed to memorization skills which could be transferred from their L1.

For the Arabic-speaking learners, the rank of the most commonly used strategies remained unchanged from the order we observed to be valid for all groups of students assessed together. However, the number of times which can be attributed to the usage of word analogy is much higher for Arabic speakers, and it accounts for 43% of the time, comparing to Chinese (32%) and French (30%) speakers.

Arabic-speaking learners have both opaque and transparent orthography in their native language, and they become literate using both of these systems. Some studies suggest that reading in an opaque writing system in L1 can prompt students to use rote-memorization which is necessary in order to remember strings of letters with no direct phoneme-grapheme correspondence (Ryan & Meara; 1992, Ryan, 1997). Users of transparent orthography, on the other hand, rely more on pronunciation. These considerations made it difficult to predict which strategies would this group of participants prefer. As we saw from the ranking, more Arabic speakers preferred the phonemic route over rote-memorization.

In the ranking of the top strategies for the French-speaking students, the order coincided with the arrangement which was in place in the Arabic group, and all language groups together. Word analogy was used 30 % of the time, while 26 % of the time was accounted for pronunciation strategy. The place of the third most commonly used strategy was divided between letter-rehearsal (12% of the time), and pronunciation while dividing a word into parts (12 % of the time). These results suggest that French students applied pronunciation more often than other two groups. Since the French language uses opaque orthography, it was interesting to see whether this fact would affect the choice of strategies in this group and prompt students to use rote-memorization. However, it was found that using pronunciation was more prominent for the members of this group.

Accuracy Scores

The accuracy scores of the three language groups were arranged in the anticipated direction based on the similarity of L1 writing systems of the participants and the English writing system. The results showed that French-speaking students produced significantly more correct spellings compared to the other two groups. It may be attributed to the obvious similarities

between French and English writing conventions. These findings also support the conclusion made by de Groot (2006). He found that similarities between one's native orthographic system and the L2 orthographic system provide a certain advantage to learners. The results of this study showed that French speakers, indeed, may have benefited from the similarities between the French and English writing systems. The Arabic orthography has more similarities with the English orthography than the Chinese writing system, which could also be one of the reasons for Arabic-speaking participants outperforming Chinese-speaking learners in spelling the target words.

Even though we can see a certain trend in our results regarding accuracy, namely Chinese speakers produced fewer correct words than Arabic learners did, and Arabic speakers produced fewer accurate words than French learners, the difference was found statistically significant mostly for one pair among the groups: Chinese versus French.

Results of the Arabic speaking group seemed rather interesting to me. It was discovered that they are statistically better than the Chinese group in memorizing the words from the only category - Category 1 (Direct). Notably, this very category seemed to be statistically easier for Arabic speakers than the other two categories of words. These results suggest that Arabic speakers are more successful than Chinese speakers in spelling orthographically transparent words, and these learners are producing more accurate answers for this type of word than they do for words with silent letter(s). Since the words from Direct category can be easily pronounced in comparison with the words from Silent category, it seems that this fact could have made the difference for Arabic speakers. We could further assume that English words with transparent letter-to-sound correspondence are easier for Arabic speakers in terms of spelling.

For Chinese participants, we did not see any statistically significant difference among their accuracy rate for words from Direct, Silent, and Uncommon categories. It seems that all words were equally difficult for them. Thus, the division of the words into transparent and nontransparent did not play any role for the accuracy rate of this group of participants.

Number of Strategies Used by the Participants

I also looked at the number of strategies which the participants used to memorize every word. First of all, we will look at three categories of words, and the number of strategies which learners used to memorize the spelling for the words of each category.

The results suggest that there is a slight difference in the number of strategies which were used for transparent words (Direct) and their nontransparent counterparts (Silent, Uncommon). For the words from Direct category, Chinese speakers used on average 1.19 strategies, which is lower comparing to Arabic (1.36) and French learners (1.24). For the words from Silent category, these numbers slightly increase: Chinese learners used 1.35 strategies per word, while Arabic and French participants applied 1.44 and 1.38 strategies respectively. For the words from Uncommon category, the increase in the number of applied strategies can be observed again with Chinese students reporting 1.48 strategies per word, and Arabic and French students using 1.65, 1.47 strategies per word respectively. These numbers suggest that in order to remember nontransparent words, our participants used slightly more strategies than for transparent words. Such findings can imply that there is an inherent difference between the three categories of words in terms of their difficulty. Since all participants consistently used more strategies to remember nontransparent words, it seemed that their mental processes required more effort when memorizing this group of words.

