THE EFFECTS OF CONTEXT, VOICE, AND VOWELIZATION ON THE WORD RECOGNITION SPEED, ACCURACY, AND COMPREHENSION OF L2 ARABIC READERS AT DIFFERENT PROFICIENCY LEVELS

YAHYA ALJOHANI

A DISSERTATION SUBMITTED TO THE FACULTY OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM IN LINGUISTICS & APPLIED LINGUISTICS YORK UNIVERSITY TORONTO, ONTARIO

MAY 2022

Abstract

The present study focuses on the effects of context, grammatical voice (hereafter, voice), and vowelization on the word recognition of L2 Arabic readers at different proficiency levels. It examined the role of different context and voice conditions and different types (amounts) of vowelization usage in Arabic word recognition and their effects on L2 Arabic learners' word decoding speed, accuracy, and comprehension at different stages of L2 Arabic acquisition. The study used Arabic verbs whose active and passive forms are heterophonic homographs, that is, forms that differ in their pronunciation, while their letter orthography in the Arabic writing system remains identical. The use of different contexts and voice conditions and different types of vowelization with such verbs provides important insights about the role of context, voice, and vowelization in L2 Arabic reading. Forty-eight English-speaking L2 learners of Arabic were recruited to perform two tasks: 1) reading aloud Arabic verbs that are differently vowelized (fully, partially, and non-vowelized) with and without context, and 2) selecting their correct meaning. Participants were also interviewed to answer a few questions about their thoughts and preferences regarding the use of vowelization in Arabic. The findings of this study showed that while context had no effect on the reading speed and accuracy of all proficiency groups, it enhanced their reading comprehension. The study also showed that voice greatly affected the reading speed, accuracy, and comprehension of all groups of L2 Arabic readers. Partially vowelized and unvowelized active verbs were read faster and more accurately and were understood better than were passive verbs. Lastly, the study findings showed that vowelization improved the reading speed, accuracy, and comprehension of all groups of L2 Arabic readers. Particularly, partial vowelization was found very beneficial for the accuracy and comprehension

of L2 Arabic readers. The theoretical and practical implications of the study's findings are

discussed in light of recent research on L2 Arabic word recognition.

Acknowledgement

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Arabic is one of the most common languages in the world, and it is the official language of 27 countries. It is also the language of the Quran (the holy book of Muslims), which makes it an important language not only for Arab people but also for non-Arab Muslim people. Many non-Arab Muslim people are motivated to learn Arabic as a second language because they want to be able to read and understand the Quran. Religious purposes were found to be the most frequently reported reasons for motivating non-Arabic speaking students to learn Arabic as a second language at King Saud university in Saudi Arabia (Alshehri, 2019). In addition, learning Arabic as a foreign language is gaining more popularity for different reasons (e.g., political, economic, and educational) in many different countries (Al Midhwah, 2018).

L2 Arabic research is limited as compared, for example, to L2 English research (Share, 2008). Although there are many aspects of L2 Arabic learning that need to be investigated, this study focuses on word recognition by L2 Arabic readers. Word recognition is an early stage of the reading process that needs to be acquired for better reading development. However, word recognition in any language is affected by many factors, one of them being the writing system. The Arabic writing system is an abjad, which is a system that represents primarily consonants and the three long vowels <ا> /aa/, <و> /uu/ and <ي> /ii/. Short vowels are optionally added by diacritical marks (vowelization). The Arabic writing system has particular characteristics (e.g., dots, connectivity, shape variation, vowelization and other diacritical marks) that are believed to affect the word decoding processes, but the most important characteristic is vowelization (e.g., Abdelhadi et al., 2011; Asaad & Eviatar, 2013; Ibrahim, 2013; Khateb, et al., 2013; Taha, 2016). There is no consensus on whether vowelization has positive or negative effects on word recognition in Arabic reading. Although only little is known about the effects of vowelization on

word recognition in Arabic as L1, even less is known about its effects on L2 word recognition. Thus, this study investigated the effects of different types of vowelization on the word decoding processes of L2 Arabic readers in different context and voice conditions in order to better understand the role of these factors in the reading acquisition of L2 Arabic learners.

Most reading studies of Arabic as a first language (L1) have shown that vowelization in Arabic influences the processes of word recognition (e.g., Abu-Rabia, 1996; 1997a; 1997b; 1998; 2001; Alshdifat, 2014; Ibrahim, 2013; Taha, 2016). It affects their word decoding speed, accuracy, and recognition. While some studies have shown that vowelization improves the word recognition and reading accuracy of poor and skilled L1 Arabic readers (e.g Abu-Rabia, 1996; 1997a; 1997b; 1998), other studies have suggested that vowelization negatively affects word decoding speed, particularly for skilled L1 Arabic readers (Ibrahim, 2013; Taha, 2016). Findings from Arabic as a second language (L2) reading studies have shown that while vowelization seems to play a significant role at the beginning stages of L2 Arabic learning, it seems to have a much smaller role for advanced L2 Arabic readers (Al Midhwah, 2018; Hansen, 2010). Thus, it is important to investigate the effects of vowelization at different L2 Arabic proficiency levels.

Many Arabic studies have indicated that vowelization is an important factor in Arabic word recognition because it represents valuable phonological information (Asaad & Eviatar, 2013). However, vowelization is not commonly used in the Arabic writing system, and it is not for everyday writing, but it is used for specific purposes (i.e., children's books, L2 books, or religious texts). The Arabic writing system is already visually complex without the use of vowelization because of some of its particular characteristics (e.g., dots, connectivity and letter shape); thus, adding vowelization may add more visual complexity to the Arabic writing system.

Hence, it is important to investigate the effects of adding or removing vowelization on L2 word recognition and how it affects the visual complexity of L2 Arabic texts.

Using vowelization in L2 Arabic textbooks is different from using it in textbooks that are designed for L1 Arabic readers. L1 Arabic textbooks normally use full vowelization in early years of learning to read, but as students move to upper grades, the use of vowelization gradually decreases. For example, there are fewer vowels in high school textbooks than there are in elementary school textbooks (Al Midhwah, 2018). This seems to align with perspectives of reading development for L1 reading in Arabic. The use of full vowelization seems to be suitable for beginner L1 Arabic readers and their low reading skills, but as their reading skills develop, the use of vowelization decreases from using full vowelization to partial, to none. Meanwhile, textbooks for L2 Arabic readers, at least in some L2 Arabic programs, use full vowelization for all L2 Arabic proficiency levels (low levels as well as advanced levels). They do not seem to gradually decrease the use of vowelization for their learners, which represents a big gap for L2 Arabic learners when shifting from reading L2 Arabic textbooks to reading L1 Arabic textbooks that are mostly written without vowelization. Therefore, examining the effects of different types (or amounts) of vowelization (full, partial, or none) may shed more light on their effects on word decoding speed, accuracy and comprehension of L2 Arabic readers.

Moreover, L1 Arabic reading studies have shown that context and voice also affect the word decoding process of L1 Arabic readers. While the presence of context was found to increase reading accuracy (e.g. Abu-Rabia, 1996; 1997a; 1997b; 1998), the passive voice (the less frequent voice) was found to slow the reading process (Hermena et al., 2015). Some Arabic verbs look identical if they were written unvowelized, and the only way to distinguish between their active and passive voices is to use vowelization. Little research has been done on the effects

of context on L2 Arabic word recognition, and no L2 Arabic study, to the best of my knowledge, has investigated the effects of different voice conditions on word recognition. Thus, this study investigated the effects of different context condition (with vs. without context) and different voice conditions (active voice vs. passive voice) on L2 Arabic word recognition to fill in this gap in the literature.

The study addressed the following research question:

What are the effects of the use of different types (amounts) of vowelization (full, partial and none) on the word (past tense verbs) decoding speed, accuracy, and comprehension of L2 Arabic readers at different proficiency levels when verbs are active versus passive and when verbs are presented separately (isolated) versus when verbs are presented within context?

This dissertation is organized as follows: this chapter has provided a brief introduction that outlines the focus and the importance of this study. The next chapter reviews scholarly literature concerning theories and models of L2 word recognition, Arabic word recognition processes, the Arabic writing system and its effects on Arabic word recognition of L1 and L2 Arabic readers, and the purpose of this study. The third chapter describes the methods of the study, including: participants, materials, and tasks. It also describes the data collection and analysis procedures. The fourth chapter reports the findings of the study. The last chapter summarizes the findings of the study and discusses their potential theoretical and practical implications.

Chapter 2: Literature Review

This chapter provides an overview of the Arabic writing system and its historical development. It also provides an overview of research on word recognition and word decoding processes in different writing systems. Then, the chapter discusses different L2 word recognition models and theories that provide the theoretical framework of this study before it discusses and reviews research on word recognition processes in Arabic. The chapter ends with a statement of the purpose and research question of the study.

2.1   The Arabic Writing System (AWS)

Arabic is the official language of 27 countries, and it is spoken by 300 million people, which makes it the fourth most common language in the world (Eviatar & Share, 2013). In addition, the AWS is the second most widely used phonemic system in the world after the Roman alphabet (Dai, et al., 2013), where it is used for Arabic and other languages, such as Farsi and Urdu. It is classified as abjad or a consonantal writing system (Cook & Bassetti, 2005), in which letters represent only consonants and long vowels. Short vowels are represented by diacritical marks that are placed above or below the consonantal letters. A consonant when combined with a vowel in the fully vowelized Arabic texts forms a CV syllable, which led some researchers to suggest that AWS should be considered a syllabic writing system (Taouk & Coltheart, 2004). However, vowelization (or diacritical marks) are omitted in most Arabic texts (e.g. newspapers, books, journal articles, and handwriting), and only used in particular Arabic texts (e.g. religious or children's book). Arabic readers have to use context or background knowledge to compensate for the absence of vowelization while reading unvowelized Arabic

texts. Thus, it is not convincing to consider AWS as a syllabic system when vowelization rarely appears in Arabic texts.

However, although vowelization does not usually appear in Arabic texts, it may sometimes be used in Arabic texts on heterophonic homographs when the surrounding text does not disambiguate them. Hermena et al., (2015) conducted a survey of over 5,000 Arabic sentences, taken from different genres, on Arabic verbs that are heterophonic homographs, where active and passive voice forms of verbs may look identical but are pronounced differently. The purpose of the survey was to find which of these heterophonic homographic forms (active or passive) are often vowelized in Arabic texts in order to facilitate disambiguation. Hermena et al. (2015) found that active verbs (active form) were never vowelized when the text was unvowelized, but most passive verbs (passive form) were vowelized even when the text was unvowelized, particularly when context does not seem beneficial.

The AWS is written from right to left, and consists of twenty-eight consonantal letters that each corresponds to a phoneme. However, two letters serve dual functions: either as long vowels < و > /u:/, < ي > /i:/ or semi-vowels < و > /w/, < ي > /j/. Short vowels are represented by diacritical marks that are not part of the Arabic alphabet (Abu-Rabia, 1997a), but extra graphemic cues that are usually used in L2 and children's books in order to help them improve their reading ability (Rogers, 2005). The appearance of vowelization enables readers to deduce the correct pronunciation of written words, but since they are not always there, Arabic readers must learn how to read without them.

In Arabic, there are some particular writing characteristics that are thought to influence Arabic reading acquisition (e.g., dots, connectivity, shape and diacritical marks). First, there are groups of Arabic consonantal letters that are strikingly similar in shape, and only differ in the

number and position of dots that are placed either above or below the letters (e.g.< ن , ث , ت , ب > and < ج , خ , ح >). Second, Arabic letters are connected in a specific way that is particular to AWS. That is, while most Arabic letters are connected to the preceding and following letters, six letters are only connected to the preceding letters but not to the following letters < ز , ر , ذ , د , ا , و >. This feature leads to the third particular characteristic of the Arabic letters, namely its extensive allography. That is, letters have different shapes based on their position in the word. Twenty-three letters out of the twenty-eight Arabic letters have four shapes each: word initial, word medial, word final, and when they follow a non-connecting letter (the separate shape). The remaining six letters have two shapes each: word final and separate shape (Abdelhadi et al, 2011). In addition, the Hamzah (the glottal stop) has many different shapes or ways to be written. Although it is a fully functioning consonant, it is sometimes treated as a diacritical mark or as a part of the *alif* letter, a particular letter that is written in many different ways in Arabic based on its position in the word and its preceding vowel (e.g., أ، إ، ء، ئ، ؤ). Lastly are the diacritical marks that are used to represent the three short vowels (fatħah /a/, dˤammah /u/, kasrah /i/), the consonant doubling (šaddah), the absence of vowels (sukūn), among others (see Table 2.1 for the most common Arabic diacritical marks). The marking of short vowels is part of these diacritical marks in Arabic. Thus, while the term "diacritical marks" represents all of the Arabic diacritics including those marking vowels, the term "vowelization" or "vowels" in this study represents the three short vowels (fatħah /a/, dˤammah /u/, kasrah /i/).

Table 2.1: The most common Arabic diacritical marks

Name	Function	Position
fatħah	represents the vowel /a/	Above the letter ó
dˤammah	represents the vowel /u/	Above the letter ó
kasrah	represents the vowel /i/	Below the letter ọ
šaddah	consonant gemination mark (double consonants)	Above the letter ő [1]
sukūn	marks vowel absence	Above the letter ȯ
tanwin	Doubled *fatħah*, *dˤammah* or *kasrah* to represent the grammatical case of indefinite noun phrases. It represents one of the three sounds /-an/, /-un/ or /-in/	Above the letter for /-an/, /-un/ or Below the letter for /-in/

These four particular characteristics of AWS have been examined to find out whether or not they have an influence on L1 Arabic word recognition and reading acquisition (e.g., Abdelhadi et al., 2011; Asaad & Eviatar, 2013; Khateb, et al., 2013). It has been hypothesized that these characteristics add more visual complexity to Arabic words that slows their recognition and eventually affects the process of Arabic reading acquisition. However, concerning the first three characteristics (dots, connectivity, and shape variation), these studies have suggested that they have effects at the beginning of reading acquisition but not at later stages of reading learning.

The influence of the number and place of dots has been examined in Asaad & Eviatar, (2013) and Abdelhadi et al. (2011). The finding showed that dots by themselves do not seem to have a significant contribution to the visual complexity of AWS, but when they are combined

---

[1] The Šaddah mark indicates double consonant. The first must have *Sukun,* and the second must have a vowel (*fatħah, dˤammah or kasrah*).

with the other particular characteristics of the AWS, such as connectivity or shape, they may marginally affect reading speed of young L1 Arabic readers.

In regard to letter shapes, Asaad and Eviatar (2013) found that misplacing letter shapes slows the retrieval speed of the older readers, but not younger readers. While for young readers, a sound is represented by a 'family' of shapes that are equally retrievable, for adult readers, the various shapes of letters may not be equally represented. Any change to the normal letter shapes may cause longer reaction time for adult Arabic readers then it does for young Arabic readers. This indicates that as native Arabic readers become familiar with the different letter shapes, it is no longer an issue for them.

With regard to connectivity, the findings showed that L1 Arabic readers responded faster and more accurately to the connected stimuli than they did to the non-connected stimuli, where older readers responded faster and more accurately than younger readers (Abdelhadi et al., 2011; Khateb, et al., 2013). Letters in Arabic words are usually connected; all Arabic letters can be connected at least from one side. Thus, when stimuli were more similar to the majority of words in Arabic (connected words), recognition was more efficient. Native Arabic readers are exposed to connected words from an early age which reduces the impact of the connectivity and different shapes of the letters during visual recognition. Also, connected items exploit less spatial frequencies than non-connected items, which may lead to less time-consuming visual processing (e.g., difference in gaze/fixation duration and number of saccades) during word recognition (Roman & Pavard, 1987; Taha et al., 2012). Thus, connectivity, in contrast with the visual complexity hypothesis, enhances reading accuracy and speed among adult native Arabic readers.

The findings on the three first characteristics of AWS (dots, connectivity, and shape variation) indicate that these characteristics may have some influence on Arabic word

recognition and reading acquisition, particularly when they are combined with each other. Their effects are only found on the speed of word recognition and acquisition (automaticity processes) but not on accuracy processes. However, although acquiring and mastering these characteristics may be difficult and cognitively demanding at the beginning, such difficulties may decrease with more experience and exposure. At the beginning, the effect is somehow normal and expected as all novice readers will have some difficulties with writing conventions when they start learning to read, it is not unique to Arabic (Abū Ḥamdiyya, 2017). But, as they become familiar with the writing conventions, they will overcome such obstacles. Native Arabic readers after a lengthy period of exposure to the AWS become familiar with these characteristics (dots, connectivity, and shape variation). Once familiarity is established, their reading performance becomes better with these features than without them. Familiarity with these characteristics will compensate for any deficiencies due to these characteristics (Abdelhadi et al, 2011; Asaad & Eviatar, 2013; Dai, et al., 2013; Khateb, et al., 2013).

Although the findings on the first three characteristics (dots, connectivity, and shape variation) showed no effect on expert native Arabic readers, there is lack of consensus on the effect of the fourth characteristic (vowelization). Some findings showed that vowelization improves reading accuracy (Abu-Rabia,1997a; 1997b; 1998), and reading comprehension of skilled and poor native Arabic readers (Abu-Rabia,1999). Other findings suggested that vowelization has a negative influence on reading accuracy and speed (Ibrahim, 2013), particularly for skilled native Arabic readers (Taha, 2016). The contradictory findings on vowelization could be partially attributed to the fact that vowelization, unlike the other characteristics, is usually used at the beginning stages of reading acquisition (i.e., children's book) or in some specific textbooks (Islamic religious books such as the Quran). But, it is

omitted from texts that are intended for adult or skilled readers (e.g. university textbooks, newspapers or research articles). The first three characteristics of AWS (dots, connectivity, and shape variation) are stable and never change in the Arabic orthography. Although they may add visual complexity, findings showed that familiarity with them overcomes their visual complexity. However, the use of vowelization is not constant in Arabic orthography and there are no specific guidelines on how to use it. Writers have the option to fully, partially, or never use it. Thus, variability in the use of vowelization has led researchers to investigate the effects of their use on L1 and L2 word recognition process.

2.1.1   *The Importance of Vowelization in Arabic*

Vowelization is believed to vary in its importance of use (Hermena et al., 2015). While in some situations it may be essential for word decoding and text comprehension, in other situations, it may be redundant and easily predicted. Due to different reasons such as familiarity, absence of homographs, and priming effect (related words), some Arabic words are easier to be predicted and read accurately even if they are unvowelized; vowelization may add no value to their mental representation. For example, the first and most common form of past triliteral Arabic verb is /CVCVCV/, where V is mostly "FatHa" <◌َ> /a/ (e.g., the verb /kataba/ "he wrote" <كَتَبَ>). This form of past Arabic verbs may be called the default (or preferred) form of verbs because it is the first form that comes to the mental representation of L1 Arabic readers when such verbs are written unvowelized (Hermena et al., 2015). The use of *FatHa* on these verbs could be redundant, it does not add any new phonological information that could help readers in their word recognition or mental representation process (Abu Ashmah, 2017; Aldosoqi, 1939; Members of the Academy of the Arabic Language in Cairo, 1959). However, if the passive form is the target form (e.g., /kuteba/ "was written" <كُتِبَ>), it is very important to

include all or some of the vowels in order to access and activate the intended target form (the passive form), particularly if context is not available or beneficial. L1 Arabic readers usually read unvowelized passive verbs in their unintended active form (e.g., /kataba/), but within context they may be able to attain and read the intended target passive form (Hermena et al., 2015). However, readers may vary in their reading time depending on their ability to use context.

The study above suggests that context may compensate for the absence of vowelization. This entails that adding vowelization within context may be redundant and may lead to more visual complexity that delays word recognition and reading process. However, this is not always the case. The use of vowelization on some words may be critical even when context is available, and omitting vowelization may delay word decoding or lead to incorrect word decoding that eventually delays the reading process or impacts reading comprehension. For instance, as mentioned above, when a verb (e.g., past verb) is orthographically represented without vowelization, the first mental representation of L1 Arabic readers would be the active form. But with sufficient context, L1 Arabic readers are able to recognize the intended passive form, but they take longer reading time.