We also found that Arabic speakers used slightly more strategies than the other two language groups. On average, these learners used 1.48 strategies per word, comparing to Chinese (1.34) and French (1.36) participants. This data suggests that Arabic speakers might have been processing spelling on a deeper level compared to the other two groups, which seemed to rely predominantly only on one strategy per word.

Teaching Implications

One of the important questions we wanted to talk about was how spelling should be taught in ESL classrooms. Some studies suggested that, unfortunately, many English teachers, especially the novice ones, have difficulty when assigned teaching this skill (Adoniou, 2014). We found that it might probably be due to the fact that there are many controversial points of view when it comes to teaching spelling.

Misty Adoniou talks about different assumptions in approaching the teaching of spelling (2014). Some believe that the ability to spell is innate, thus adherents to this theory think that being exposed to reading is enough to learn how to spell. However, there is evidence that spelling is much more difficult than reading (Bosman & Van Orden, 1997). Similarly, Margaret Peters (as cited in Westwood, 2015, p. 3) thought that the English orthography is so inconsistent that it does not seem wise to break words down into syllables and sounds. She thought it would not really help with learning unfamiliar English words. On the contrary, she concluded that, first and foremost, spelling is a visual skill. Some of the strategies for learning spelling she emphasized were deliberate concentration with a focus on remembering letter patterns. Gabarro (2011) concluded, “Good spellers recall a mental image of a word when they think about how it is spelled. So, when they write down a word they are actually just copying it from the image previously stored in their mind” (p.5).

The results of our study showed that the participants, indeed, used the visual route for memorizing spelling. However, these strategies were used only 3 % of the time. Chinese students, who I expected would mostly use visualization due to the specifics of their L1 orthographic system, applied the visual route when learning the spelling only 5 % of the time. However, since it was not possible to isolate a visual analogy from word analogy strategy, probably, the usage of the visual route could be higher for our participants. One can assume that if spelling depended only on visual memory extensive reading, which would provide constant exposure to orthographic patterns, would be sufficient to ensure that one is a good speller. However, there is research which proves this hypothesis wrong (Hayward & Phillips, 2012).

The schools related to behaviorism suggest using rote-memorization and repetition in order to learn spelling. Templeton and Morris (1999) conclude that these two strategies also perceive the spelling process as a visual skill of making strings of letters devoid of meaning. There are spelling techniques which follow this theory. For example, “look cover, write, check” is a popular activity to learn spelling along with similar exercises in which words are presented in different colors and fonts. These strategies presuppose that learning to spell in English is a visual skill. Subsequently, many teachers believe that spelling could only be learned through memorization.

Other researchers think that spelling is primarily dependent on our auditory skills, namely our ability to match sounds to their corresponding letters. Westwood (2015) supports the fact that our ability to use phonic knowledge is of crucial importance for the development of reading and spelling skills. The results of our study showed that pronunciation was used 22 % of the time by all participants as a group. Within the French and Arabic speaking groups, pronunciation was the second top strategy which was used 26 %, and 22 % respectively. However, it was used

significantly less often by our Chinese group (19 %). Thus, we can assume that a native language might have played a role in the choice of spelling strategies associated with the phonemic route. The participants from alphabetic backgrounds (Arabic, French) used the phonemic route more often than the participants from a logographic background (Chinese).

The third group of researchers claim that efficient spellers not only rely on the visual skills, but incorporate many other elements, such as using pronunciation, etymology, and morphology (Bowers & Bowers, 2017; Daffern, 2017). Our research showed that the participants used a quite limited number of strategies. On average, Arabic students used 1.48 strategies per word, which is more than Chinese (1.34), and French (1.36) students did. We think that this is an important finding for teachers suggesting that most of the time students primarily rely only on one strategy instead of employing a variety of them. Such exclusive dependence on one unique strategy may lead to the following difficulties with spelling: for instance, visual learners might remember all letters in a word, but they would reproduce them in the incorrect sequence, whereas learners who use the phonemic route might spell the word <delicious> as / deleshous/ because this incorrect spelling would sound correct to them. These examples support the research suggesting that a successful speller uses a variety of different spelling strategies.