However, context is not always sufficient, and readers (even skilled readers) in some situations may have difficulties reading Arabic sentences because one phrase may have more than one possible correct reading (Al-shdiat, 2014). For example, the phrase <دفع الطالب>, could be read in two different ways if written unvowelized, and context may not help readers identify the correct form:

1. <دفع الطالب... >
    a. Could be "the student pushed…"
    b. Or "the student was pushed…"

In their first attempt, most L1 Arabic readers would read the phrase as it appears in the first form (the active form) when it is unvowelized without realizing that the second form (the passive form) may be the intended reading. But, as they precede (using larger context), they may be able, depending on their ability to use context, to identify the target reading and then reconstruct the meaning of the sentence. The detection process will vary from very quick detection to failing to detect the correct form, the passive form. Thus, it is very important in such cases to include vowelization even if context is available. Adding vowelization to the verb will make the phrase unambiguous:

2.   *VSO word order:*

    a. "the student pushed…" <دَفَعَ الطالب...>, or

    b. "the student was pushed" <دُفِعَ الطالب>

3.   *SVO word order:*

    a. "the student pushed…" < الطالب دَفَعَ... >, or

    b. "the student was pushed" <الطالب دُفِعَ ...>

Moreover, the importance of the use of vowelization with or without context may not only be essential for the internal part of words but also for affixes. For example, it is very important to use vowelization to differentiate the different forms of the suffix <ت> /ta/ that attaches to the end of verbs.

4. دفعتِ الطالب

    a. "She pushed the student" <دفعتْ الطالب>, /dafaʕ**t** altaleb/

    b. "I pushed the student" <دفعتُ الطالب>, /dafaʕ**tu** altaleb/

    c. "you (F) pushed the student" <دفعتِ الطالب>, /dafaʕ**ti** altaleb/

    d. "you (M) pushed the student" <دفعتَ الطالب>, /dafaʕ**ta** altaleb/

Using different vowels with the suffix <ت> indicates different meanings and pronunciations (i.e., gender, number, and person). For example, when the suffix <ت> is written with sukun to mark vowel absence <تْ> /t/ like in the verb /dafaʕ**t**/ (Example 4a), it represents the third person feminine singular form of the verb; when it is written with the short vowel /u/ <تُ> /tu/ like in the verb /dafaʕ**tu**/ (Example 4b), it represents the first person singular form of the verb; when it is written with the short vowel /i/ <تِ> /ti/ like in the verbs /dafaʕ**ti**/, it represents the second person feminine singular form of the verb (Example 4c); and when it is written with the short vowel /a/ <تَ> /ta/ like in the verbs /dafaʕ**ta**/, it represents the second person masculine singular form of the verb (Example 4d).

The written form of <ت> is ambiguous if it is written without using vowelization, sometimes even when context is available. One vowel changes the entire meaning of the sentence; thus, it is important to treat vowelization differently because vowels have different roles in the AWS. While some of them may be redundant, others are essential for word recognition and reading comprehension.

The amount of vowelization with or without context may affect word recognition processes. Words with full vowelization may be more accurately read but may take longer to

read. Unvowelized words, on the other hand, may take shorter decoding time, but there is a higher chance of errors and misinterpretation. Thus, it is important to investigate word decoding processes using different types (amounts) of vowelization (Full, partial or none) with and without context. For instance, when we write the passive form of the past triliteral verb (e.g., /dufeʕa/ "was pushed" (دُفِعَ)), do we need to use vowelization to activate the target passive form? If yes, do we need to include both diacritical marks or is using one diacritical mark enough to activate the target passive form? Does the availability of context make any difference? All these questions are important inquiries that need to be answered in order to have a better understanding of the effects of vowelization on L2 Arabic readers.

2.1.2 *Syntactic Vowelization vs. Non-Syntactic Vowelization (Morphological Vowelization)*

Syntactic vowelization. Syntactic vowelization refers to vowel diacritics that are placed on the last letter of Arabic words (word-final diacritical marks) to represent case marking in Arabic (i.e. Khaldieh, 2001). There are three cases in Arabic that are represented by short vowels (syntactic vowels): /u/ represents nominative (مرفوع), /a/ represents accusative (منصوب), and /i/ represents genitive (مجرور). These vowels alternate according to word position and grammatical role in Arabic sentences. For example, if the word (الطالب) "the student" is in the subject position (the doer of action: *فاعل*), it will be marked by the nominative case mark (/u/, damah, الطالبُ). But, if the same word is in a different position in the sentence (e.g., the object position *مفعول به*), it will be marked by the accusative case mark (/a/, fatHa, الطالبَ). Thus, these case marks change on every single word according to its syntactic role in Arabic sentences, and they are placed on the last consonant of that word.

Non-Syntactic vowelization (Morphological vowelization). Arabic morphology is known for its root and pattern system, where most words are based on trilateral (three-consonant)

or quadrilateral (four- consonant) roots. Different forms derived from these roots are formed by using affixes, vowels, or both (patterns). For example, the root (k, t, b) indicates something related to writing, different verb and noun forms can be derived from this root by using short vowels that are optionally written above or below consonants:

كتب (to write)

1. كَتَب (he wrote) | 2. كُتِب (was written) | 3. كُتُب (books)
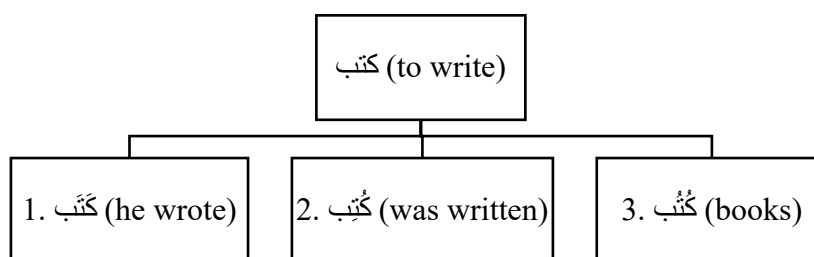
When vowelization is the only method to differentiate between words of the same root, these forms will look identical (homographs) if they are written unvowelized (Abu-Rabia & Siegel, 1995), and Arabic readers would have to use contextual cues to differentiate between these forms. This type of vowels that help to form and differentiate the different patterns of Arabic words are called "morphological vowels" or "morphological vowelization" in this study to distinguish them from "syntactic vowels" or "syntactic vowelization". There was no effect of syntactic vowelization on L2 Arabic reading comprehension (Khaldieh, 2001), but the effects of morphological vowelization on L2 Arabic readers is not clear as yet. Therefore, the use of vowelization in this study was concentrated on morphological vowelization (instead of syntactic vowelization) in order to fill in this gap in the literature.

2.1.3   *The Historical Development of Diacritical Marks in the AWS*

During the early Islamic Era, most writing activities were done for Islamic purposes such as writing the Quran (the holy book of Muslims). The Quran was first written during the time of Caliph Uthman Ibn Affan. Only a few copies were written and sent to the Islamic states with

reciters who were able to read it in order to teach the Muslim people. The AWS at that time did not include diacritics or dots (see Figure 2.1) because Muslim people at the time were mostly illiterate native Arabic speakers, who used listening and reciting as a method to learn and transmit the Quran. However, after the Islamic empire expanded, many non-Arabic speaking people converted to Islam. Since the Quran is only allowed to be written in Arabic and it is the holy book of Muslims, they had to read it and understand it. The non-native Arabic Muslims were making a lot of pronunciation mistakes that sometimes changed the meaning of some verses, which is unacceptable with the Quran. Thus, Muslim scholars called for an urgent modification of the AWS to make it easier and clearer for non-native Arabic Muslims to read in order to avoid making mistakes and to understand the Quran better (Al Midhwah, 2018).
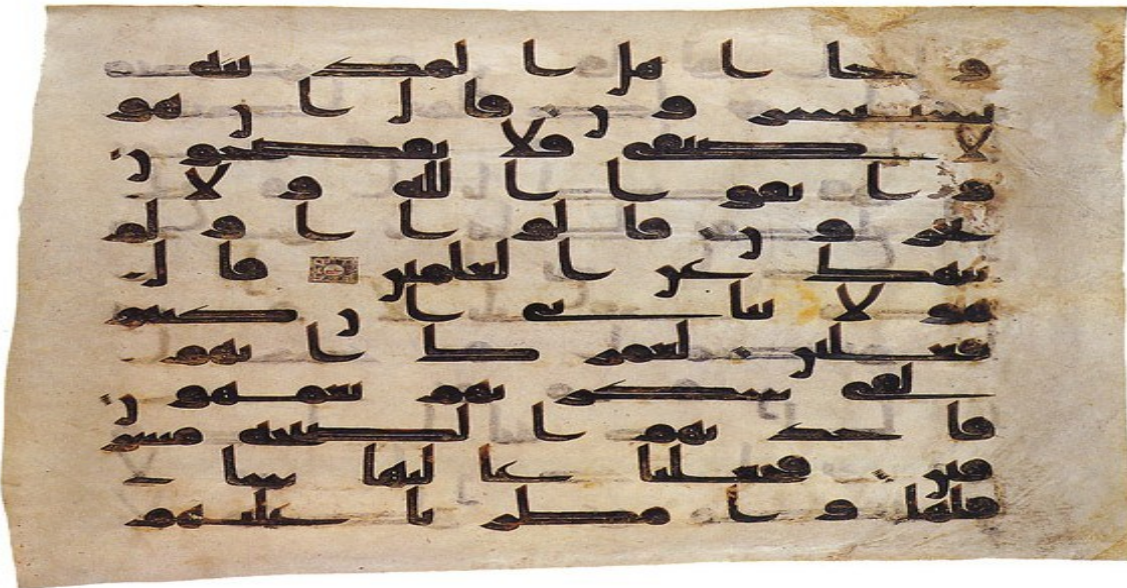
Figure 2.1: Arabic script from the Holy Qur'an in black ink without dots and Diacritical marks

The development of the AWS went through four different phases until it arrived at its current conventions. The first phase was developed by Abu Al-Aswad Al-Du'alī (603-689 CE) and was concerned with adding syntactic dots placed at the end of words (*Naqtˤ ʔal-ʔiˤrāb*). The

dots were written in red ink. One dot is placed above the letter if the last consonant is followed

by *fatḥah* /a/, one dot within the letter if the last consonant is followed by *dˤammah* /u/, and one

dot below the letter if the last consonant is followed by *kasrah* /i/. If the word ends with *tanwin*

(nunation /-an/, /-un/ or /-in/), two dots would be written instead of one and placed the same way

the one dots are placed (i.e. if it is *fatḥah tanwin* /-an/, they are placed above the letter, etc.).

The second phase was developed by Naṣr Ibn Asim (D. 708 CE) and Yaḥyā Ibn Yaʿmur

(D. 709 CE) and was concerned with adding dots to letters that are similar in shape. Letters with

similar shapes prior to this stage were written without dots, which caused difficulties in

distinguishing between them. Some letters have the same shape if they are written without dots

(e.g. خ، ج، ح), and the only way to distinguish between them is by adding dots to them (*Naqtˤ ʔal-*

ʔiˤdʒām). While syntactic dots were written in red ink, these dots were written in black ink to

differentiate them from syntactic dots that were added earlier by Abu Al-Aswad Al-Du'alī. The

number of dots was also used to differentiate between a group of similar shape letters, and the

maximum number used is three (e.g. ب، ت، ث , and س، ش).

The third phase was developed by students of Naṣr Ibn Asim and Yaḥyā Ibn Yaʿmur and

was concerned with adding additional diacritics that were not actualized in the first or second

phases (e.g. *hamza* "glottal stop", *sukūn* "silence", and *šaddah* "gemination"). These additional

diacritics were written by adding dots with different ink colors. However, this technique of using

different colors within a word made the AWS more difficult for writers (in using different

colors) and readers (in distinguishing them) to follow. Thus, the fourth and last phase of AWS

development was introduced.

The fourth phase was developed by Al-Khalīl Ibn Ahmad Al-Farāhīdī (719 – 786 CE)

and was concerned with the issue of different colors of dots and their functions. Thus, the fourth

phase was developed by maintaining the dots of letters to differentiate between letters that have similar shapes and converting the other dots to different small shapes (e.g., بَ، بِ، بُ), that are known today as diacritical marks. This system retained all the benefits of the previous systems and solved the problem of using different ink colors by abandoning it altogether. At this stage, the use of diacritical marks expanded from using them at the end of words for syntactic purposes to using them within the words for morphological purposes. The system that was developed at this stage remains the same AWS used today, but with minor changes added (for more details on the developmental history of diacritical marks, see Al Midhwah, 2018).

2.1.4   Dots vs. Diacritical Marks in Arabic

Dots in Arabic consonantal letters are those small points that are placed above or below Arabic letters like < ب > < ت > < ث >, and < ن > which represent the phonemes /b/, /t/, /θ/, and /n/, respectively. The dots were not part of AWS in the early Arabic script. They were added during the second phase of the AWS development when the diacritical marks system was still underdeveloped. Thus, there is an ongoing debate on how to identify or consider the Arabic dots. Are they diacritical marks or are they an integral part of the Arabic letters (or graphemes)? Some researchers argue that Arabic dots are diacritical marks because they have a feature that is similar to Arabic vowel diacritical marks as they are both placed either above or below the letters. They claim that Arabic dots are diacritical marks because they are used to distinguish graphemes within the same basic shape (Kurzon, 2013). Their claim is based on the fact that diacritical marks are defined as distinguishing marks (Wells, 2001; Kurzon, 2008), and since Arabic dots are used to distinguish Arabic letters that have strikingly similar shapes, they should be considered as diacritical marks.

Other researchers argue that Arabic dots are not diacritical marks, but integral parts of the Arabic graphemes because they do not have a consistent phonological function. They are similar, for example, to the cross of the lower-case < t >, or the dot on the lower-case <i> in the Roman alphabet (Daniels, 2006; 2013). The use of dots has been adopted in other languages that have adopted the Arabic script such as Persian and Urdu, but in an inconsistent manner. For example, in Persian, dots are used to distinguish graphemes that represent phonemes that are specific to Persian and do not exist in Arabic (e.g., /p/, /tʃ/) (Kurzon, 2013).

Although Arabic dots are placed above or below letters in a way that makes them similar to diacritical marks, they do not have phonological or self-orthographical functions as opposed to diacritical marks. In regard to the phonological function, dots have no phonological function themselves, whereas each diacritical mark represents unique phonological information in the Arabic language. For example, fatHa <ó> represents the vowel /a/, kassra <ọ> represents the vowel /i/, and damma <ỏ> represents the vowel /u/. These diacritical marks when combined with a letter represent different CV syllables (e.g., <بَ> /ba/, <بِ> /bi/, <بُ> /bu/). With regard to the self-orthographical function, dots when written by themselves apart from their letters do not represent or indicate any linguistic information, whereas diacritical marks have linguistic information independently from the letters (e.g., <ó> = /a/ fatHa, <ọ> = /i/ kassra, <ỏ> = /u/ damma). In addition, dots are not orthographically changeable as they cannot change their places, but diacritical marks change their places to represent different morphological and syntactic information. For example, when a singular noun is the subject of a sentence, the last consonant will include the diacritic of damma (/u/, <ỏ>) to indicate that the noun is nominative. But, when the same noun is the object of the same sentence, the same last consonant will include the diacritic of fatHa (/a/, <ó>) to indicate that the noun is accusative. In short, since dots have

no phonological function, no orthographical function, and no linguistic value in and of themselves apart from their letters, one can argue that they are not diacritical marks, but integral parts of the Arabic graphemes.

2.1.5   *Proposals to Reform the AWS*

Due to the complexity of the vowelization system in AWS and their usual absence in Arabic texts, many Arabic researchers have presented different proposals to reform the AWS. Hejazi (1982) outlined more than seventy proposals to reform AWS. Most of these proposals are following one of two directions: adopting the Roman script or simplifying the AWS. Researchers who follow the Roman script adoption propose that the Arabic script is problematic and should be replaced by another script such as the Roman script, where both consonants and vowels are orthographically represented. These scholars tend to count on the successful experiences of other languages (i.e., Turkish). However, these types of proposals have been widely and strongly rejected by Arabic scholars for different reasons. Some of the rejections are related to problems in applying such proposals in the Arabic language. The AWS is attuned to reflect the consonant inventory and the consonantal roots of the root-and-pattern morphology, so that is better suited for Semitic languages than for other languages such as Turkish (which has a different consonant inventory and more vowels, including vowel harmony). Other objections are related to the potential impact of such proposals on the culture, beliefs, and identity of the Arab world and its people (Al-Toma, 1961).

The other proposal is the simplification or modification of the AWS. There are different proposals on how to simplify or modify the AWS, and each one is concerned with one or more of the particular characteristics of AWS (e.g., shape, connectivity, or diacritical marks). One of

the proposals concerning diacritical marks is Aldosoqi (1939), who makes some suggestions to minimize the use of diacritical marks[2]:

- *FatHa* is the diacritical mark that appears the most in Arabic words, thus it should be omitted from all the letters, where any unvowelized letter should be assumed to have *FatHa*. For example, *fatHa* in active form of verbs should be omitted.

- Add diacritical marks only when needed (when ambiguity is possible, "أشكلُ ما يُشكِل"). For example:

  - Vowelize the first letter of passive forms of triliteral verbs (e.g., <رُسل> /rusel/ "was sent").

  - Vowelize the first and penultimate letters of passive forms of quadrilateral verbs (e.g., <يُرسَل> /yursal/ "is sent").

  - Vowelize the penultimate letter of the morphological pattern "مفعل" /mVCC<u>V</u>C/ form (e.g., <مكتَب> /maktab/ "office" and <مصرف> /masref/ "bank").

  - Vowelize all ***Nouns,*** except frequent nouns (e.g., <محمد> /Mohammed/).

  - ***Hamzah*** "the glottal stop", ***Shada*** "the gemination mark" and ***Madd*** "Lengthening of the long vowels" should be all written on Arabic words.

  - Diacritical marks should not be written on the first letter after the Arabic definite article (<ال> /al/ "the") because it is either ***Sukun*** (after the pronounced /L/ ال *AL Alqamariah*") or ***Shadda*** (after the non-pronounced /L/ ال الشمسية *AL Alshamsiah*").

  - Diacritical marks should not be written on the last letter of the last word in a sentence because this mark should not be pronounced.

---

[2] This proposal has been paraphrased and translated from Arabic to English (for the original text see Aldosoqi, 1939).

Another example of simplifying the use of diacritical marks in AWS comes from the Academy of the Arabic Language in Cairo (1959). Their proposal targets the use of diacritical marks in the textbooks of Egypt's education system (elementary, middle and high school textbooks). Their proposal suggests that[3]:

1. The text from the Quran or Alhadith (prophet Mohammed's words) should be completely vowelized in all school stages because error is not acceptable with this type of texts.

2. At the elementary level: all diacritical marks should be written unless the word is very obvious and clear.

3. At the middle-school level:

    *   All syntactic diacritical marks should be written.

    *   Morphologic diacritical marks should be written according to the following rules:

        -   **FatHa**, unless written on semi-vowels, should not be written <و> /u/ or <ي> /i/ (<حِيَل> /Heyal/ "tricks")

        -   Diacritical marks other than FatHa should be written.

        -   **Hamzah** "the glottal stop" and **Madd** "Lengthening of the long vowels" should be written on all Arabic words.

        -   Less frequent nouns should be vowelized.

4. At the high-school level:

    *   The use of syntactic diacritical marks should be decreased. They should be written when comprehension ambiguity is possible.

---

[3] This proposal has been paraphrased and translated from Arabic to English (for the original text see Members of the Academy of the Arabic Language in Cairo, 1959).

- The use of morphologic diacritical marks should also be decreased to situations where comprehension ambiguity is possible.

- Less frequent nouns should be vowelized.