It is said that English orthography is rather consistent when it comes to expressing meaning through morphemes. It is more regular at this level than at the phoneme level (Devonshire & Fluck, 2010). However, teaching phonics is still the most prominent method for educators when it comes to teaching literacy. Thus, teachers emphasize phonics instruction and ignore morphology training. I thought that if orthography is more regular at the morpheme level, learners would benefit from explicit instruction.

Our research showed that Arabic, Chinese, and French-speaking learners look for connections between target words and other words which are familiar to them when using word analogy. They divide words into meaningful segments. This process constitutes the nature of the word analogy strategy in which participants were looking for familiar strings of letters and linking them to words they knew. Since we observed that our participants were finding connections between words on their own, we think that it might be beneficial to build on this tendency by teaching phonics along with morphology and etymology.

Unfortunately, as Bowel notes in his article, it is rarely considered an option to teach phonology together with etymology and morphology even though existing research has provided evidence that such comprehensive teaching curriculum is an effective approach in teaching literacy skills (Nunes et al., 2003). As Westwood (2015) concludes in his article, the spelling process relies on a combination of information, including visual and auditory data. He argues that it is not wise to focus only on one of these dimensions when learning spelling, but it is better to use all of these resources simultaneously. However, as studies show, phonological knowledge still prevails in spelling curriculums over other linguistic knowledge (Adoniou, 2014)

Chapter VI. Limitations and Further Research

One of serious limitation of this study was the inability to make a clearer description for the top used strategy, namely, word analogy. Since the researcher avoided providing any kind of detailed prompts to elicit participants' answers during interviews, it was not possible to distinguish between phonemic and visual analogies. I was trying to minimize the outcome in which a participant reports a strategy s/he did not actually use, but confirms its usage after a researcher suggests it to him/her.

The second significant limitation of this study relates to the selection of the participants. I did not control for their proficiency level in English, which might have influenced the results. According to Schmitt (2007), there is a difference between strategies which are chosen by students of various proficiency levels in English. He concluded that beginners usually use simple memorization, or repetition, whereas intermediate and advanced students more often prefer to use their imagery. Thus, the ranking of the most commonly used strategy might have looked differently depending on the language competency of participants. This variable might be used in further research and lead to more accurate results. Will beginner students across different language groups indeed choose memorization over imagery, and which strategy would advance students prefer?

The difference in the proficiency level of the participants and its effect on their performance might somehow explain the disparity among accuracy scores which exists within each language group. We saw Chinese participants who managed to reproduce 11-13 correct spellings. At the same time, there were people in this group who could produce only one correct spelling. The same fact is true for the Arabic and French language groups in which we could observe both excellent performance with total of 13-15 accurate spellings, and quite a poor one

with only two or three correctly spelled words. According to the existing research, the influence of L1 in the spelling process becomes less obvious and important for an ESL learner as he becomes more competent in L2 (Saigh & Schmitt, 2012). This fact could explain the vast divergence among accuracy scores of participants from the same language group. This discrepancy among scores could be different depending on the proficiency level of the participants. This analysis could be taken into consideration for further research on this topic.

The third limitation lies in the inherent variability among the participants. As research shows, the choice of vocabulary learning strategies is interrelated not only to a proficiency level, but also to other factors such as motivation (Schmitt, 2000). Excellent accuracy scores of some of the participants might have been due to such idiosyncrasies, and not related to their native language. Every participant had his own learning style. It is said, “The more cognitive energy a person expends when manipulating and thinking about a word, the more likely it is that they will be able to recall and use it later “(Schmitt & McCarthy, 1997, p. 3). Therefore, the spelling score which was calculated for every language group could have been affected not by the idiosyncrasies of this group as a whole, but by the individual differences of each participant.

It was also observed that the interference tasks which were presented as math problems might have worked differently for the individual language groups. Usually, Chinese participants solved the problems more quickly than the other two language groups. I thought that since they were spending much less time on these tasks than other participants, they could have been rehearsing the target spellings during the rest of the time which was designated for the interference task (20 sec.). Thus, they could have had more time for memorizing the spelling than other learners, which could have affected the results of this study. Future research could take this problem into consideration.

The fourth limitation of this study relates to the number of participants. With a larger pool of subjects, some of the individual characteristics of each participant, such as motivation, proficiency level, etc., would not significantly influence the results. In this study, statistical tests consistently show significant difference for two groups Chinese and French ones. However, the results of the Arabic group of students are statistically significant only for one group of words (Direct). It would be interesting to see with larger number of participants whether the Arabic group would be statistically significant from the other two groups in other categories of words.

The fifth limitation for this study relates to the choice of the target words. Although I did my best to find words which would not prime students to use certain strategies, some of the words contained segments which could be familiar to students. For example, the target word <Thoroughwort>, which was in Category 3 (Uncommon), has a segment /Thorough/ which many students identified as being similar to the word <through>. Thus, a lot of students chose the top strategy (word analogy) to memorize this word. This is the full list of words which had the similar problem: Polybolos (the segment <poly>); mistletoe (two segments: <mist> and <toe>); dinghies (the segment <ding>); lagniappes (the segment <lag>); isthmuses (the segment <muse>); xiphosura (the segment <sura>); thoroughwort (the segment <thorough>). In addition, only two words were presented in their plural form, namely <dinghies> and <lagniappes>. This is why, it was logical for participants to use one of the strategies (№ 9 Derivational morphology) only to learn these two words.

The other major limitation relates to the process of randomization. T-test showed the significant order effect based on the comparison of the participants' performance on the first five and last five items. However, the slide show was organized in such a way that the first five and

last five items included the same categories of words. The items were randomized in this way, but were displayed in the same order to the participants. The previously mentioned results of the statistical tests suggest that the learners performed better towards the end of the test comparing to their performance in the beginning of the test. For future research, this may be taken in the consideration so that it would be possible to avoid the order effect.

The results might also have been influenced by some technological issues, such as timing each step of the experiment. Since the timing was done using a stopwatch and was mechanically controlled by the researcher, some students might have had a one to two second advantage. Automatically designed time frame in PPT would solve this problem.

And lastly, I have not done any error analysis when coding the spelling produced by our participants. Such data could have shed light on the possible difficulties which were experienced by each group of students which could be detected by looking at specific errors committed by participants. Further research could take this into consideration.

Chapter VII: Conclusion

This study has attempted to discover how an L1 orthography might influence the spelling process in English. Similarities and differences of the Chinese, Arabic and French writing systems with English writing conventions were analyzed in order to address several research questions.

Firstly, the most commonly used spelling strategy was determined. It was found that all learners, regardless of their native language, preferred to use word analogy in order to memorize the spelling of newly-learned English words. This strategy was also a top one within each language group. We thought that these findings could be useful for ESL/EFL teachers for building a strong spelling curriculum which can scaffold on the skills our students already possess.

Our results confirmed that characteristics of an L1 writing system might influence learners' experience of processing spelling in L2. According to our findings, it seems that the more similar an L1 orthography is to the English writing system, the more advantage the learners coming from this orthography have in terms of the spelling process in English. This study shows that French speakers were the most accurate in producing spelling in English while Chinese students were the least successful in completing this task. Arabic speakers consistently produced more correct words, but this group of learners was statistically better only in writing transparent words comparing to the Chinese-speaking learners. These findings suggest that the more apparent similarities between the Arabic and English orthography might have provided a certain advantage to the Arabic group over the Chinese group.

The findings of this study support the idea that L1 writing traditions have influence on the learning of spelling in English. Other languages, such as Japanese, or Russian which have

obvious differences with English orthography in terms of writing can also be studied in the future in order to provide some more evidence for the phenomenon at hand.

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Appendix A: Consent Form

Title: What strategies do learners use to remember the spelling of newly learned words?

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Telephone: (320) 298-5533

Introduction

Learning vocabulary in a foreign language is an essential step of becoming proficient in this language. There is a lot of knowledge involved in learning every single word: what is the meaning? What is its part of speech? How is it spelled? etc. This study is about learning spelling in English.

The orthography system in English is not an easy one. There are words with clear grapheme-to-letter correspondence, such as the word <cat>. Each letter has one sound. This is why, this type of words usually does not cause any problems for students in terms of learning the spelling. However, there are such words as <enough>, in which the three letters at the end of the word represent only one phoneme. There are a lot of words in English with such unusual letter-to-sound mapping, and memorizing their spelling oftentimes require students to use various strategies.