These are two examples from many other proposals suggested by Arabic scholars. However, none of the proposals have been widely accepted or adopted in the Arab communities due to religious, political, and financial reasons (Mahmoud, 1980). Thus, reforming AWS does not seem to be a suitable solution for its complexity, unless something unexpected happens (e.g., political enforcement) (For further details on this topic, see Abu Eid, 2015; Aldosoqi, 1939; Al-Toma, 1961; Hejazi, 1982; and Mahmoud, 1980). In the meantime, Arabic reading/writing researchers and teachers should work together to find ways and methods to help their students overcome difficulties caused by the complexity of the AWS.

2.2   Word Recognition Research

Reading is a complex set of skills and processes that interact with each other in a complicated way to produce the ultimate goal of reading comprehension. To achieve this goal, readers are required to learn how to deal with the text as an entire piece as well as its smaller components (e.g., letters, words, sentences), but which one comes first is a fundamental question in the literacy literature. Some researchers argue that a text can be approached by dealing first with its smaller components in order to understand it as a whole, this is called the bottom-up approach and prioritizes lower-level skills (Hudson, 2007). Other researchers believe that a text should be approached by dealing with it as a whole to be able to understand its smaller components, this is called the top-down approach and prioritizes higher-level skills (Hudson,

2007). However, although these are the two main approaches, some researchers suggest that reading can be processed in an interactive way by going back and forth between these two processing approaches, this approach is called the Construction-Integration Model (Kintsch, 1988).

Hudson (2007) indicated that reading is an interaction between the text and the reader, and describes three reading approaches involved in the reading process: bottom-up, top-down, and interactive approaches. The bottom-up approach hypothesizes that this interaction is generated from the text information (e.g., word recognition) and builds up to construct meaning in the reader's mind. The top-down approach postulates that the reader, using their background knowledge, approaches the text with generated hypotheses; and while they are reading, they verify and reform their hypotheses according to the text information. The interactive approach is a mediated approach between the two other approaches (bottom-up and top-down). It postulates that meaning or comprehension is constructed from the interaction between the text information and the reader's background or world knowledge. While there is a lack of empirical research that supports the top-down approach (Nassaji, 2011), many researchers suggest that an integrated comprehension of a text relies heavily on the fluid, accurate, and efficient application of a bottom-up approach (Rupp, et al., 2006).

Two important aspects of the bottom-up approach are accuracy and automaticity where accuracy precedes automaticity (Asadi, et al., 2017; LaBerge & Samuels, 1974). Meaning construction in the bottom-up approach is built by decoding symbols, words, and sentences; moving upwards until the reader attains text comprehension. At the early reading-learning stage, the lower-level cognitive decoding processes require attention and awareness that occupy most of the working memory capacity, which leaves little or no capacity for text comprehension.

However, with more practice and experience, the lower cognitive processes will usually become automatic and function unconsciously. Consequently, the working memory is less occupied leaving more capacity to be put towards higher reading processes and comprehension (Vanniarajan, 2012).

The process of word recognition is concerned with word knowledge or lexical mental representation which significantly influences the overall process of reading comprehension. Word (or lexical) knowledge is a factor that plays an essential role in first language (L1) and second language (L2) reading. Many studies have shown that lexical knowledge is a key factor for successful reading comprehension, particularly in L2 reading (e.g., Hamada & Koda, 2008). While word knowledge is crucial for all four aspects of language learning (reading, writing, listening and speaking), word recognition is a component of word knowledge that is particularly important for the reading process. Successful word recognition improves reading development, but deficiency in processing any of its components (e.g., phonological extracting) will lead to unsuccessful word recognition that ultimately impacts reading comprehension. With regards to L2 Arabic word knowledge, a high relationship between word knowledge and reading comprehension has been found, where word knowledge significantly affects the performance of L2 Arabic readers (Khaldieh, 2001).

The early reading research indicated that fast and accurate word decoding is an essential prerequisite for good reading comprehension (Abu-Leil, et al., 2014). In English, for example, word recognition skills have been reported to be strongly associated with reading comprehension. The verbal efficiency model suggests that there is an interference between slow word recognition and comprehension (Perfetti, 1992). The model "is founded on the assumption that a deficit in word decoding efficiency impairs reading comprehension and makes reading

much less efficient" (Abu-Leil, et al., 2014, p.258). To attain better comprehension, the reader's attention should be focused on comprehension while the process of word recognition should operate more or less automatically (Ehri, 2005).

With respect to teaching L2 reading, bottom-up processing supporters emphasize the importance of teaching phonetics and decoding skills (Coulmas, 2003), word parts (i.e., morphological components), and vocabulary or sight words through instructional extensive reading (Anderson, 2009; Coulmas, 2003; Nation, 1990; Pulido, 2009; Wolter & Helms-Park, 2016). However, L2 teachers should ensure that the type of vocabulary they teach is suitable to the students' reading level, their learning purpose, and the type of vocabulary they would encounter within and outside the instructional setting (Anderson, 2009).

2.2.1   Strategies and Skills of Word Recognition

There are two types of reading strategies: local strategies and global strategies. While global strategies are concerned with the text as a whole (e.g., using background knowledge, identifying text gist, and identifying textual organization), local strategies are concerned with the lower levels of the text (e.g., sound-letter, word-meaning, sentence syntax, and text details). The use of each strategy correlates with L2 reading proficiency. High proficient L2 readers often use global strategies. Research findings show that proficient L2 readers use context to guess unknown words (Carrel, 1989; Nassaji, 2003). Low proficient L2 readers usually use local strategies (Carrel, 1989), which means that low proficient L2 readers are still at the stage where lower levels of the text (e.g., word recognition) is of utmost concern for them. Proficient readers alternate between local and global strategies (Perfetti & Dunlap, 2008). Beginner readers mostly use local strategies and a bottom-up approach because they do not have sufficient linguistic

knowledge that allows them to use global strategies or a top-down approach (Khaldieh, 1999; Nassaji, 2003).

Reading skills are also classified into two different categories: lower-level skills and higher-level skills. Reading involves a hierarchy of skills from lower-level to higher-level skills. Lower-level skills are concerned with the lower levels of the text (e.g., graphemes, words, sentences) that are needed for basic reading processes (e.g., word recognition). Higher-level skills that are needed for higher-level processes (e.g., text inferencing) are usually preceded by lower-level skills that are needed for lower-level processes (e.g., word recognition). Any deficiency in the lower-level processing will certainly affect the higher-level processing that consequently affect reading comprehension (Abu-Leil, et al., 2014; Hansen, 2010; Haynes & Carr, 1990; Hudson, 2007).

Lower-level processing is associated with orthographic decoding in phonological writing systems; and the skills that are associated with it (i.e., analyzing a word's graphemic features, extracting phonological and morphological information, retrieving its meaning, and aligning the word's meaning with the contextual information) are usually transferred from L1 to L2 (Brown & Haynes, 1985). Thus, L1 orthographic awareness and skills are an important factor that contributes to L2 orthographic development and decoding skills (e.g., Akamatsu, 2005; Hamada & Koda, 2008; Holm & Dodd, 1996; Koda 1989; 1990). While reading in two similar writing systems requires little orthographic awareness and decoding skills adjustment, more adjustment is needed when the two writing systems are different. Empirical research shows that L2 readers may still transfer their L1 word decoding processes to their L2 even if the L1 and the L2 have different phonological writing systems (e.g., Korean & English, Hamada & Koda, 2008). However, the transfer is less likely to occur when the two languages (L1 & L2) are incongruent.

For example, Chinese has a morphographic writing system unlike English, where its writing system is phonographic. Hence, when native Chinese speakers learn English as an L2, it is less likely for them to transfer their L1 word decoding process because the two languages (Chinese and English) have incongruent writing systems and different word decoding processes (e.g., Hamada & Koda, 2008). Thus, the L1 writing system of L2 readers should be taken into consideration when investigating L2 word recognition processes.

However, there are some factors that eliminate the effect of L1 on L2 decoding processes. L2 proficiency and word frequency reduce the effect of L1 orthography on L2 decoding processes. For example, as reading proficiency increases, the effect of L1 orthography on L2 word recognition decreases. In other words, beginner readers of L2 are affected by L1 orthographic knowledge more than are proficient L2 readers; and the effect appears to be on low-frequency words more than on high-frequency words (Akamatsu, 2005; Frost et al., 1987). Ehri (1998) identifies five methods that young English readers use to recognize English words: (1) assembling letters into a blend of sounds; (2) pronouncing and blending familiar spelling patterns; (3) retrieving sight words from memory; (4) analogizing words to other words that are already known by sight; and (5) using context cues to predict words. Reading proficiency affects the selection of method but skilled readers should have the ability to use them all. They should also have the ability to select which method to use according to context and word familiarity (Koda, 2007). However, while these methods may be applicable for word recognition in any language, particularly languages that use alphabetic writing systems, different languages may require different methods.

2.2.2 Word Decoding Processes

Word knowledge entails linguistic knowledge and general world knowledge (Wolter & Helms-Park, 2016). There are three dimensions for word knowledge: form, meaning, and use. Knowledge of the form refers to the knowledge of spoken and written forms. Use refers to the ability of using a word in its appropriate context. Meaning refers to the knowledge of the connections between word forms, text, and world meaning (Nation, 2001).

Word recognition is a bottom-up process that refers to the process of retrieving the meaning of words with or without context. The recognition process entails different operations including analyzing a word's graphemic features, extracting phonological and morphological information, retrieving its meaning, and aligning the word's meaning with the contextual information (Koda, 2005). The latter operation involves aligning the word to its local meaning (within a sentence) and its global meaning (within a text and the reader's world knowledge). However, the recognition process does not mean letter-by-letter processing, it requires a holistic word identification that is rapid and effortless. This requires more proficiency in the language and adequate knowledge of its writing system.

The phonological decoding of a word involves linking the word's orthographic representation to its phonological information and stored meaning. Doing this sufficiently will enhance the functioning of working memory. Accessing the phonological information efficiently and automatically will lead to less cognitive demands on the working memory, which consequently leads to more available working memory capacity that can be used for reading comprehension. Morphological knowledge entails knowledge of word parts (in alphabetical writing systems) that enable readers to use morphological components to form new words, and to extract partial information from unknown words.

Semantic processing entails retrieving a word meaning(s) with or without context. While a word may have many different meanings when it is contextually free, it usually has one possible meaning within context. Context facilitates word meaning selection, but it is unclear how that occurs. One view suggests that when a word is encountered, all its meanings will be activated, and context will facilitate the selection of the most appropriate meaning. The other view suggests that the meaning of a word is retrieved after the occurrence of context facilitation (Koda, 2005). Context will facilitate the activation of the most relevant meaning, but not the other less-relevant meanings. Thus, instead of activating all the word meanings and then selecting the appropriate meaning, only one meaning that is context-appropriate is activated. For example, when a reader encounters the word "bank" (bank: financial institution or edge of the river), both meanings according to the first view will be activated in the reader's mind, but context facilities the selection of the appropriate meaning. However, according to the other view, only one meaning will be activated in the reader's mind that is relevant to the contextual information; the other meaning will not be activated at all. In Arabic both views of context facilitation may occur. That is, when an Arabic text is vowelized, all the word's different meanings may be activated before the facilitation of context, but context will facilitate the selection of the appropriate meaning. Whereas when a text is unvowelized, context will facilitate the activation of only the most relevant meaning (Abu-Rabia, 2002).

In the L2 reading literature, research findings show that context is not often helpful in word recognition unless most of the surrounding words are known. A larger proportion of the words in a text must be known in order for context to facilitate the guessing of unknown words (Wolter & Helms-Park, 2016). Knowing most of the surrounding words requires a higher level of

reading proficiency, which indicates that context may only assist proficient L2 readers but not low proficient L2 readers.

2.2.3 Word Recognition in Different Writing Systems:

Word decoding processes are affected by the variations of writing systems (Koda, 2005). The major difference between the writing systems of the world is whether graphemes are connected to meaning (e.g., Chinese) or sounds (e.g., Italian) (Cook & Bassetti, 2005; Sproat, 2006; Rogers, 2005). Graphemes in phonographic writing systems are written to represent phonological units such as phonemes, morae, or syllables. In meaning or morphographic writing systems, graphemes are directly connected to meaning with no necessity for phonological extraction. Word recognition is affected by how the phonological or morphological information of graphemes are decoded and encoded in the language. Where alphabetic writing systems are phonologically decoded and encoded, other writing systems may use different decoding and encoding processes (e.g., Chinese language uses morphological representation, and many Chinese characters involve sub-components that facilitate the recognition of meaning). Although the Arabic writing system is considered an alphabetic writing system, it differs from most alphabetic languages (e.g., English, Spanish, Italian, etc.) in the sense that consonants and long vowels are primarily represented, but short vowels are optionally added by diacritical marks. This system is called "abjad" and used in most Semitic languages such as Arabic and Hebrew (e.g., Rogers, 2005).

2.3 L2 Word Recognition Models and Theories

Research on the development of the reading process is generally derived from L1 reading research that is mostly conducted on L1 English reading. Accordingly, reading models are

generally drawn from L1 English reading research (Grabe, 2009; Hudson, 2007), which makes

them inherently biased towards a particular language (e.g., English) and a particular writing

system (e.g., the Roman alphabet) and may not be applicable or consistent with reading in other

languages (e.g., Arabic). Researchers have suggested that the basic cognitive processes are

similar across languages (Grabe, 2009), and readers from one language will develop similar

reading processes when learning to read in another language, but L2 reading studies have come

up with important additional insights about the nature of L2 reading show that it is different from

L1 reading (e.g., word recognition among different groups of L2 readers, Koda, 2005).

Although L2 reading research and models are based on L1 reading research, there are

some aspects that are specific and unique to L2 reading. Different theoretical models have been

proposed to explain the nature of L2 reading. While some of them attempt to explain the general

nature of reading comprehension, other models attempt to explain the nature of reading

subcomponents that are essential for reading processes and comprehension, such as lexical or

word recognition, syntactic processing, and working memory (e.g., the Lexical Quality Model

(Perfetti, 2007)). Such specific models include lower-level processes (i.e., word recognition) that

are considered a fundamental prerequisite for higher level processes and reading comprehension

(Hansen, 2010; Nassaji, 2011). The following paragraphs describe the four main models

discussed in the literature which provide a theoretical framework for this study.

2.3.1 Bernhardt's Model

Bernhardt (1991; 2000; 2005) provided one of the most comprehensive and interactive

L2 reading models that capture both bottom-up and top-down processing (Brantmeier, 2004).

Bernhardt pointed out that L2 studies in the 1970s and 1980s were based on conceptions of L1

literacy research, which eventually led to the belief that L2 reading issues were either a grammar

issue or a prior knowledge issue. However, based on a synthesis and close investigation of many studies, she concluded that there are far more complex variables involved in L2 reading than there are in L1 reading. Prior knowledge alone is not sufficient to explain the complexity of L2 reading processes. Other variables that affect L2 performance such as word recognition processes, syntax knowledge, vocabulary knowledge, and L2 proficiency are involved. Therefore, she posited a model that attempts to capture a holistic depiction of the interaction of such variables in the L2 reading process. The model integrates different conceptions of L2 reading that consist of micro-level features (e.g., graphophone, word recognition, syntax), macro-level features (e.g., background knowledge, perceptions, strategies), and other factors that are unique to L2 reading process (e.g., L1 literacy, L2 proficiency).

The model also looked at the development of these variables and how they interact with each other over time. While word recognition and phonological issues seem to affect L2 reading developments at the early stages, syntax knowledge appears to affect L2 reading development at later stages. Bernhardt suggested that these variables operate in a synchronic, interactive, and synergistic way to compensate for any deficiencies in the development of L2 reading ability, which aligns with the compensatory processing model (Stanovich, 1980). She also stated that when an L2 reader starts to learn reading in an L2 setting, they do not start from point zero but from a point above it. This is attributed to the pre-existing literacy knowledge that an L2 reader brings at the set-off point of reading in L2, particularly with cognate languages. This point highlights one of the major differences between learning to read in L1 and L2.

Bernhardt's model has drawn attention to variables that are important in L2 reading acquisition other than those that were derived from L1 literacy (e.g., background knowledge). The model emphasized the importance of word recognition at the beginning of L2 reading

acquisition, particularly when the two languages (native and second language) are orthographically different or have different writing systems. It also emphasizes the importance of L2 proficiency and suggests that different factors may have different effects on the reading development of L2 readers at different proficiency levels. The model suggests that word recognition processes affect the reading comprehension of low proficient L2 learners more than they do for high proficient L2 learners. Thus, this study was designed to investigate word recognition at different L2 proficiency levels in order to examine the effects of the study variables on L2 readers at different proficiency levels.

2.3.2 *The Bilingual Interactive Activation (BIA) Model*

The effect of orthography on L2 word recognition is depicted in the Bilingual Interactive Activation (BIA) model, and its revised version the BIA+ (Van Heuven, 2005). This model is generated from the Interactive Activation (IA) model that was hypothesized for L1 word recognition. There are two theoretical perspectives about the bilingual word recognition process. One perspective proposes that there are two independent and separate lexicons, thus word processing of one language is not affect by the other. The other perspective postulates that there is one integrated lexicon, thus word processing of one language is influenced by the knowledge of the other language. Most studies support the non-selective access to integrated lexicon. The BIA model assumes that L1 and L2 share the same storage where meaning can be activated from both L1 and L2 through the visual input, particularly when the two languages have similar writing systems.

The BIA model posited four nodes that are involved in word recognition: features, letters, word, and language. The interaction between these nodes uses a pattern of activation and inhibition to arrive to the particular word form and its meaning. That is, a string of features

activates letters that contain these features and inhibit other letters. Letters then activate words that contain these letters and inhibit others. Before the interaction of language node, a word is activated in both L1 and L2 when there are similarities. The language node then activates the selected language and inhibits the non-selected one. The language node seems to be operated for languages that share the same script, for example English and Dutch, or scripts that have some commonalities, such as the Roman and Cyrillic alphabet, where sometimes words or part of words can be parsed in either script (Angermeyer, 2005; 2012). However, it's hard to assume that this process will operate when L1 and L2 have different scripts, such as English and Arabic. An English and Arabic bilingual reader will activate either language right after they see the text. The visual word recognition may operate the other nodes but not the language node since the selected language is already activated. Thus, this study aimed to investigate learners whose L1 and L2 scripts are different (English and Arabic) to activate the selected language and minimize the effects of their L1. Moreover, in the revised version of this model (the BIA+), three nodes were added: (1) a phonological component that accounts for sound-based similarities; (2) a semantic component that accounts for semantic overlap; and (3) a non-linguistic task/decision system that incorporates other non-linguistic factors that might affect word recognition.

2.3.3   The Dual-Route Model

Visual word recognition and reading aloud are described in the Dual-Route Model (Coltheart, et al., 2001). There are two routes for decoding and reading a printed word. One relies on the letters-sounds correspondence (phonological route), the other route relies on retrieving the whole word from the mental lexicon (lexical route). In the phonological route, the word is read letter-by-letter, and letters are mapped into phonemes that are assembled into larger phonological units. A word in this route can be read aloud with or without knowing its meaning

(Cook & Bassetti, 2005). However, in the lexical route, a word is recognized as a whole unit and must be accessed in the mental lexicon before pronunciation is retrieved. This route is used for irregular words where letter-sound mapping fails to match the target pronunciation.

One important aspect in the discussion of these two routes is the involvement of phonology, sound (Coulmas, 2003), particularly in the lexical route, where sounds are thought to be accessed post-lexically, not pre-lexically. A word has to be identified in the reader's mind (the mental representation) before they can read it or pronounce it. This follows the "Universal Direct Access Hypothesis" (Baluch & Besner, 1991) where word reading always occurs by a visual route, with phonology only used when required. However, Scholfield and Chwo (2005) indicate that while phonological recoding always occurs pre-lexically in the phonological route, there is increasing evidence that phonological recoding also occurs pre-lexically in the lexical route. Sounds are accessed from the written shape on the way to the meaning (pre-lexically), not as a series of segments as in the phonological route, but as a holistic word sound shape or "addressed phonology". A similar idea is hypothesized in the "Universal Phonological Principle" (Perfetti & Zhang, 1995), where written words are always read with some access to phonology due to the phonological representations in the working memory, regardless of what route has been used. However, the difference between the two routes is recently not seen as one route involving sound (phonological) and the other route not (lexical), but as a matter of dominance in route selection, where readers of a language may prefer one route over the other (Scholfield & Chwo, 2005).

There are some factors that affect the selection or preference of each route. The first factor is word frequency. High frequency words favor the lexical route. Readers seem to recognize frequent words as a whole but not letter by letter due to their frequent occurrence. The second factor that affects the use of decoding route is word familiarity. When the reader is

familiar with the word (e.g., sight words), they will most likely use the lexical route. But, when the reader is not familiar with the word or the word is nonsense, it is hard, if not impossible, to read it using the lexical route because it does not exist in their lexicon. Instead, they use the phonological route. The third factor is the type of task that the reader is required to do, particularly in an experimental setting. While some tasks may favor the phonological route (e.g., sound similarity judgment), other type of tasks may favor the lexical route. Lastly, the fourth factor that affects the use of decoding route is the reader's age. For example, younger children find the lexical route conceptually easier (Scholfield & Chwo, 2005), particularly in deep orthographies like English where some letters are not consistent with their sounds.

The two decoding routes have been claimed to work independently and in a parallel manner (Humphreys & Evett, 1985), but one route may be more dominant in a given language, based on its writing system. In other words, while both routes can be used when learning to read in a language, one route, as reading is developed, will be selected to be the dominant route based on the writing system of that language. In English, children may use the phonological route at the beginning of reading English words, but with many failed attempts due to the irregularities in letter-sounds mapping, they will shift to use the lexical route more often (Cook & Bassetti, 2005; Coltheart, et al., 2001; Perfetti & Dunlap, 2008).

Another, but different, example may come from Arabic. In Arabic, children in their first years of education, usually from grade one to grade four, are only exposed to vowelized texts that are shallow and transparent in regard to the letter-sound correspondence. Thus, they use the phonological route. However, later in their years of education, usually from grade four and upwards, they will mostly be exposed to unvowelized texts that are opaque and non-transparent in regard to the letter-sound correspondence. This will lead them to shift from the phonological

route to the lexical route, which is more appropriate for reading unvowelized Arabic words (Fender, 2008; Maroun & Hanley, 2017; Abu-Leil, et al., 2014; Taouk & Coltheart, 2004). This shift among young Arabic readers from the phonological decoding route to the lexical decoding route is suggested to be one of the reasons that delay their reading acquisition (Asadi, et al., 2017). However, after sufficient exposure to unvowelized words, skilled Arabic readers will prefer the lexical route over the phonological route because of the absence of important phonological information in the unvowelized representation of Arabic words. For L2 Arabic reading, advanced English L2 Arabic learners are supposed to use the lexical route more than the phonological route similar to native Arabic readers, but research findings showed the opposite. They tend to use the phonological route more often (Khaldieh, 1996). The explanation was attributed to the visual complexity of the Arabic writing system as well as to the availability of context. They use the visual (lexical) route more when they read isolated Arabic words, but when they read words within a sentence, they use the phonological route more often (Khaldieh, 1996). One of the goals of the current study was to examine the effects of context, voice, and vowelization on L2 Arabic readers to find out which decoding route they would prefer.

2.3.4   *The Orthographic Depth Hypothesis*

The Orthographic Depth Hypothesis (Katz & Frost, 1992) explained the relationship between graphemes and phonemes in regard to word representation and recognition. The grapheme-phoneme correspondences affect phonological information extraction, which consequently affects word recognition. The correspondences range from very shallow or transparent correspondences to very deep or opaque correspondences. In shallow and transparent orthographies, the grapheme-phoneme relationships are highly regular and transparent, usually one-to-one correspondence. Each letter corresponds to one phoneme that is represented by one

grapheme. Thus, the phonological information is retrieved from the presented graphemes in a straightforward, systematic manner. In deep or opaque orthographies, grapheme-phoneme relationships are irregular and non-transparent. One phoneme may be represented by different graphemes (e.g., the sound [k] is orthographically represented by < k, c, ck, qu >), or one grapheme may represent different phonemes (e.g. the letter < c > may represent different sounds [s, k]). While phonological information is easy to be extracted in shallow orthographies because of the one-to-one grapheme-phoneme correspondence, it may be difficult in deep orthographies to extract phonological information due to the indirect grapheme-phoneme correspondences.

The word recognition process is believed to be easier and effortless in shallow orthographies because phonological decoding is simple and straightforward. But, in deep orthographies, lexical identity access (lexical mental representation) may be needed to retrieve the word meaning and its phonological information. Accessing lexical information through the visual input (orthographic information) facilitates phonological extraction in deep orthographies (Koda, 2005). Therefore, grapheme-phoneme correspondence and its association with phonological or orthographical information influences the way a word is recognized in different languages with different writing systems. While shallow writing systems seem to rely on phonological information extraction, deep writing systems appear to heavily rely on orthographical information. Grapheme-phoneme correspondences differently influence word recognition processes in different writing systems (Koda, 2005).

In Arabic, the presence/absence of diacritical marks (e.g., vowelization) determines the depth of its orthography (Frost, 1998). It is considered shallow when diacritical marks are represented "because all of the phonological information, necessary for reading aloud, is represented in the text" (Asaad & Eviatar, 2013, p.157). Reading vowelized Arabic words is

suggested to rely on phonological information (phonological processes). However, when diacritical marks are not represented, the Arabic writing system as used in the Standard Arabic language is considered deep "because information about the vowels must be inferred from contextual and lexical representations" (Asaad & Eviatar, 2013, p.157). Reading unvowelized Arabic words is said to rely on orthographical information (lexical processes) and context cues (Abu-Rabia, 2001; Frost, 1998). Unlike Roman writing systems where each writing system is considered as either shallow or deep, depending on its grapheme-phoneme correspondences, the Arabic writing system is a type of writing system where you can see both representations, the shallow representation (when diacritical marks are represented), and the deep representation (when diacritical marks are absent).

Finally, research on the effect of orthography (or writing system) on L2 word recognition has mostly been conducted in English, which led this research to emphasize some characteristics that are important for English reading but not particularly relevant to many other languages (Share, 2008). Thus, many researchers call for more research on languages other than English in order to broaden our understanding about the effect of writing systems on L2 word recognition. For example, homograph is a factor that may be marginal to learners of L2 English but is crucial to learners of French, Chinese, Japanese, and Arabic (Cook & Bassetti, 2005). Diacritics is another factor that does not exist in English but may be critical for reading in other languages (e.g., vowel marks in Arabic and Hindi, accent marks in French). Thus, investigating the effects of the Arabic writing system on L2 word recognition will contribute to filling in this gap in the literature.

2.4   Research on Word Recognition in Arabic

2.4.1   Visual Complexity of the AWS

A writing system is a system of graphic marks that visually represent utterances of a language by relating to their phonology and/or morphology. A writing system is the way in which phonological or morphological information are represented in a language. To be able to read in any language, readers must be able to convert writing symbols to meaningful information. The process of converting writing input automatically into speech is widely believed to be affected by efficient visual word recognition and lexical access (Vellutino, et al., 2004). L1 and L2 reading acquisition were found to be greatly affected by the transparency relationship between phonological information and writing symbols (Orthographic Depth Hypotheses: Frost, et al., 1987; Katz & Frost, 1992). Additionally, the relationship between morphological information and writing symbols was also suggested to play a role in reading acquisition (Abu-Rabia & Abu-Rahmoun, 2012; Cook & Bassetti, 2005).

The AWS is believed to be visually complex, which influences the reader's working memory and cognitive load, which consequently affects reading comprehension and fluency (Shankweiler, 1989). Slowness and inaccuracy in word identification are the main consequences of visual complexity, which means that orthographic representation contributes to both word decoding and reading fluency (Asadi et al., 2017). Several recent psycholinguistic studies have reported that the complexity of AWS slows word identification processes (Abu-Leil, et al., 2014). Reading in Arabic was found to be slower and more challenging than reading in other languages such as Hebrew, English, French, and Serbo-Croatian (Azzam, 1984; Bentin & Ibrahim, 1996; Frost et al., 1987; Ibrahim et al., 2002; Ibrahim et al., 2007; Katz & Frost, 1992; Roman & Pavard, 1987). More interestingly, native Arabic readers have been found to read their

L1 slower than reading their L2 (e.g., Hebrew) (Ibrahim et al., 2007). Another finding suggests that learning to read in Arabic is more difficult than learning to read in other languages. Native Arabic children were found to acquire reading at a later age in comparison to children learning to read in other languages such as Hebrew and English (Abdelhadi et al, 2011). These two main findings in reading Arabic are partially attributed to the visual complexity of the AWS (Abdelhadi et al, 2011; Asaad & Eviatar, 2013; Dai, et al., 2013; Ibrahim, 2013; Khateb, et al., 2013; Taha, 2016).

Although vowelization may improve reading accuracy, it may increase reading time. Roman and Pavard (1987) examined the effects of vowelization on native Arabic readers using the eye movement technique. Participants were asked to silently read fully vowelized and unvowelized Arabic short passages. The findings showed that vowelization increased the number and duration of eye fixations, which resulted in a reduction in the participants' reading speed. Roman and Pavard explained these findings as a result of the visual complexity of vowelization, that added more visual information and delayed the processes of word identification (they called it: *perceptual noise*).

However, most Arabic words are based on trilateral (three-consonant) or quadrilateral (four-consonant) roots. Different words derived from these roots are formed by the use of affixes and the combination with different stem vowels. As a result, many of these derived word forms look identical in writing (i.e., are homographs) if they are written without vowelization (Abu-Rabia & Siegel, 1995). Arabic readers (especially novice readers) have difficulty reading unvowelized words because of this inherent ambiguity. Thus, if vowelization and context are not available, then the correct reading of every second or third word is ambiguous (Abu-Rabia & Siegel 1995). This indicates that vowelization is an important facilitator in the process of word

recognition because of the homograph phenomenon in Arabic, particularly in the absence of context. Arabic writers, when targeting novice Arabic readers, purposely use vowelization to facilitate novice readers' reading accuracy.

Skilled L1 Arabic readers use contextual cues to compensate for the absence of vowelization. This indicates an important difference between Arabic and English readers. In English, "skilled readers rely on their autonomous decoding of each word and do not need the context to facilitate word recognition. Only poor readers lacking these automatic decoding skills compensate for this deficit with other resources" (Stanovich, 1980 as cited in Abu-Rabia, 1997a, p.66). Meanwhile in Arabic, both skilled and poor Arabic readers use and benefit from contextual cues, where skilled readers benefit the most. When reading unvowelized Arabic texts, the reader must first understand the sentence in order to recognize unknown words (Abu-Rabia, 1997a). This kind of cognitive activity entails high level processing skills which is difficult for poor readers to attain, thus, they tend to benefit less from context (Abu-Rabia, 1997b).

2.4.2 The Effects of Vowelization and Context on L1 Arabic Word Recognition

Vowelization was found to have positive effects (Abu-Rabia, 1996; 1997a; 1997b; 1998; 1999; 2001), negative effects (Ibrahim, 2013; Taha, 2016), or neither (Hansen, 2010) on word recognition processes of L1 Arabic readers. Abu-Rabia in a series of studies investigated the effect of vowelization and context on L1 Arabic reading accuracy (e.g., Abu-Rabia, 1996; 1997a; 1997b; 1998; 1999; 2001). In his 1996 study, Abu-Rabia investigated the role of vowelization and context in Arabic word recognition. Sixty skilled L1 Arabic high school students were asked to read vowelized and unvowelized words in two conditions: isolated and within context (in paragraphs). Participants were only tested on their accuracy, where unvowelized isolated words could be read in any way, as long as they corresponded with the presented letters. The results

indicated that participants read the words within context more accurately than without it, whereas vowelized words were read more accurately than unvowelized words in both conditions. Participants made the highest number of errors when they read the unvowelized isolated words, and the least number of errors when they read vowelized words within context. This indicates that vowelization and context are significant facilitators in reading Arabic words among skilled L1 Arabic readers. Abu-Rabia (1996) pointed out that the Arabic word recognition process is not an autonomous process but a context-dependent process, where vowelization and context facilitate the activation of the correct word pronunciation. However, reading vowelized words may take longer than unvowelized words, an issue that Abu-Rabia (1996) did not investigate in this study.

Abu-Rabia (1997a) also investigated the effects of vowelization and context on the Arabic reading accuracy of L1 Arabic readers. In his previous study (Abu-Rabia, 1996), he examined skilled readers only, but in this study, he included seventy skilled L1 Arabic readers and thirty-nine poor L1 Arabic readers. Participants were asked to read vowelized and unvowelized texts as well as vowelized and unvowelized isolated words. The results showed that both participant groups (poor and skilled readers) performed better with vowelized texts and vowelized isolated words, which indicates that vowelization facilitates word recognition and reading processes. The results also showed that context helps participants improve their reading, but skilled readers benefit from context more than poor readers. The highest level of participant performance was obtained when both vowelization and context were available (vowelized texts). The second highest level was obtained when vowelization was available (vowelized texts and isolated words). The third level was obtained when context was available (unvowelized text), and the lowest level was obtained when both vowelization and context were absent (unvowelized

isolated words). This altogether suggests that vowelization and context are important variables that facilitate word recognition and reading accuracy of both poor and skilled L1 Arabic readers.

Similar results were obtained in Abu-Rabia (1997b). Abu-Rabia included thirty-four poor and forty-four skilled L1 Arabic readers who were asked to read Arabic paragraphs, sentences, and isolated words using three conditions (fully vowelized, partially vowelized and unvowelized) in order to investigate the effects of vowelization and context. The results of reading paragraphs showed that both groups of participants read fully vowelized paragraphs more accurately than unvowelized paragraphs, whereas partially vowelized paragraphs fell in between. The results of reading sentences showed that both groups of participants read the fully and partially vowelized sentences more accurately than unvowelized sentences, while the difference between reading fully and partially vowelized sentences was not significant. Context was suggested to help readers to compensate for the partial absence of vowelization. The results of reading isolated words showed that both groups of participants read fully vowelized words more accurately than unvowelized words, whereas partially vowelized words fell in between. These findings indicate that vowelization and context play an essential role in the reading accuracy of native Arabic readers.

However, it is worth noting that although Abu-Rabia added the partially vowelized condition that was not used in his previous studies, it was classified by adding only one vowel to the last letter of the words (word-final vowel). An important distinction should be made here: word-final vowelization (syntactic vowelization) provides syntactic information, whereas the other vowelization (morphological vowelization) provides morphological information. The findings of Abu-Rabia (1997b) revealed that word-final vowels (the syntactic vowelization) enhance word recognition and reading performance of both poor and skilled L1 Arabic readers.

The inclusion of partial vowelization was found to be more beneficial in all reading materials (paragraphs, sentences and isolated words) than the exclusion of vowelization. As for partial vowelization in comparison to full vowelization, the findings showed that while there were no significant accuracy differences in reading partially and fully vowelized sentences, fully vowelized paragraphs and isolated words were read more accurately than were partially vowelized paragraphs and isolated words. These findings indicate that partial vowelization is somehow equivalent to full vowelization in short texts such as sentences. However, with no context (isolated words) or long context (paragraphs), full vowelization seems to lead to more reading accuracy than partial vowelization did.

Abu-Rabia (1998) continued investigating the effects of vowelization on reading accuracy using different vowelization conditions: correctly vowelized, unvowelized and wrongly vowelized. He included sixty-four L1 Arabic readers, with half being skilled readers, and the other half poor readers. Participants were asked to read as accurately as possible twelve Arabic texts extracted from four different genres (narrative, informative, poetic, and Koranic). One text of each genre was correctly vowelized, the second one was unvowelized, and the third one was wrongly vowelized. The results confirmed the benefits of vowelization in word recognition of skilled and poor L1 Arabic readers particularly within context, whereas skilled readers benefited more from vowelization than poor readers did. Although reading narrative and informative texts may be considered easier than poetic and Koranic texts, because poetic and Koranic texts may contain higher percentages of low frequency words, both groups of readers benefited from the presence of vowelization in all of these genres. Interestingly, Abu-Rabia reported that poor and skilled L1 Arabic readers did not ignore vowelization when they were wrongly represented on the letters, which led to wrong pronunciations. This finding suggests that L1 Arabic readers are

sensitive to vowelization, and a minor error in placing a vowel can lead to incorrect phonological decoding.

Alshdifat (2014) investigated the effects of vowelization and context on the reading accuracy of low and high skilled L1 Arabic readers. The study included 48 ninth grade Jordanian native Arabic students reading vowelized and unvowelized isolated words as well as vowelized and unvowelized texts. Results from reading isolated words showed that both groups of readers read the unvowelized isolated words more accurately than the vowelized isolated words. This is expected due to the homographic phenomena in Arabic. Arabic unvowelized words can be read correctly in many different ways, whereas vowelized words can only have one correct pronunciation. Therefore, Alshdifat concluded that it is methodologically inappropriate to compare reading accuracy of unvowelized isolated words with vowelized isolated words. The possible correct ways of pronouncing unvowelized words give them a privilege over their vowelized counterparts. The results from reading vowelized and unvowelized texts showed that vowelization played a significant role in reading accuracy of both types of readers. Low and high skilled L1 Arabic readers read vowelized texts more accurately than unvowelized texts, particularly high skilled readers. While other studies showed that low skilled readers benefit the most from context (e.g., in English) (Stanovich, 1980), this study showed that high skilled L1 Arabic readers benefit from context more than their low skilled L1 Arabic counterparts. High skilled L1 Arabic readers benefited the most when vowelization and context were present.

Alshdifat's (2014) findings also indicated that it is better to either have both or none of the vowelization and context available than to have only one of them available. That is, while the absence of both vowelization and context (unvowelized isolated words) gives readers a variety of correct pronunciations, the presence of both vowelization and context (vowelized texts) provides

all the phonological and contextual information necessary for reading accuracy. However, when vowelization is only available with isolated words, the correct pronunciation is reduced to one correct pronunciation, but it lacks contextual cues that help L1 Arabic readers predict the correct intended pronunciation. Meanwhile, when context is only available with unvowelized texts, the correct pronunciation of words is reduced to one correct pronunciation, but this would lack sufficient phonological information to help readers with their decoding accuracy.

Additionally, Arabic syntactic vowels (word-final vowels) can be substituted with *Sukun*, where a word's pronunciation would still be considered correct. Alshdifat looked at this issue from a methodological perspective. He provided two analyses: one in which *Sukun* (the absence of syntactic vowelization) is considered correct and the other as incorrect. In the latter analysis where participants had to pronounce the syntactic vowels for their pronunciation to be considered correct, the findings showed that both types of readers obtained lower accuracy rates. However, when the absence of syntactic vowelization was considered correct, participants achieved higher accuracy rate. While these findings contradict the findings about the effects of partial vowelization in the Abu-Rabia (1997b) study, they showed that L1 Arabic readers prefer to substitute the syntactic vowels with *Sukun*, which indicates that the way of analysis affects the results. Thus, researchers should explicitly explain their coding methodology whenever the goal is to examine the effects of vowelization on accuracy.

The studies reported above (Abu-Rabia, 1996; 1997a; 1997b; 1998; Alshdifat, 2014) investigated the effects of vowelization and context in word recognition and reading aloud accuracy. Abu-Rabia (1999; 2001) added to the literature by investigating the effects of vowelization on reading comprehension. In his 1999 study, Abu-Rabia investigated the effects of vowelization on reading comprehension by examining 74 sixth-grade L1 Arabic students (who

had already been exposed to unvowelized Arabic texts) and 71 second-grade L1 Arabic students (who still use vowelization in their textbooks). The findings revealed that vowelization improved reading comprehension of both beginner and advanced L1 Arabic readers. Advanced readers still benefited from the presence of vowelization even when they have learned to read without it.