In this study, we are interested to see how students from Chinese, French, and Arabic writing traditions, which differ to various extents from English orthography, will learn the spelling of English words.

Purpose

In this project, we are trying to find out which spelling strategies do students use in order to remember the spelling of newly learned English words.

Study Procedures

To do this, we are inviting you to participate in a test followed by a short interview. It will take about 40 minutes – 1 hour to complete the test and the interview. Even though you are participating in language tests, we are NOT testing you. We are interested in learning which strategies work for you when you learn spelling.

Benefits

Benefits from this study include gaining more information about learning spelling in English. These new insights can also influence the teaching process of spelling by getting to know which strategies are actually used among the participants from the target language backgrounds, and which strategies are effective for the above-mentioned group of students.

Risks

There are no foreseeable risks anticipated in the participation of this study. This is NOT a test of your ability, and there is no personal risk.

Confidentiality

You will be audio-taped during the research process, however the confidentiality of the information gathered during your participation in this study will be maintained. Your personal identity will remain confidential. You will not be identified by your name in any published material. All data will be kept in a file cabinet in a locked office. Your name will NOT be used in data analysis and report. The result from the research may be presented or published (Your name will NEVER be used.).

Voluntary participation/withdrawal

Your participation in this study is voluntary. You may withdraw any time. Even if you decide not to participate, it will NOT affect your relationship with the researchers or the university. Also, your participation will NOT affect your grades in any class.

Contact information

If you are interested in the obtaining a summary of the results of the study, or have additional questions later, please feel free to contact the researcher Sofiia Logvinenko at sglogvinenko@stcloudstate.edu, or her advisor, Dr. Choonkyong at ckim@stcloudstate.edu. You will be given a copy of this form for your records.

Acceptance to participate

Your signature indicates that you are at least 18 years of age, you have read the information provided above, you acknowledge that you will be audio-taped, and you have consent to participate. You may withdraw from the study at any time without penalty after signing this form.

Subject Name (Printed):

Subject Signature:

Date:

Appendix B: Math Problems Used for Interference Tasks

1). $3 \times (4-2) + 2 = ?$

2). $14 - 3(6-4) = ?$

3). $2 \times (10 - 5) + 55 = ?$

4). $(22+8) \times 3 - 5 = ?$

5). $10 \times (3-8) + 20 = ?$

Appendix C: Response Sheet

Name: _____

I

1. _____

2. _____

3. _____

Math answer: _____

II

1. _____

2. _____

3. _____

Math answer: _____

III

1. _____

2. _____

3. _____

Math answer: _____

IV

1. _____

2. _____

3. _____

Math answer: _____

V

1. _____

2. _____

3. _____

Math answer: _____

4. _____

5. _____

6. _____

Math answer: _____

Appendix D: Example of a Transcribed Interview

R: “Here is just one question: How did you remember? Let’s start with the first word. What did you do, in your head?”

P: “I tried to visualize the image and combine with the word at the same time, and try to spell the word in my head, but not in English as I should like, I just pronounced it in my head like in French.”

R: “Can you do it for me, so I understand how exactly you did it”.

P: “I was pronouncing it: [mistletoi], like with the French accent, so I can remember how to write it”.

R:” Ok, alright, what about this word?

P: “Oh, this word, I when the spelling is confusing in my head, I cannot remember because I did not like. The word is seems like a lot of words in French, so it created a lot of confusion”.

R: “Ok, so you have similar words in French?”

P: “Yes”

R: “Which ones?”

P: “Same like Caramel, Comet, so that is why I could not remember.”

R: “But when you were remembering what were you doing?”.

P: “I was trying to pronounce it in my head in French. The thing is when you have many words from the same like, with the same spelling, you kind of confused”.

R: “Ok, what about this one?”

P: “This one, I like made a combination of two words in French to remember: <sciatic>, this is the kind of ... in science, so I just cut a word in two parts, so it is means birds, they have their home, this is why I can remember, <nid> is about birds, and I also remember that it is referring to a fish. At the first time I would try to pronounce it in French”.

R: “So, what about this word?”