Abu-Rabia (2001) examined sixty-five adult L1 Arabic readers reading vowelized and unvowelized isolated words and paragraphs in both Arabic (their L1) and Hebrew (their L2). The purpose of the study was to investigate the effects of vowelization and context on their reading accuracy in the two languages. Participants were also asked to read vowelized and unvowelized short stories, in Arabic and Hebrew, and answer multiple-choice comprehension questions. Results from reading isolated words and paragraphs showed that vowelization and context improve participants' reading accuracy. Vowelized isolated words and paragraphs were read more accurately than unvowelized isolated words and paragraphs in the two languages. This demonstrates the positive influence of vowelization on reading accuracy. There were no significant differences between reading vowelized isolated words and vowelized paragraphs. Vowelization helped participants read more accurately whether context was available (paragraphs) or not (isolated words).

However, the advantage of context could be seen with the unvowelized isolated words and paragraphs. The reading accuracy of unvowelized paragraphs, where context was available, was much higher than the reading accuracy of unvowelized isolated words, where context was unavailable. Context helped participants reach a higher level of accuracy when vowelization was absent. These findings indicate that context plays an important role in the reading accuracy of L1 Arabic readers when vowelization was absent. But, when vowelization was present, context has less influence on the reading accuracy of L1 Arabic readers because all the necessary

phonological information was present. Participants did not have to use context cues to extract the correct pronunciation of words.

With regard to the effects of vowelization on reading comprehension, the findings of Abu-Rabia (2001) revealed that vowelization facilitated silent reading comprehension of both beginner and skilled L1 Arabic readers. Participants comprehended the short stories in the two languages better when vowelization was present than when it was absent, a finding that was recently confirmed by Abu-Liel et al. (2014) for skilled adult L1 Arabic readers when reading short text passages. Abu-Rabia (2001) attributed these findings to the additional phonological information that is provided by vowelization, which assists the L1 Arabic readers to disambiguate homographs and recognize the precise meaning of words. As a result, less cognitive effort is needed for recognizing words, and more effort is allocated for text comprehension.

Although vowelization has been found to be an important variable for reading accuracy and comprehension, its appearance decreases reading speed of native Arabic readers. Hussien (2014) investigated the effects of vowelization on the oral reading accuracy, speed, and comprehension of eighty-five L1 Arabic students (34 fifth graders and 51 tenth graders) recruited from schools in Saudi Arabia. Participants were asked to read vowelized and unvowelized Arabic texts excerpted from two different genres, informational and poetic. Results showed that participants accurately read and comprehended the vowelized texts of both genres more than they did the unvowelized texts. But they spent more time reading the vowelized texts of both genres in comparison to the unvowelized texts. Results also showed that participants read the informational genre in both conditions (with and without vowelization) more accurately and rapidly with more comprehension than they did the poetic genre in both conditions. The findings

indicate that vowelization improved reading accuracy and comprehension, but decelerated reading speed. This implies that vowelization can concurrently have both positive and negative influences on words recognition and the reading processes of L1 Arabic readers. Arabic is mostly written without vowelization, and Arabic readers should be able to read Arabic texts without vowels to be considered fluent. Thus, Arabic students should dedicate more time and effort to transition from reading vowelized texts to accurately reading unvowelized texts.

One issue worth noting is that the use of vowelization may lead to higher visual complexity that can influence reading speed as well as accuracy, particularly for skilled L1 Arabic readers. Ibrahim (2013) examined the effects of vowelization on word recognition among young skilled L1 Arabic readers. Seventy-five (eighth-grade) L1 Arabic students were asked to read aloud isolated words (vowelized and unvowelized) and pseudowords as quickly and accurately as possible. The words of the study were controlled for length (between 3-6 syllables) and frequency (form low to high frequency words). Results showed that pseudowords were read at the slowest rate and least accurate, which was expected, but the unvowelized words were surprisingly read more quickly and more accurately than the fully vowelized words. Although these findings contradict Abu-Rabia's (1996; 1997a; 1997b; 1998) findings, Ibrahim provided several possible explanations that may account for this contradiction.

First, the work of Abu-Rabia only tested reading accuracy, but not reading speed. Second, participants were skilled Arabic readers who have had no contact with vowelized Arabic script for several years. Thus, adding vowelization to Arabic words may look abnormal and distract them. Third, studies showed that there are two routes to recognize a word: the phonological route, where readers go letter by letter to decode a word and then recognize its meaning; and the orthographic route, where readers recognize the word as a whole (whole word

recognition) (Coulmas, 2003) before they attain its phonological information from memory (Coltheart, et al., 2001). Participants in Ibrahim's (2013) study were fluent readers who usually rely on orthographic information more than phonological decoding (Fender, 2008; Taouk & Coltheart, 2004). Thus, vowelization seems to add more phonological information that increases the visual complexity of words and slows the word recognition process of fluent L1 Arabic readers.

However, regarding the measurement of reading accuracy it is worth noting that in Arabic, for an unvowelized word, multiple different pronunciations could be coded as correct, whereas a vowelized word has only one correct pronunciation. Ibrahim (2013) did not clarify how correct Arabic unvowelized words were coded and analyzed. Each vowelized Arabic word has only one correct pronunciation, where there are no problems in coding the correct and non-correct pronunciations. However, unvowelized Arabic words are highly homographic and each can be read with different pronunciations depending on the context. Reading Arabic homographic words without context is difficult (if not impossible) to be narrowed to one correct pronunciation. Thus, how Ibrahim (2013) coded the unvowelized word pronunciation is an important methodological question that needs clarification. If Ibrahim (2013) considered any possible pronunciation of the unvowelized words correct, then this may give the unvowelized words an extra credit (or privilege) that vowelized words do not have, which may explain the high rate of accuracy for the unvowelized words over the vowelized words. However, if this was not the case, then his coding of unvowelized word pronunciation remains an issue that requires clarification.

Another possible explanation of Ibrahim's (2013) findings, particularly in regard to reading speed could be that skilled L1 Arabic readers are usually exposed to unvowelized texts;

vowelization only appears in important texts (e.g., in the holy book: The Quran) to indicate that caution with pronunciation is desired. L1 Arabic readers usually tend to read such texts carefully with more caution to the vowelization and their correct representation. Thus, when the skilled L1 Arabic readers of his study saw vowelization in some of the words, it is possible that they dedicated more attention and time to read them.

Finally, Taha (2016) examined the effects of vowelization on reading accuracy and speed among poor and skilled young L1 Arabic readers. The readers were recruited from three different age groups (second grade, fourth grade, and sixth grade), and they were asked to read real Arabic words as quickly and accurately as possible. The selected words were controlled for length, 3-6 letters and 1-4 syllables. Results from fourth and sixth graders indicated that both poor and skilled L1 Arabic readers read the unvowelized words faster and more accurately than they did the vowelized words. Results from second graders showed that while skilled readers read unvowelized words more accurately than they did vowelized words, the difference in reading speed was not significant. In contrast, poor readers from second graders showed no significant difference in reading accuracy or speed.

While the findings from second graders indicated that accuracy precedes automaticity (Vanniarajan, 2012), the findings from fourth and sixth graders confirmed the findings of Ibrahim (2013) that vowelization negatively affects skilled L1 Arabic readers. Vowelized words were read less accurately and slower than unvowelized words. The findings also suggested that vowelization is not as important for advanced L1 Arabic readers, due to these readers' ability to use the orthographic route, as it is for beginner L1 Arabic readers who heavily rely on phonological decoding. Beginner L1 Arabic readers rely on phonological decoding unlike skilled L1 Arabic readers who mostly rely on whole word decoding (orthographical route). Thus,

vowelization may be very helpful for beginner L1 Arabic readers, but not for advanced (or skilled) L1 Arabic readers. Vowelization may add more visual complexity and more cognitive load for advanced L1 Arabic readers that may result in lower recognition accuracy and more processing time.

Altogether, findings from L1 Arabic reading studies indicate the following: (1) vowelization increases reading accuracy for beginner L1 Arabic readers, but not for advanced (or skilled) L1 Arabic readers; (2) vowelization slows reading speed and process, particularly for advanced L1 Arabic readers; (3) vowelization enhances reading comprehension for beginner and advanced L1 Arabic readers; and (4) while beginner L1 Arabic readers tend to use the phonological route for word decoding, advanced L1 Arabic readers tend to use the orthographical route. Vowelization then appear to enhance the phonological route, which may help improve the word decoding processes for beginner L1 Arabic readers. However, for advanced L1 Arabic readers, vowelization seems to add more visual complexity, which distracts them and slows their word decoding processes.

2.4.3   *The Effects of Vowelization and Context on L2 Arabic Word Recognition*

In the L2 reading research, findings show that it is very rare for L2 learners to attain native-like pronunciation or speed (e.g., Vanniarajan, 2012). Cook and Bassetti (2005) noted that huge differences in reading speed are normally found between L1 and L2 readers. L2 learners in classrooms learn new words both orally and visually at about the same time, whereas native speakers develop their phonological system before they learn to read. Fast phonological decoding is critical in word learning because phonology facilitates information integration in the working memory. The *phonological loop*, a speech-based component of working memory, mediates the formation and retention of phonological information (Gathercole & Baddeley,

1993). Efficient phonological decoding facilitates the functioning of working memory and

cognitive operations (Hamada & Koda, 2008), where accuracy precedes automaticity. Fast

phonological decoding cannot be attained if accuracy has not been attained (Vanniarajan, 2012).

Additionally, orthographic input has an important role in the phonological acquisition of newly

learned words (e.g., Showalter & Hayes-Harb, 2013). In Arabic, vowelization was found to

enhance L1 phonological decoding accuracy, but its presence may add more complexity to the

AWS.

Although more research is needed to examine the effects of vowelization on L1 Arabic

readers, there is also an urgent need to examine its effects on L2 Arabic readers. Very little is

known about the effects of vowelization on the word recognition processes of L2 Arabic

learners. Among the few studies that have empirically examined the effects of vowelization on

L2 Arabic reading acquisition is Khaldieh (2001). Khaldieh investigated the relationship between

knowledge of iraab "parsing" (word-final vowels), lexical knowledge, and reading

comprehension of L2 Arabic readers. He investigated the effects of syntactic vowelization and

vocabulary knowledge on L2 reading comprehension. Syntactic vowelization, as mentioned

above, concerns those vowels that are placed on the last letter of a word to mark its syntactic

function. Forty-six native English L2 Arabic learners were asked to read an Arabic short story

and then write an immediate recall protocol, as well as complete a vocabulary task and an iraab

(parsing) task. Results revealed that while vocabulary knowledge highly contributed to L2

reading comprehension, the word-final vowels (syntactic vowelization) did not play a significant

role in L2 Arabic reading comprehension. There was no relationship between word-final vowel

and reading comprehension or vocabulary knowledge. Knowledge of one did not affect

knowledge of the other and vice versa, which suggests that word-final vowels do not have an effect on L2 word knowledge or reading comprehension.

Abu-Rabia (1997b) indicated that word-final vowels enhance word recognition and reading performance of poor and skilled L1 Arabic readers, but the lack of correlation between word-final vowels and L2 Arabic reading comprehension found in Khaldieh (2001) suggests that word-final vowels do not seem to have an influence on Arabic reading comprehension of L2 Arabic learners. In fact, similar to L1 Arabic readers, L2 Arabic readers appeared to ignore word-final vowels. L1 and L2 Arabic readers did not benefit from the use of word-final vowels in reading Arabic words and pseudowords, and they tend to ignore them while relying more on contextual cues to recognize words' syntactic functions (Taouk & Coltheart, 2004). These findings of L2 Arabic readers suggest that more time and effort in L2 Arabic classrooms should be put into vocabulary learning instead of teaching parsing that seems to be less important for L2 Arabic learners in their L2 Arabic reading comprehension.

Hansen (2010) investigated the influence of vowelization on the reading speed and comprehension of L1 and L2 Arabic readers. The study included twenty-four L1 Arabic readers, and seventy-one L2 Arabic readers at different proficiency levels (low, intermediate and advanced). With regard to reading speed, results revealed that while L1 Arabic readers and advanced L2 Arabic readers showed no speed differences in their reading of vowelized and unvowelized Arabic texts, low and intermediate L2 Arabic readers read the vowelized text slower than they did with the unvowelized text. Hansen pointed out that vowelization increases the cognitive demands on the decoding processes of less proficient L2 readers, which impedes the establishment of automatic word recognition that is necessary for reading fluency. However, Hansen did not measure reading accuracy, an important factor that could explain the effects of

vowelization on L2 Arabic word recognition and reading process. Additionally, Hansen pointed out that there may be a methodological problem with the texts in her study. The texts seemed to be easy for the L1 Arabic readers and advanced L2 Arabic readers and, as a result, these readers seemed to ignore vowelization and rely on contextual cues in reading both the vowelized and unvowelized texts. Vowelization seems to have neither positive nor negative effects on their reading speed. With regard to reading comprehension, results revealed that while L1 Arabic readers and advanced L2 Arabic readers understood vowelized texts more than unvowelized text, low and intermediate L2 Arabic readers understood the unvowelized text slightly more than they did with the vowelized text. However, the differences were unclear whether they were statistically significant or not because she could not do statistical measures due to the small number of comprehension questions. Nevertheless, she concluded that vowelization does not seem to improve reading comprehension of L2 Arabic readers.

Recently, Al Midhwah (2018) investigated the effects of vowelization on L2 Arabic reading acquisition. Al Midhwah looked at the use of vowelization in L2 Arabic textbooks and how it influences the learning of L2 Arabic reading at different L2 proficiency levels. Two L2 Arabic programs were selected: one used vowelized textbooks and the other used unvowelized textbooks. Participants were asked to read vowelized and unvowelized isolated words as well as vowelized and unvowelized texts. The findings indicated that participants who studied using vowelized textbooks outperformed those who studied using unvowelized textbooks in reading vowelized and unvowelized isolated words and texts. Participants from the vowelized textbook program at all proficiency levels read isolated words and texts significantly faster and more accurately than did those from the unvowelized textbooks program, except in two contexts. First, the beginner readers from the vowelized textbooks program read the isolated words less

accurately than did the beginners from the unvowelized textbooks program. This indicates that when L2 Arabic learners are introduced to vowelization, they heavily rely on them at the beginning of their reading learning to the point where they may not be able to read without them. Second, there were no significant differences in reading speed for the advanced participants in the two groups, which indicates that vowelization plays a minor role in advanced L2 Arabic reading processes.

2.4.4 *The effects of Voice on L1 Arabic Word Recognition*

Conducting an eye movement experiment, Hermena et al. (2015) examined the effects of processing vowelization on natural silent reading among skilled L1 Arabic readers. They used five reading conditions with a particular focus on verbs that were heterophonic homographs "whose active and passive voice pronunciations differ, while letter orthography remains identical" (p. 9). Participants were asked to read Arabic sentences that include either the active or the passive form of Arabic verbs. The five vowelization conditions were: (1) fully vowelized sentences with active verbs; (2) unvowelized sentences with active verbs, (3) fully vowelized sentences with passive verbs; (4) unvowelized sentences with passive verbs; and (5) partially vowelized sentences with passive verbs, where vowelization only appear on the passive verbs.

The findings showed that the most effective way to use vowelization with passive verbs is partial vowelization. Having vowelization only on passive verbs increases the reader's chances to recognize that a passive form of the verb is present. Full vowelization seemed to be redundant and L1 Arabic readers appear to ignore vowels when they are fully represented. Unvowelized sentences seemed to hinder the readers' ability to recognize the passive form initially, but as they precede reading, context seemed to help them recognize the intended (passive) form. When passive verbs were unvowelized, the findings indicated that L1 Arabic

readers initially preferred to read verbs in their active form. But, when context is inconsistent with their interpretation, readers reconsidered their interpretation and recognized the intended passive form. Additionally, on the effects of processing vowelization on active verb sentences, the findings showed that vowelization affected the eye movement behaviour of L1 Arabic readers. They increased the average fixation duration, which indicates that more reading time is required when vowelization is present. However, the difference was surprisingly not significant as was predicted, which may indicate that L1 Arabic readers ignore vowelization when it is fully represented in Arabic texts.

The findings of this study showed that native Arabic readers prefer to read unvowelized Arabic verbs in their active form, but no study, to the best of my knowledge, has investigated the preference of L2 Arabic readers in reading unvowelized Arabic verbs. Thus, this study aimed to fill in this gap by investigating L2 Arabic readers' preference in reading unvowelized Arabic verbs. If L2 Arabic readers prefer to read them as active verbs, it means that they have a similar preference as native Arabic readers, but if they prefer to read them as passive verbs, it means that they have a different preference than native Arabic readers.

2.5   The Purpose of the Study

The purpose of this study was to examine the role of different types (amount) of vowelization in word recognition and their effects on L2 Arabic learners' word decoding speed, accuracy, and comprehension at different proficiency levels. The study used three types of vowelization on target verbs; full vowelization, partial vowelization, and no vowelization. Full vowelization means that every letter in the target verb was vowelized. Partial vowelization means that target verbs were presented with only one diacritical mark (one vowel) that is placed

on the first letter of the verb. According to the BIA model (discussed above), four nodes are involved in word recognition and these nodes use a pattern of activation and inhibition to arrive at the particular word form and its meaning. A string of features activates letters that contain these features and inhibit other letters; the activated letters then activate words that contain these letters and inhibit others. Thus, vowelizing the first letter may help readers to activate the intended form of the verb (i.e., passive form) and inhibit the other (i.e., active form). No vowelization means that target verbs were presented unvowelized. To be able to examine the effect of vowelization, the study used Arabic verbs whose active and passive forms are homographs when they are written unvowelized, and the only way to differentiate between them is to use vowelization or context.

The study also used two context conditions, isolated and within context. While target verbs were presented isolated and without any context in the isolated condition, target verbs were presented within a sentence in the within context condition. Each sentence was presented separately and included one target verb that was placed at the beginning of the sentence (first word of the sentence). All these variables (context, voice, and vowelization) were used in this study to address the following main research question:

What are the effects of the use of different types (amounts) of vowelization (full, partial and none) on the word (past tense verbs) decoding speed, accuracy and comprehension of L2 Arabic readers at different proficiency levels when verbs are active versus passive and when verbs are presented separately (isolated) versus when verbs are presented within context?

This chapter provided an overview of the AWS, research on word recognition, key models and theories of L2 word recognition, studies on Arabic word recognition, and the purpose of this study. The following chapter describes the design, sample and methods used to address the study research question.

Chapter 3: Method

This chapter describes the criteria for selecting participants as well as participants'

demographic information. It also describes the design, materials and methods used to address the

study research question. Then, the chapter describes the tasks of this study and how participants

carried them out. Lastly, the data collection, coding, and analysis procedures are explained.

3.1   Participants

Forty-eight L2 Arabic learners were recruited to participate in this study. Participants

were recruited from the Arabic Language Institution (ALI) of Islamic University in Saudi

Arabia. The L2 Arabic programs at the ALI accepts only male students, thus, all participants of

this study were adult male students learning Arabic as a second language. While most L2 Arabic

reading studies have been done in a context where Arabic is a foreign language and participants

were learning Arabic as a foreign language, this study took place in Saudi Arabia where Arabic

is the official language of the country and participants were learning Arabic as a second

language.

3.1.1   Participants' proficiency levels

Participants were recruited from three proficiency levels (low intermediate, high

intermediate, and advanced) of the L2 Arabic program of ALI. The ALI L2 Arabic program has

four levels. Level one students are novice L2 Arabic learners; thus they were excluded from this

study. Participants who were at level two (low intermediate) were categorized as beginner L2

Arabic readers in this study, participants who were at level three (high intermediate) were

categorized as intermediate L2 Arabic readers; and participants who were at level four

(advanced) were categorized as advanced L2 Arabic learners. The proficiency level in ALI is

determined by three criteria: a placement test, an interview with the L2 learner, and a follow up

with their teachers. That is, when enrolling at the institution, every student has to take a placement test to determine his proficiency level. After the placement test is done, the student is interviewed to make sure he was placed at the appropriate level. A month later, teachers will report on their students' proficiency level, and, if they think a student needs to be placed in a different level, the necessary adjustment is made.

3.1.2 Criteria for selecting participants

Participants had to meet certain criteria to be able to participate in the study. First, this study investigated the effects of vowelization on L2 word recognition, thus, participants could not be native or heritage speakers of Arabic or previously lived in any Arab country for longer than six months. Second, participants must be native English speakers, which was determined by participants' self-reporting. Third, participants must not be competent of any language that uses Arabic script (e.g., Farsi or Urdu). Fourth, participants must be enrolled in level two, three, or four of the L2 Arabic programs at ALI of Islamic University, and they must have not been previously enrolled in any other L2 Arabic programs. Before being able to participate in the study, volunteer students were asked to answer a background questionnaire, and they were allowed to participate in the study only if they met these criteria. Students who did not meet these criteria were not invited to participate in the study.

Native English speakers were selected for this study because the English language uses the Roman script that is different from the Arabic script, and it does not include diacritical marks. The lack of diacritical marks distinguishes English from most other languages that use the Roman alphabet. Being able to read in a language that uses the Arabic script or has diacritical marks in its script may affect participants' performance in reading Arabic language. While L1 awareness and decoding skills can be transferred to L2 decoding process when the two writing

systems are similar, reading in two different writing systems requires more awareness and decoding skills adjustment (e.g., Korean & English) (Hamada & Koda, 2008). Thus, it was decided that participants' native language(s) must not use Arabic scripts or have diacritical marks in its writing system.

3.1.3   *Participants' demographic information*

The study recruited forty-eight adult male participants from three proficiency levels of L2 Arabic program at ALI of Islamic University. There were 14 beginner readers, 17 intermediate readers, and 17 advanced readers. The age of participants ranged from 19 to 31 years old for beginner readers, from 21 to 35 years old for intermediate readers, and from 22 to 30 years old for advanced readers (Table 3.2).

The majority of participants were high school graduates (27 participants), and while one participant has a master's degree, the remaining participants (20 participants) were college or university graduates. There were no major differences between groups in regard to the level of education. Each proficiency group has a relatively close number of high school graduates and post-secondary graduates among its participants. For beginner readers, eight participants were high school graduates, and six participants were post-secondary graduates. For intermediate readers, nine participants were high school graduates, and eight participants were post-secondary graduates. For advanced readers, ten participants were high school graduates, and while one participant was a master's degree holder, the other six participants were post-secondary graduates (Tables 3.2).

Participants were from many different countries. Most of these countries were either African (i.e., Rwanda, Ghana, South Africa, Nigeria), or western (i.e., Canada, USA, UK, New Zealand). Twenty-two participants were from African countries (9 beginner readers, 4

intermediate readers, and 9 advanced readers), and 21 participants were from western countries

(5 beginner readers, 9 intermediate readers, and 7 advanced readers). A small number of

participants (5 participants) were from either Central America (i.e., Jamaica (2 intermediate

readers), Belize (1 intermediate reader)), or Asia (i.e., Uzbekistan (1 advanced reader), Sri Lanka

(1 intermediate reader)) (Table 3.2).

While 21 participants spoke only English as a first language, 27 participants spoke one or

more languages other than English, most of which they can speak, but not write or read. Most of

these spoken languages were African languages (Tables 3.2). For more details on participants'

demographic information see Appendix A.

Table 3.1: Participants' demographic information by proficiency level

Proficiency	Number of Participants	Age Range	Country			Native Language(s)	
			Western	African	Other	English only	More than English
Beginner Readers	14	19 - 31	5	9	0	6	8
Intermediate Readers	17	21 - 35	9	4	4	9	8
Advanced Readers	17	22 - 30	7	9	1	6	11
TOTAL	48	19 - 35	21	22	5	21	27

3.2   Study Design

The study design is illustrated in Figure 3.1. The independent variables consisted of two parts: a between-subject variable and three within-subject variables. The between-subject variable was proficiency level. Participants of this study were selected from three L2 Arabic proficiency groups: beginner, intermediate and advanced. The within-subject variables were context, voice and vowelization. Context had two levels: isolated (no context) and within context. Voice had two levels: active voice and passive voice. Vowelization had three levels: full vowelization, partial vowelization and no vowelization (none). The dependent variables were reading speed, accuracy, and comprehension. Reading speed refers to participants 'reading time in milliseconds. Reading accuracy refers to whether or not target reading was accurate. Reading comprehension refers to whether or not target reading was understood or comprehended.

The combination of within-subject variables created 12 different combinations (or conditions) of variables. Each combination was repeated 5 times. Thus, each participant was presented with 60 verbs in total: 2 context levels X 2 voice levels X 3 vowelization levels X 5 repetition = 60 verbs for each participant. The 12 combinations of within-subject variables are shown in Table 3.1.
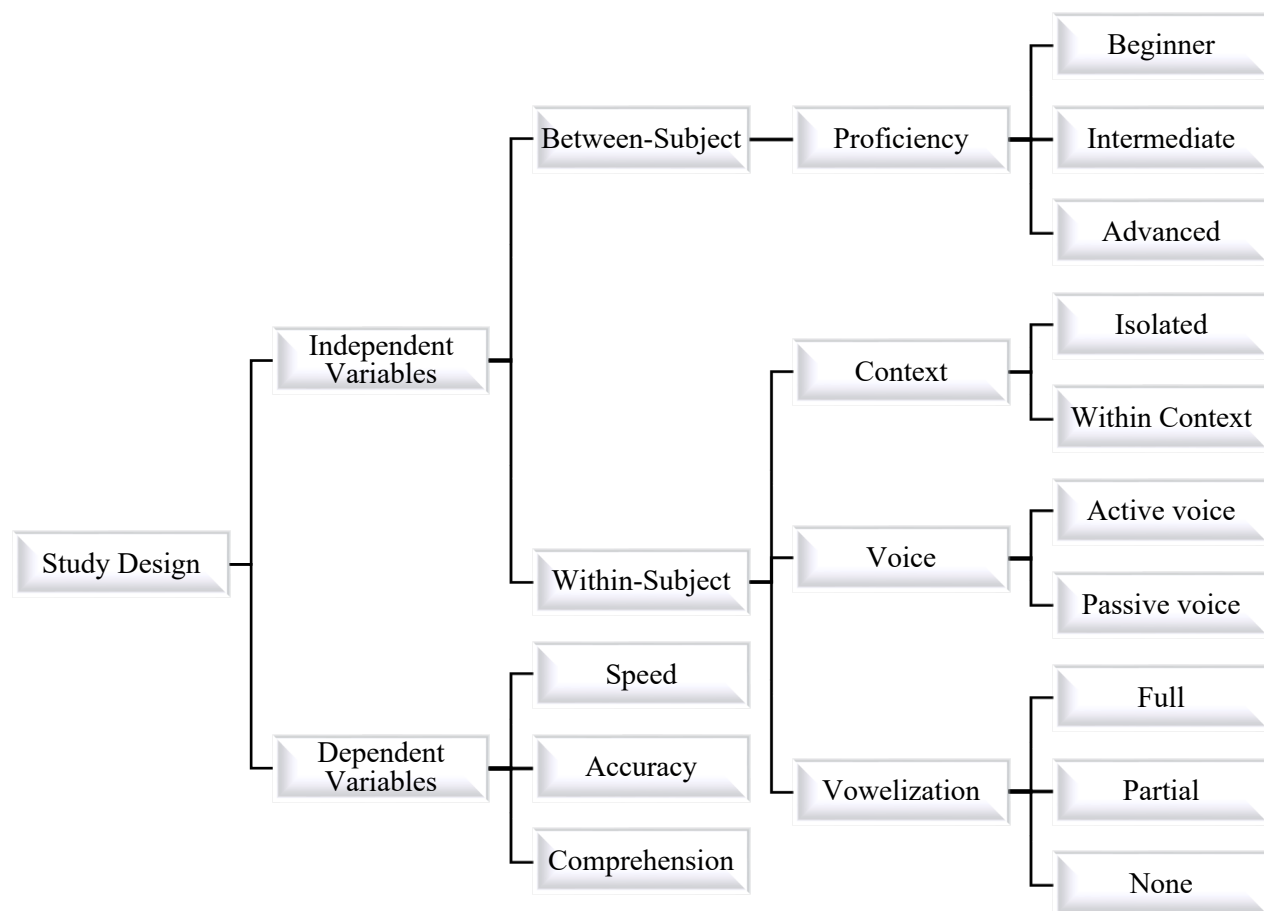
Figure 3.1: Illustrates dependent and independent variables of the study (the study design)

Table 3.2: The 12 combinations of within-subject variables

Context	Voice	Vowelization	Combination	Example	
Isolated	Active	Full	isolated active fully vowelized	بَعَثَ	(he) sent
		Partial	isolated active partially vowelized	بَعث	
		None	isolated active unvowelized	بعث	
	Passive	Full	isolated passive fully vowelized	بُعِثَ	was sent
		Partial	isolated passive partially vowelized	بُعث	
		None	isolated passive unvowelized	بعث	
Within Context	Active	Full	within context active fully vowelized	بَعَثَ الرَّجُلَ بِرِسَالةٍ	(he) sent the man with a message
		Partial	within context active partially vowelized	بَعث الرَّجُلَ بِرِسَالةٍ	
		None	within context active unvowelized	بعث الرَّجُلَ بِرِسَالةٍ	
	Passive	Full	within context passive fully vowelized	بُعِثَ الرَّجُلُ بِرِسَالةٍ	The man was sent with a message
		Partial	within context passive partially vowelized	بُعث الرَّجُلُ بِرِسَالةٍ	
		None	within context passive unvowelized	بعث الرَّجُلُ بِرِسَالةٍ	

3.3   Materials

3.3.1   Selecting target words

Target words for this study were Arabic verbs written in the same orthographical representation in their active and passive voice forms when they are unvowelized. The study investigated the effects of vowelization; thus, the two voices of selected verbs must be only differentiated by vowelization if they were written without context (isolated). For instance, when the verb (/katab/ <كتب> "wrote") is written unvowelized, it could represent the two voices of the verb (active voice and passive voice). The only ways to differentiate the two voices is to use vowelization (كَتَبَ /kataba/ "he wrote", كُتِب /kuteb/ "was written") or by context.

Verbs whose active orthographical representation is different from their passive orthographical representation when written unvowelized were excluded from this study. Verbs that have a long vowel in their second or third letters, for example, were excluded from the study because that long vowel of such verbs will change if verb voice changes. For instance, the verb (/qaala/ <قال> "he said") where the second letter is a long vowel /aa/ was excluded because the orthographical representation of active voice (/qaala/ <قال> "he said") differs from the passive voice form (/qiila/ <قيل> "was said"). The long vowel of the verb changed from (/aa/ <ا>) to (/ii/ <ي>) when the verb is passive. This change in the orthographic representation makes it possible for readers to differentiate voices even if verbs were written unvowelized and isolated. Vowels in such verbs seem to have a lesser effect.

The target verbs of this study were selected from the "Al-Arabia-bin-Yadik" textbooks (second edition). These textbooks are used for L2 Arabic courses in ALI of Islamic university. Every two textbooks are taught at one level (eight textbooks in total). To select appropriate verbs for each proficiency level, the study selected verbs from textbooks that are appropriate for each

proficiency level. For instance, Al-Arabia-bin-Yadik 4A and Al-Arabia-bin-Yadik 4B were written for advanced readers (the fourth level of ALI). Therefore, verbs selected from the level four textbooks are suitable for advanced L2 Arabic readers. Similarly, verbs selected from the level three textbooks are suitable for intermediate L2 Arabic readers, and verbs selected from the level two textbooks are suitable for beginner L2 Arabic readers. However, when selecting target verbs, the study followed this set of criteria:

1. All verbs must be trilateral (three-letter) simple past verbs, and the three letters must be different. Trilateral verbs that have doubled consonants (letters) as their second and third consonants such as (/?adda/ <عَدّ> "counted") were excluded. Verbs that were not trilateral (i.e., quadrilateral verbs) were also excluded.

2. All verbs must follow the vowel pattern /CaCaC/ such as (/katab/ <كَتَب> "he wrote") where the two morphological vowels were /a/. Trilateral past verbs such as (/rakib/ <رَكِب> "he rode") where the second vowel is /i/ were excluded.

3. All verbs, when written unvowelized, must be written in the same orthographical representation when the verb is active or passive, and the only way to differentiate the two voices is to use vowelization (كَتَب /katab/ "he wrote", كُتِب /kuteb/ "was written") or context. Verbs that change in their written form such as semi-vowel verbs were excluded (see above).

4. All verbs must be transitive verbs that take one or more objects. That is, to form a complete thought, a transitive verb must include a subject and at least one object. The verb (/kataba/ <كَتَبَ> "to write"), for instance, is a transitive verb, and to write a complete sentence using this verb we need to have a subject and an object (Example A). Writing the sentence without the object will make the sentence incomplete (Example B).

A. kataba   al-walad-u   al-wajib-a

wrote-ACT   the-boy-NOM   the-homework-ACC

"the boy wrote the homework"

B. * kataba   al-walad-u[4]

wrote-ACT   the-boy-NOM

"the boy wrote"

Transitive verbs were selected because in Arabic, unlike English, the agent (the doer of action) can always be omitted without affecting the meaning of the sentence, and it can be omitted in active voice as well as passive voice. The study used transitive verbs only because it aimed to use the same sentence for each verb, whether the voice of the verb was active or passive. In English, however, agent (the doer of action) can only be omitted in passive sentences, but not in active sentences.

The agent in Arabic can be omitted for active and passive sentences, and the sentence would still be grammatically correct. In active voice, the agent can be omitted, and no change will happen to the sentence. The object will still be an object without any change in its grammatical role (Example C). However, in passive voice, the agent must be omitted, and the object will now become the subject of the sentence (Example D). The subject of passive voice is called (نائب الفاعل "*naʔib alfaʕil*") in Arabic. Tables 3.3 to 3.5 list the 25 verbs selected using the criteria above for each proficiency level in this study.

---

[4] This sentence is incomplete

C. kataba   al-wajib-a

  wrote-ACT   the-homework-ACC

  "(he)[5] wrote the homework"

D. kutiba   al-wajib-u

  wrote-PASS   the-homework-NOM

  "the homework was written"

3.3.2 *Vowelizing and counterbalancing the verb lists*

Twenty-five verbs from each proficiency level textbooks were selected to be used as target verbs in the study (Tables 3.3, 3.4, and 3.5). Selected verbs were vowelized using three vowelized conditions (fully vowelized, partially vowelized, or unvowelized) in two different voices (active and passive).

1. Fully vowelized active condition (e.g., /كَتَبَ/ "to write")

2. Fully vowelized passive condition (e.g., /كُتِبَ/ "to be written")

3. Partially vowelized active condition (e.g., /كَتب/ "to write")

4. Partially vowelized passive condition (e.g., /كُتب/ "to be written")

5. Unvowelized condition, which could be used for both active and passive voices (e.g., /كتب/ "to write")

Each verb of the original list was vowelized in the 5 different conditions listed above. This resulted in 5 differently vowelized sets for each originally selected list of verbs. The first set was

---

[5] The subject is interpreted from context

fully vowelized active verbs, the second set was fully vowelized passive verbs, the third set was partially vowelized active verbs, the fourth set was partially vowelized passive verbs, and the fifth set was unvowelized verbs (which could be used for active and passive verbs). These five sets were then counterbalanced to present participants with the same verbs, but differently vowelized. That is, 5 different verbs form each set were combined to make a new group of verbs. Each group included: 5 fully vowelized active verbs, 5 fully vowelized passive verbs, 5 partially vowelized active verbs, 5 partially vowelized passive verbs, and 5 unvowelized verbs. Then, unvowelized verbs were repeated. The first time they were considered by the author as unvowelized *active* verbs, and the second time they were considered as unvowelized *passive* verbs. Each group of verbs now include 30 verbs (differently vowelized). These 30 differently vowelized verbs were reordered in the following order:

1. Fully vowelized active verb

2. Partially vowelized passive verb

3. Unvowelized active verb

4. Fully vowelized passive verb

5. Partially vowelized active verb

6. The same verb that appeared in 3 above was repeated again, but this time the unvowelized verb was considered as "Unvowelized passive verb"

7. Each group included 30 verbs; thus, this order was repeated 5 times

At the end of this vowelizing and counterbracing process, the original list of verbs from each proficiency level was developed to generate five lists of the same verbs. Each of them consisted of 30 verbs that are differently vowelized. That is, when a verb was presented as fully

vowelized active verb in one group, it may be represented in a different vowelized condition in the other groups (i.e., fully vowelized passive condition). For instance, if the first group of verbs had the verb /كتب/ "to write" as active and fully vowelized /كَتَبَ/ "he wrote", the second group may have it as active and partially vowelized /كَتب/ "he wrote", the third group may have it passive and fully vowelized /كُتِبَ/ "was written", and so on. Thus, all groups of verbs included the same verbs, but differently vowelized (see Appendix B).

3.3.3 *Adding context to selected verbs*

Participants of this study were asked to read selected verbs in two different context conditions: isolated and within context. Thus, target verbs were added to sentences to meet the second context condition of this study (within context condition).

All sentences that were used in this study were similar to sentences in examples C and D above, where the agents of all sentences were omitted. Each target verb had two similar sentences, one for active voice and the other for passive voice. Readers had to identify the voice of verbs by using vowelization or context. If verbs were vowelized, readers can use both vowelization and context to differentiate between active and passive verbs. However, if verbs were unvowelized, readers can only use context, particularly the second word in the sentence, to differentiate between active and passive voice. They can identify voice by paying attention to the case mark of the second word in the sentence they were assigned to read. That is, in active sentences, the second word (the noun after the verb) is always accusative because it is the object of the sentence. But in passive sentences, the second word is always nominative because it is the subject of the sentence (نائب الفاعل "*naʔib alfaʕil*"). Thus, in each sentence, the case marking of the second word will be the indicator for the verb's voice, particularly when the verb is unvowelized.

Target verbs were always placed at the beginning of each sentence (the first word of each sentence), and while they were differently vowelized (fully vowelized, partially vowelized, and unvowelized), the remaining words in each sentence were always fully vowelized for two reasons. First, L2 Arabic programs in Saudi Arabia use textbooks (i.e. Al-Arabia-bin-Yadik) that are usually fully vowelized for all proficiency levels. Thus, the study tried to present texts for participants in a way that is similar to their textbooks. Second, fully vowelized texts are considered shallow orthography that is easier to read, and the aim of the study was not to examine the whole context, but only the target verbs. Thus, the study used the different types of vowelization (fully, partially and unvowelized) in target verbs only, while the remaining words of the sentence were fully vowelized to make it easier for participants to read the context, and to avoid any challenges that unvowelized texts may present for participants.

Sentences were added to the five differently vowelized groups of verbs developed earlier; sentences were added to each verb according to its voice in the set. That is, if a verb was active in the first set, then the active sentence was added, where the second word (noun) was accusative. However, if the same verb was passive in the second set, then the passive sentence was added, where the second word (noun) was nominative (see example of one verb in Table 3.6; for the complete lists of verbs and sentences, please see Appendices C, D, and E).

Sentences were written by the researcher to be simple and appropriate for each proficiency level. The target verbs and sentences of the study were examined for their suitability for each proficiency level by two L2 Arabic professors from two different universities. The professors' feedback and comments were considered, and necessary adjustments were made before verbs and sentences were presented to participants.

Table 3.3: Selected verbs and their meaning for beginner readers.