P: “(*Scabiosa, pronouncing this word*) I just focusing in the spelling in my head, I just pronounce it in French... Scabios... For me, when I feel comfortable with the spelling I can easily remember the word. Even if I did not know the word, I can pronounce it easily, not like <Xiphosura>, < Scabiosa> it is easy”.

R: “Ok, so what about this one? (*pointing at the word Xiphosura*)”

P: “(*Xophosura, trying to pronounce it*) I was trying to remember but as I said, it is kind of similar to many words in French, when these other words came out in my head it became confused for me. Because it is like <xenophobe>, I don’t know, it is kind of confusing. (*Xophosura, trying to pronounce it*), I tried to link them because when I saw the word, I, I don’t know, I was visualizing another animal in French, but it has another spelling, this is why I was confused, I don’t know, I don’t remember the exact word in French, but it is similar to another word in French, and I had a vision of an animal in my head”.

P: “Ok, I see, what about this one?”

P:” Ding, that was kind of awkward, because in my head it is boat in English, and (*trying to pronounce Dinghies*) this, I was pronouncing it, but I did not get right spelling’.

R: “Ok, let’s see, this word, you got it right.”

P: “... (*pronouncing falarica*) I was trying to visualize and to add with the word, because it is easy to pronounce, falarica it is same like in French, the spelling is easy, I got the like, when the word is not easy to pronounce, you got to retain it easily, but if it is difficult to pronounce the spelling will be difficult for you. It is easy for me to say Falarica than <Lagniappes>, or <Gyphsophila>”.

R: “Ok, let’s talk about this one”.

P: “(*pronouncing Lagniappes*)”.

P: “Yes, almost correct. What did you do? Because you remembered a lot”.

P: “(*pronouncing Lagniappes*). I visualize the chocolate, like the kind of chocolate. The image, I tried to made a combining between the image and the word, like let’s see, I guess just put in my head like if you see something like chocolate it is lagniappes, yes and I also to pronounce it *Lagniappes, Lagniappes, Lagniappes*”.

R: “Here, yeah, you got it right”.

P: “(*pronouncing Arachnid*) I already was, this is not my first time to see this word, so I did know this word before, *pronouncing Arachnid*, in French, it is kind of, I don’t know if it is about the same, but I know that I already know this word, *pronouncing Arachnid*, and there are many French words (giving other examples of French words), so it was easy to remember”.

R: “Ok, what about this one?”

P: “Yes, (*pronouncing polybolos*), I cut the word in two parts, <poly> is in French poly, and <bolos> is also, we have this expression in French, but it is not formal, so, <bolos, bolos>, you can call a boy like this, but it is not formal. So, I made a combination to remember: poly and bolos. And I also visualized the image: polybolos, and also because on the picture there are two parts, and poly means two, multiple, so it was easy to remember. Poly means more than two”.

R: “Ok, and the last one, you also got it right”.

P: “(*pronouncing isthmuses*) I was pronouncing it, it as <muse>. I just cut the word, like I did with polybolos, and /Isth/, I did not know, and I was just saying it in my head, and muses, we have in French, it is muse, like *ma muse (pronouncing in French)*, yes, I was just retaining this part (isth)”.

R: “Ok, so and the last one, this one”

P: “Oh, this one, it was confusing for me, it was like I was pronouncing in my head like (*pronouncing Thoroughwort*), this is why I made, it was like what I said, if I have a good pronunciation in my head, it is easy for me to write the word, but if the way I pronounce it is not a good spelling, so for the word...the way I am listening, and I understand the word, will be the way I write the word. I also divided this word, but I made a mistake because I was referring to <through> in English, but it is not the same, this is why I made a mistake”.

P: “And this is, I was not sure and I put the /s/ in the end. (*pronouncing zufolo*) I was visualized the color of the stone, I don’t know if it is the stone, but I see the color, and something red is about zufolo, I don’t know the word, but I know it is something Zufolo, Zufolo, and I get confused in the end, because I was pronouncing it as Zufolos. This is why I put the /s/ in the end”.

R:” Ok, and the last one, you got it right.”

P. “I just tried to memorize the spelling. Like Ignimbrite, Ignimbrite (*pronouncing the word*), repeating constantly in my head, because I don’t know the word, it is my first time to see it, so I was like Ignimbrite, ignimbrite”.