N	Verb	Meaning
1	بَحَثَ	searched
2	جَمَعَ	collected
3	أَخَذَ	took
4	بَعَثَ	sent
5	جَعَلَ	made
6	دَفَعَ	pushed
7	رَفَضَ	refused
8	حَرَقَ	burnt
9	دَفَنَ	buried
10	ذَكَرَ	mentioned
11	زَرَعَ	planted
12	صَنَعَ	manufactured
13	رَفَعَ	raised
14	سَبَقَ	preceded
15	سَجَنَ	imprisoned
16	عَرَفَ	knew
17	قَصَدَ	intended
18	طَبَخَ	cooked
19	غَرَسَ	implanted
20	قَتَلَ	killed
21	مَنَعَ	prevented
22	وَجَدَ	found
23	مَنَحَ	granted
24	نَسَخَ	copied
25	هَجَرَ	left

Table 3.4: Selected verbs and their meaning for Intermediate readers.

N	Verb	Meaning
1	حَفَرَ	drilled
2	خَلَقَ	created
3	أَمَرَ	ordered
4	حَكَمَ	ruled
5	حَرَمَ	deprived
6	ذَرَفَ	wept
7	سَرَقَ	stole
8	ذَبَحَ	slaughtered
9	رَبَطَ	linked
10	رَزَقَ	gave
11	سَلَكَ	walked
12	ضَرَبَ	hit
13	سَكَبَ	poured
14	شَغَلَ	filled
15	شَكَرَ	thanked
16	ظَلَمَ	wronged
17	غَفَرَ	forgave
18	طَرَدَ	fired
19	عَطَفَ	sentimentalized
20	عَقَدَ	intended
21	قَصَرَ	limited
22	مَسَحَ	deleted
23	غَمَرَ	flooded
24	قَذَفَ	threw
25	لَعَنَ	cursed

Table 3.5: Selected verbs and their meaning for Advanced readers.

N	Verb	Meaning
1	بَسَطَ	simplified
2	خَبَزَ	baked
3	بَذَلَ	spent
4	جَرَفَ	swept away
5	حَمَلَ	carried
6	خَدَمَ	served
7	زَعَمَ	claimed
8	خَتَمَ	completed
9	خَلَقَ	created
10	دَحَضَ	rebutted
11	عَبَدَ	worshiped
12	غَلَبَ	defeated
13	سَكَنَ	lived
14	عَرَضَ	offered
15	غَفَرَ	forgave
16	قَسَمَ	split
17	مَنَعَ	prevented
18	فَعَلَ	did
19	لَمَزَ	muttered
20	لَمَسَ	touched
21	نَشَرَ	spread
22	وَضَعَ	put
23	نَذَرَ	vowed
24	نَظَرَ	looked
25	وَصَفَ	described

Table 3.6: Example of sentences added to each verb in the five differently vowelized sets

Number of Set	Selected Verb			
	Isolated		Within Context (Within Sentence)	
1st set	بَعَثَ	(he) sent	بَعَثَ الرَّجُلَ بِرِسَالةٍ	(he) sent the man with a message
2nd set	بَعث	(he) sent	بَعث الرَّجُلَ بِرِسَالةٍ	
3rd set	بعث	(he) sent OR was sent	بعث الرَّجُلَ بِرِسَالةٍ OR بعث الرَّجُلُ بِرِسَالةٍ	(he) sent the man with a message OR The man was sent with a message
4th set	بُعِثَ	was sent	بُعِثَ الرَّجُلُ بِرِسَالةٍ	The man was sent with a message
5th set	بُعث	was sent	بُعث الرَّجُلُ بِرِسَالةٍ	

3.4   Tasks

Participants were asked to do two tasks. First, they were asked to read aloud differently vowelized Arabic verbs in two context conditions: isolated and within context. Then, they were asked to identify the correct meaning of each verb.

3.4.1   Task 1: reading aloud isolated verbs and sentences

Lists of verbs and sentences were assigned to each participant randomly. Before they did the task, each participant was shown three verbs and three sentences to read in order to practice and familiarize themselves with the procedure of the task. These three verbs and sentences were presented for training purposes and were not analyzed for this study. Next, the participant was asked to read aloud isolated verbs and sentences. Isolated verbs were presented before contextualized ones, and participants were asked to read verbs and sentences as quickly and accurately as possible. Verbs and sentences were presented in power point slides, where each slide contained either a verb only or a sentence (see Figures 3.2 and 3.3). They were written in black ink and were presented on a white screen on the investigator's laptop. Participants were asked to read each verb or sentence, and then to click on the space bar to move to the next slide.

3.4.2   Task 2: identifying the correct meaning of target verbs

After reading isolated verbs and sentences, participants were asked to identify the correct meaning of each target verb. Verbs and sentences were presented again with the same type of vowelization as in task 1, but this time each target verb was followed by 4 choices of meaning to select from. After receiving training, participants were asked to silently read each verb and its associated multiple-choice options, and then to select the correct meaning of the target verb by saying the number next to the correct meaning. Verbs and sentences were presented on

PowerPoint slides where every slide contained either a verb or a sentence, along with its associated multiple-choice menu (see Figure 3.4 and 3.5). Target verbs were underlined when they were presented within sentences.

3.5   Interview

A short interview was conducted with each participant right after he completed task 2. Each participant was asked a few questions about his thoughts and preferences in regard to the use of vowelization in Arabic. The questions were aimed to investigate how L2 Arabic learners view and think about the use of diacritical marks (vowels) in Arabic. Ten questions were prepared about the participants' text selection and preferences when reading Arabic texts, their insights about vowelization and its effects on their reading accuracy, speed, and comprehension, their attitudes on whether and how vowels should be used, and their previous knowledge of active and passive voice in Arabic (Appendix F). This type of qualitative data provided important insights to help with interpreting the quantitative data of the study. The interviews were conducted in the participants' first language (English) to allow them to express their thoughts freely and deeply. They were conducted in a very quiet room and recorded using Audacity software on the researcher's laptop.

أَخَذَ
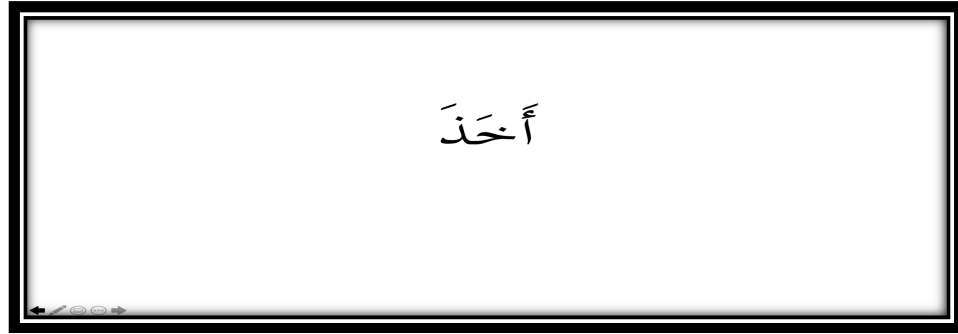
Figure 3.2: Example of isolated verb

أَخَذَ الْمُجْرِمَ إِلى السِّجْنِ
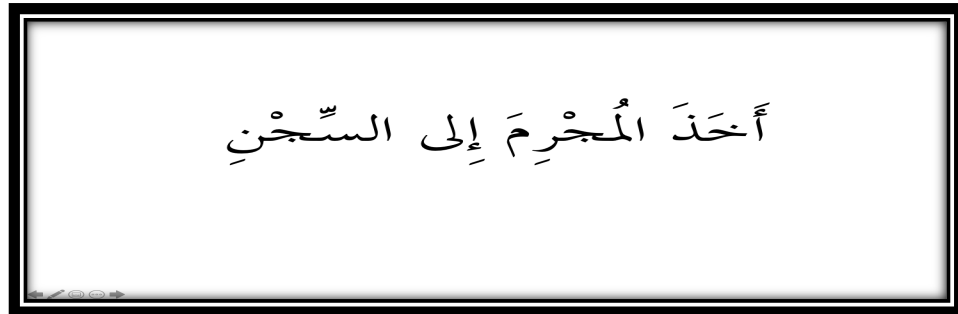
Figure 3.3: Example of within context verb

خُلِقَ

1. He creates   2. He created
3. He was created   4. He is creating
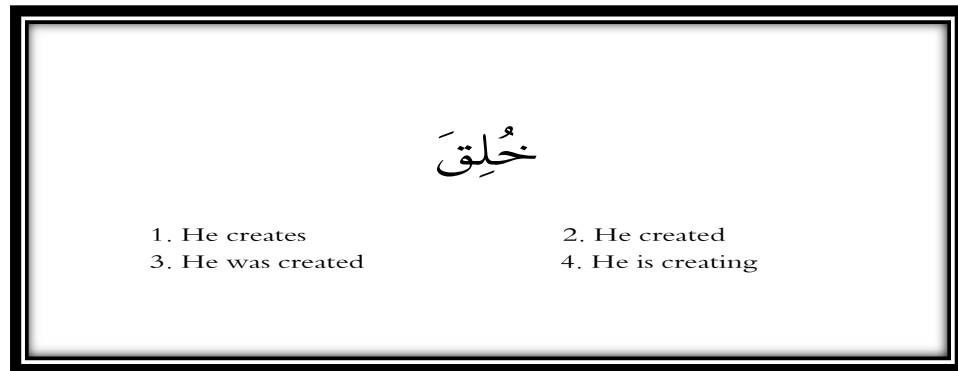
Figure 3.4: Example of isolated verb with the 4 choices of meaning

خُلِقَ الإِنْسَانُ مِنْ عَدَمٍ

1. He creates   2. He created
3. He was created   4. He is creating
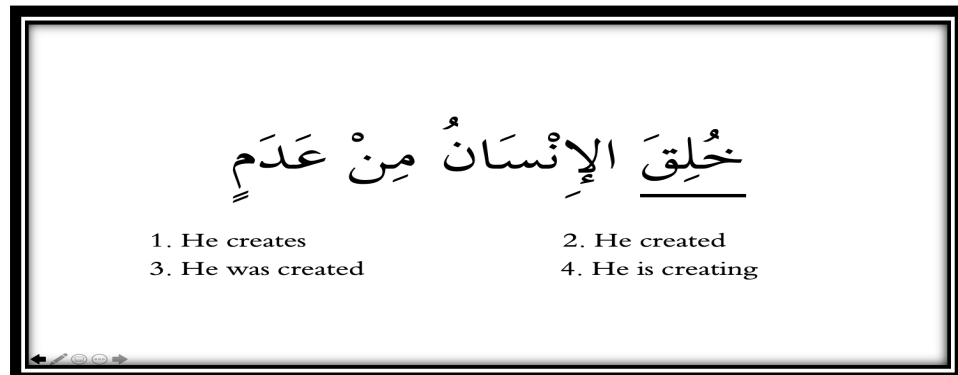
Figure 3.5: Example of within context verb with the 4 choices of meaning

3.6   Data Collection Procedures

Several steps were followed in order to conduct this study. First, an application was submitted for ethics review and approval from the Ethics Review Board at York University. Then, the Arabic Language Institute (ALI) of the Islamic University was contacted to get their approval for conducting the study at their institution. After getting all required approvals and permissions to proceed with the study, L2 Arabic learners at ALI were informed about the study by a recruitment flyer that was distributed to them by their teachers. The recruitment flyer identified the criteria for participation and briefly explained what participants were expected to do for the study. Participants were asked to voluntarily participate in this study and were encouraged to participate by offering them 50 SR (approximately $17 CD) in cash to compensate them for their participation time.

When a student expressed interest to take part in the study, criteria for participation were checked. If a participant meet the criteria, a consent form has to be read and signed before he can answer a questionnaire about his demographic and linguistic background. After that, the participants were asked to sit in front of a laptop presenting a PowerPoint file for task 1. They were informed that they will be presented with verbs and sentences in the coming slides, and they were asked to read verbs and sentences aloud as quickly and accurately as possible (task 1). They were first presented with the training slides (the extra verbs and sentences) to practice and to familiarize themselves with the procedures of this task. After they confirmed that they understood the procedures, they were asked to continue with the slides, where they were presented with isolated verbs, followed by verbs within sentences.

After the participant finished task 1, he was presented with task 2. In task 2, after receiving training, the participant was asked to select the correct meaning of each target verb. The isolated verbs were presented first before the sentences.

After he finished selecting the correct meaning of target verbs in the two context conditions, he was informed that he is done with the tasks and it is time for the interview. The interview and the two tasks were recorded using Audacity software on the researcher's laptop. When the interview was over, the participant was thanked and compensated for his time. The average time for completing the two tasks and the interview was approximately 30 minutes, and participants were informed that they could take a break whenever desired.

3.7 Data Coding Procedures

3.7.1 *Reading speed*

Reading speed refers to the reading time that readers spent to pronounce a target verb when they saw it. For isolated verbs, reading time was calculated from the moment the reader saw the verb until he completely pronounced it (see Figure 3.6). For verbs within sentences, participants were asked to read the entire sentence, but the time for reading target verbs was calculated from the moment a reader saw the sentence until he completely pronounced its target verb (see Figure 3.7). Within context target verbs were always presented as the first word of the sentence. However, if a participant had to correct himself and reread the target verb, the reading time was calculated from the moment he saw the verb until he had completely pronounced his last attempt. The time was calculated using PRAAT software where it is possible to see the
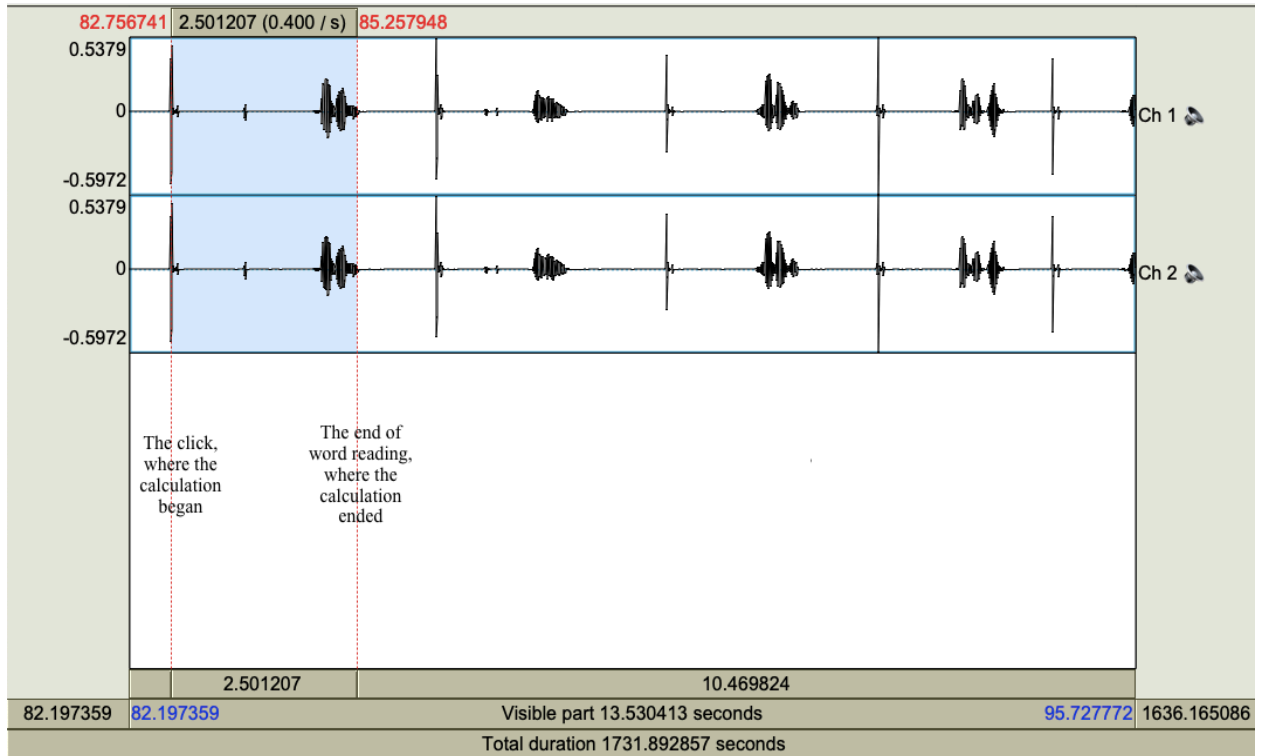
Figure 3.6: Example of how reading time was calculated for isolated verbs
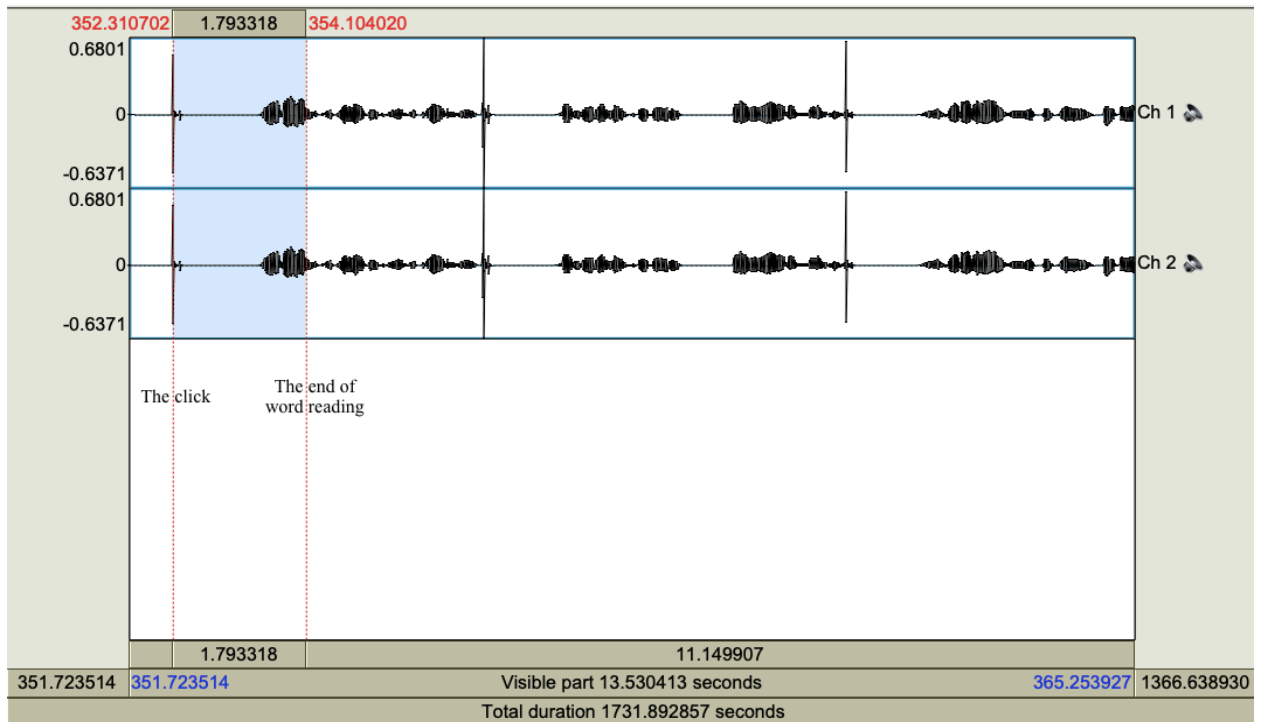
Figure 3.7: Example of how reading time was calculated for within context verbs

sound waves for the click as well as the participants' production. The click indicated that the participant has moved to the next slide, which means he began to see the verb. Thus, the time was calculated from the click until the verb was completely pronounced.

3.7.2   Reading accuracy

Reading accuracy refers to whether or not readers pronounced the target verb accurately. For isolated verbs, there was only one word (the target verb); thus, if the verb was pronounced accurately, the participant was given a point (accurate = 1 point). If not, he was given zero points (inaccurate = 0 points). For within context verbs, only target verbs were coded for accuracy in a similar way as isolated verbs, the rest of the words in the sentences were not coded for accuracy in this study.

Target verbs were presented fully vowelized, partially vowelized, and unvowelized. Fully and partially vowelized verbs have only one possible correct pronunciation. They were coded as accurate if a participant was able to pronounce them accurately based on their vowelization and context. Each verb was coded as accurate if the participant was able to accurately read the three consonants and the first two vowels of the verb. The last vowel was not considered for accuracy. The target verbs of this study were trilateral verbs that included three consonants and three vowels (i.e. <كَتَبَ> /kataba/ "he wrote"). However, in Arabic it would still be accurate if a reader deleted the last vowel of the word. For instance, if a reader reads the verb /kataba/ as /katab/, his reading will still be considered accurate. Arabic linguists refer to this as substituting the last vowel with *Sukun* (the absence of vowels, ○ْ), and they consider it accurate if a reader intends to make a pause on that word. Thus, this study coded every target verb as accurate (and was given a point= 1) if the reader was able to accurately pronounce the three consonants and the first two vowels of the verb, regardless of whether or not he pronounced the last vowel.

However, with regard to consonants, it is worth noting that the study had taken into account the difficulties that some L2 Arabic readers may have in reading some Arabic letters (consonants). For example, some L2 Arabic readers may have difficulties pronouncing the letter <ح> /ħ/, and they usually pronounce it as <ه> /h/. The study still coded their reading as accurate even if they mispronounced such difficult consonants. Vowels, on the other hand, are not difficult to pronounce at all, irrespective of the reader's native language. Arabic has only three short vowels (/a/, /u/, and /i/) that are common across languages; thus, any mispronunciation of vowels was coded as wrong (and was not given any point = 0).

Finally, coding unvowelized verbs was similar to coding fully and partially vowelized verbs, particularly when presented within context. Every unvowelized verb, if presented within context, has only one possible correct pronunciation that is appropriate for its context. But, if presented in isolated form (without context), the unvowelized verb could be read accurately in two different ways, active or passive. However, the study presented each unvowelized verb twice, the first time was considered by the author as active and was coded as correct if it was read as active. The second time was considered as passive and was coded as wrong if it was read as active. The purpose of doing so was to find out how L2 Arabic readers will read isolated unvowelized verbs. Would they prefer to read them in their active voice or passive voice? Also, to compare the isolated passive verbs with their within context counterparts to find out more about the effects of context on passive verbs. How would L2 Arabic readers read passive verbs in isolated and within context.

3.7.3   *Reading comprehension*

Reading comprehension refers to whether or not readers understood the meaning of a target verb. After reading all isolated and within context verbs, participants were presented again

with the same verbs and each verb was presented with four choices, only one of which was correct (see Figure 3.4 & 3.5). Participants were asked to select the correct meaning of the verb by saying the number next to the correct option. If they selected the number for the correct option, they were given a point (correct meaning = 1 point), but if they select one of the wrong options, they were given zero points (incorrect meaning = 0 points).

3.8   Data Analysis Procedures

There were 12 different combinations of within-subjects variables (see study design above). Each combination was repeated 5 times for each participant. Thus, each participant was presented with 60 verbs in total: 2 context levels X 2 voice levels X 3 vowelization levels X 5 repetition = 60 verbs for each participant. The total number of participants was 48 participants, 14 were beginner readers, 17 were intermediate readers, 17 were advanced readers. The total number of verbs in the study was 2880 verbs. That is, 60 verbs per participant X 48 participants = 2880 verbs. These verbs were analyzed for reading speed, accuracy, and comprehension.

The mean of the speed of pronouncing each of the 5 target verbs in each combination was calculated for each participant. As explained above, each participant was presented with 5 verbs under each combination. The reading speed for each of the five verbs under each combination was calculated and then the mean of the five verbs was calculated for that participant. The 12 combinations resulted in 12 means of reading speed for each participant. Scores for accuracy and comprehension were computer by summing up scores on the five target verbs under each combination, resulting in 12 accuracy scores (from 0 to 5) and 12 comprehension scores (from 0 to 5) for each participant.

After average speed and total accuracy and comprehension scores were calculated for each combination for each participant, the data were analyzed in SPSS software (version 27) using mixed ANOVA test since the study has proficiency as a between-subject variable and context, voice, and vowelization as within-subject variables. Then, the data file was split by proficiency groups and repeated-measures ANOVA was run to determine the effect of context, voice and vowelization for each proficiency group. To identify significant differences across groups and conditions, follow up post hoc pairwise comparisons were conducted. All assumptions were met for mixed and repeated measures ANOVA.

The interview data were analyzed thematically. Four themes were identified based on the ten questions that participants were asked to answer. The first theme was about participants' text selection and preferences when reading books other than their school's textbooks. The second theme was about participants' insights about vowelization and how it affects their reading speed, accuracy, and comprehension. The third theme was about participants' attitudes toward vowelization and how it should be used. The last theme was about participants' prior knowledge of voice in Arabic. The following chapter reports the results concerning reading speed, accuracy, and comprehension followed by the results from the interview data.

Chapter 4: Results

This chapter reports the results of this study. It first reports the results for reading speed followed by the results for reading accuracy and reading comprehension, respectively. The interview results are reported in the last section of the chapter.

4.1   Reading Speed

A four-way mixed ANOVA was run to understand the effects of proficiency, context, voice, and vowelization on verb reading speed. The results showed that there was no statistically significant[6] four-way interaction between proficiency, context, voice and vowelization, $F(2.9, 66.5) = .77$, $p=.51$. There was no statistically significant three-way interaction in all possible three-way interactions between context, voice and vowelization, $F(1.5, 66.5) = 1.03$, $p=.34$, proficiency, context and voice, $F(2, 45) = .13$, $p=.88$, proficiency, context and vowelization, $F(4, 90) = .41$, $p=.80$, or proficiency, voice and vowelization, $F(3.1, 69.6) = 1.59$, $p=.20$. In the two-way interactions, there was a statistically significant two-way interaction between proficiency and vowelization, $F(3.4, 77.4) = 3.12$, $p=.02$, $\eta_p^2=.12$, and a statistically significant interaction between voice and vowelization $F(1.5, 69.6) = 12.4$, $p<.001$, $\eta_p^2=.21$. All the other two-way interactions were not statistically significant, proficiency and context, $F(2, 45) = .59$, $p=.56$, proficiency and voice, $F(2, 45) = 1.43$, $p=.25$, context and voice, $F(1, 45) = .52$, $p=.47$, context and vowelization, $F(2, 90) = 1.86$, $p=.16$. There was a statistically significant main effect of context $F(1, 45) = 6.2$, $p=.01$, $\eta_p^2=.12$, voice $F(1, 45) = 5.6$, $p=.02$, $\eta_p^2=.11$, and vowelization, $F(1.7, 77.4) = 15.9$, $p<.001$, $\eta_p^2=.26$. Table 4.1 shows the means and standard deviations of

---

[6] All effects are reported as significant at $p<.05$.

Table 4.1: Speed mean and standard deviation in the 12 combinations by proficiency groups

	Proficiency	Mean	SD	N
1. Isolated, active, and fully vowelized verbs	Beginner	2.15	.57	14
	Intermediate	2.33	.46	17
	Advanced	1.77	.42	17
	Total	2.08	.53	48
2. Isolated, active, and partially vowelized verbs	Beginner	2.43	.88	14
	Intermediate	2.46	.88	17
	Advanced	1.73	.44	17
	Total	2.19	.81	48
3. Isolated, active, and unvowelized verbs	Beginner	2.55	.98	14
	Intermediate	2.59	.80	17
	Advanced	1.79	.57	17
	Total	2.29	.85	48
4. Isolated, passive, and fully vowelized verbs	Beginner	2.40	.70	14
	Intermediate	2.43	.76	17
	Advanced	1.82	.44	17
	Total	2.21	.69	48
5. Isolated, passive, and partially vowelized verbs	Beginner	2.65	.88	14
	Intermediate	3.23	1.38	17
	Advanced	1.93	.50	17
	Total	2.60	1.12	48
6. Isolated, passive, and unvowelized verbs	Beginner	2.21	.75	14
	Intermediate	2.27	.70	17
	Advanced	1.67	.44	17
	Total	2.04	.68	48
7. Within context, active, and fully vowelized verbs	Beginner	2.55	1.36	14
	Intermediate	2.25	.57	17
	Advanced	1.86	.48	17
	Total	2.20	.88	48
8. Within context, active, and partially vowelized verbs	Beginner	2.88	1.38	14
	Intermediate	2.92	1.33	17
	Advanced	1.95	.42	17
	Total	2.57	1.18	48
9. Within context, active, and unvowelized verbs	Beginner	2.83	1.74	14
	Intermediate	2.62	.75	17
	Advanced	1.90	.43	17
	Total	2.43	1.12	48
10. Within context, passive, and fully vowelized verbs	Beginner	2.87	1.27	14
	Intermediate	2.70	1.09	17
	Advanced	1.90	.47	17
	Total	2.47	1.05	48
11. Within context, passive, and partially vowelized verbs	Beginner	3.14	1.42	14
	Intermediate	3.48	2.03	17
	Advanced	2.13	.63	17
	Total	2.90	1.56	48
12. Within context, passive, and unvowelized verbs	Beginner	2.56	1.24	14
	Intermediate	2.52	1.03	17
	Advanced	1.85	.37	17
	Total	2.30	.97	48

reading speed of all proficiency groups in the 12 combinations of independent variables (context, voice and vowelization). As a follow up, the data file was split by proficiency groups and repeated-measures ANOVA was run to determine the effect of context, voice, and vowelization on reading speed at each proficiency group level.

4.1.1 *Proficiency*

The speed results of all proficiency groups revealed that the advanced readers were significantly faster than the intermediate and beginner readers (Table 4.2). The average reading speed of advanced readers (*M*=1.86 seconds, hereafter s) was faster than the average reading speed of intermediate readers (*M*=2.65 s), and beginner readers (*M*=2.61 s). The average reading speed of intermediate readers was the slowest among the three proficiency groups. A post hoc pairwise comparison was performed to determine significant differences between proficiency groups. The results showed that while there were no significant differences in reading speed between beginner and intermediate readers, *p*=1.00, advanced readers were significantly faster than the other proficiency groups, beginner and intermediate, *p*=.02, *p*=.008, respectively.

Table 4.2: Speed mean of proficiency groups

Proficiency	Mean	Std. Error	95% Wald Confidence Interval	
			Lower	Upper
Beginner readers	2.61	.19	2.22	3.00
Intermediate readers	2.65	.18	2.30	3.00
Advanced readers	1.86	.18	1.51	2.22

4.1.2 Context

The speed results of all proficiency groups revealed that the main effect of context was statistically significant $F(1, 45) = 6.2$, $p=.01$, $\eta_p^2=.12$. Isolated verbs were read significantly faster ($M=2.25$ s) than were within context verbs ($M=2.50$ s). The results also showed that there was no statistically significant interaction between proficiency and context $F(2, 45) = .59$, $p=.56$. All proficiency groups read isolated verbs faster than they did within context verbs (Table 4.3). However, when the data file was split by proficiency groups, the findings revealed that the main effect of context was only statistically significant for advanced readers, $F(1, 16) = 7.19$, $p=.02$, $\eta_p^2=.31$, but not for beginner readers, $F(1, 13) = 2.03$, $p=.18$, or intermediate readers, $F(1, 16) = 1.72$, $p=.21$.

Table 4.3: Speed mean by context and proficiency groups

Context	Proficiency	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Isolated	Beginner	2.40	.16	2.06	2.74
	Intermediate	2.56	.15	2.24	2.86
	Advanced	1.79	.15	1.48	2.09
	Total	2.25	.09	2.06	2.43
Within Context	Beginner	2.81	.25	2.30	3.32
	Intermediate	2.75	.23	2.29	3.21
	Advanced	1.94	.23	1.47	2.40
	Total	2.50	.13	2.22	2.77

4.1.3 Voice

The speed results of all proficiency groups revealed that the main effect of voice was statistically significant $F(1, 45) = 5.6$, $p=.02$, $\eta_p^2=.11$. Active verbs were read significantly faster ($M=2.31$ s) than were passive verbs ($M=2.44$ s). The results also showed that there was no statistically significant interaction between proficiency and voice $F(2, 45) = 1.43$, $p=.25$. All proficiency groups read the active verbs faster than they did the passive verbs (Table 4.4), but the main effect of voice was not statistically significant for beginner readers, $F(1, 13) = 2.05$, $p=.18$, intermediate readers, $F(1, 16) = 3.21$, $p=.09$, or advanced readers, $F(1, 16) = 2.79$, $p=.11$.

Table 4.4: Speed mean by voice and proficiency groups

Voice	Proficiency	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Active	Beginner	2.57	.18	2.18	2.94
	Intermediate	2.53	.17	2.18	2.87
	Advanced	1.84	.17	1.49	2.18
	Total	2.31	.10	2.10	2.52
Passive	Beginner	2.64	.20	2.22	3.06
	Intermediate	2.78	.19	2.39	3.15
	Advanced	1.89	.19	1.50	2.27
	Total	2.44	.11	2.20	2.66

4.1.4 Vowelization

The speed results of all proficiency groups revealed that the main effect of vowelization was statistically significant $F(1.7, 77.4) = 15.9$, $p<.001$, $\eta_p^2=.26$. Partially vowelized verbs were read significantly slower ($M=2.58$ s) than were fully vowelized verbs ($M=2.26$ s) and

unvowelized verbs (M=2.29 s), p<.001, p<.001, respectively. The difference between fully

vowelized verbs and unvowelized verbs was not statistically significant, p=1.00 (Table 4.5).

However, the main effect of vowelization was statistically significant for beginner readers, F(2,

26) = 4.36, p=.02, η_p^2=.25, intermediate readers, F(2, 32) = 9.77, p<.001, η_p^2=.38, but not for

advanced readers, F(2, 32) = 2.66, p=.09.

The speed results of all proficiency groups also revealed that there was a statistically

significant interaction between proficiency and vowelization, F(3.4, 77.4) = 3.12, p=.02, η_p^2=.12.

Follow up pairwise comparisons were performed for proficiency and vowelization to determine

significant differences. With regard to speed differences between proficiency groups (Table 4.5),

the results showed that there were statistically significant speed differences between advanced

readers and intermediate readers in all types of vowelization (fully vowelized verbs, p=.02,

partially vowelized verbs, p=.003, and unvowelized verbs, p=.02), and between advanced readers

and beginner readers in all types of vowelization (fully vowelized verbs, p=.02, partially

vowelized verbs, p=.04, and unvowelized verbs, p=.02). Advanced readers read target verbs

significantly faster (*Full M*=1.84 s*, Partial M*=1.94 s, *and None M*=1.8 s) than did intermediate

readers (*Full M*=2.43 s*, Partial M*=3.02 s*, and None M*=2.5 s) and beginner readers (*Full

M*=2.49 s*, Partial M*=2.77 s*, and None M*=2.54 s) in all types of vowelization. There were no

statistically significant speed differences between intermediate and beginner readers in any types

of vowelization (Figure 4.1).

With regard to speed differences between the types of vowelization in each proficiency

group (Table 4.5), the results showed no statistically significant speed differences between the

three types of vowelization for advanced and beginner readers. However, for intermediate

readers, the results showed that partially vowelized verbs (M=3.02 s) were read significantly

slower than were fully vowelized (*M*=2.43 s) and unvowelized verbs (*M*=2.5 s), *p*<.001, *p*<.001, respectively (Figure 4.1). There was no significant speed difference between fully vowelized and unvowelized verbs.

Table 4.5: Speed mean by vowelization and proficiency groups

Vowelization	Proficiency	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Full Vowelization	Beginner	2.49	.17	2.14	2.84
	Intermediate	2.43	.15	2.11	2.75
	Advanced	1.84	.15	1.52	2.16
	Total	2.26	.09	2.06	2.44
Partial Vowelization	Beginner	2.77	.24	2.29	3.26
	Intermediate	3.02	.21	2.58	3.46
	Advanced	1.94	.21	1.50	2.38
	Total	2.58	.13	2.31	2.84
No Vowelization	Beginner	2.54	.19	2.15	2.93
	Intermediate	2.50	.17	2.14	2.85
	Advanced	1.80	.17	1.45	2.16
	Total	2.29	.10	2.07	2.49
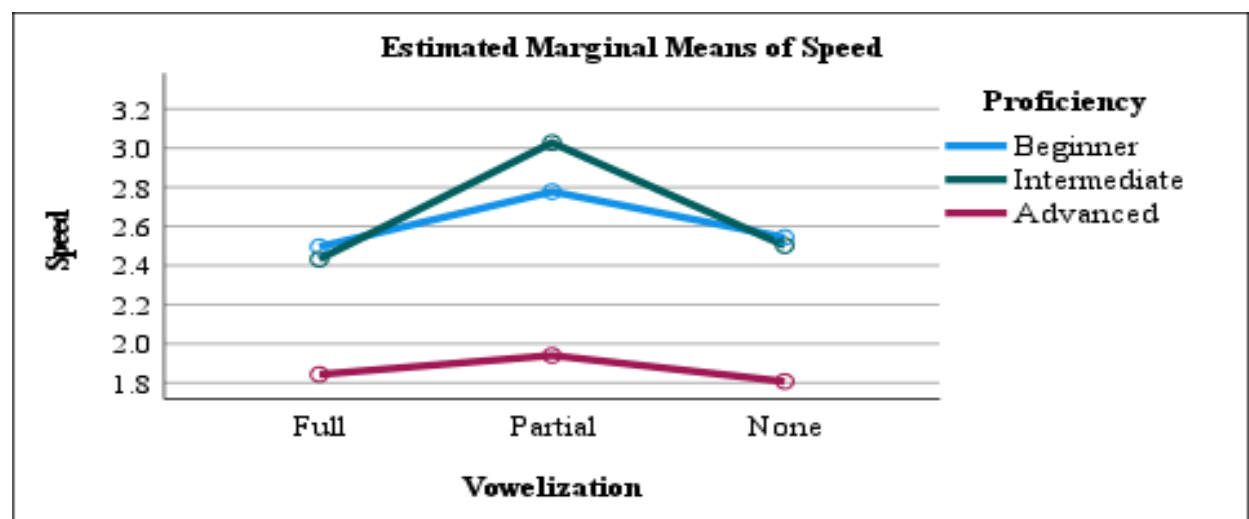
Figure 4.1: Mean reading speed by proficiency group and type of vowelization

Further, the speed results of all proficiency groups revealed that there was a statistically significant interaction between voice and vowelization $F(1.5, 69.6) = 12.4, p<.001, \eta_p^2=.21$. Additionally, the speed results of each proficiency group showed that interaction between voice and vowelization was statistically significant for every proficiency group; for beginner readers, $F(2, 26) = 9.55, p=.001, \eta_p^2=.42$, intermediate readers, $F(1.5, 23.3) = 4.58, p=.03, \eta_p^2=.22$, and advanced readers, $F(2, 32) = 4.26, p=.02, \eta_p^2=.21$. Follow up pairwise comparisons were performed for voice and vowelization to determine significant differences.

With regard to voice in speed differences of all proficiency groups (Table 4.6), the results showed that there were statistically significant speed differences between active and passive verbs in all types of vowelization (fully vowelized, $p=.002$, partially vowelized, $p=.005$, unvowelized, $p=.001$). Active verbs were read significantly faster than passive verbs when verbs were fully vowelized (active $M=2.16$ s vs. passive $M=2.36$ s) and partially vowelized (active $M=2.40$ vs. passive $M=2.77$), but, surprisingly, when verbs were unvowelized, passive verbs were read significantly faster ($M=2.19$ s) than were active verbs ($M=2.39$ s) (Figure 4.2).

With regard to the speed differences between the three types of vowelization in each voice, the results of *active voice verbs* showed that there was a statistically significant speed difference between fully vowelized verbs in comparison to partially vowelized and unvowelized verbs, $p=.005$, $p=.001$, respectively. Fully vowelized verbs were read significantly faster ($M=2.16$ s) than were partially vowelized verbs ($M=2.40$ s), and unvowelized verbs ($M=2.39$ s). There was no statistically significant speed difference between partially vowelized verbs and unvowelized verbs, $p=.85$. However, when the data file was split by proficiency groups, the results of advanced readers in *active voice verbs* showed no statistically significant speed differences between all types of vowelization (Figure 4.3). *For passive voice verbs*, the results of

all proficiency groups showed that there were statistically significant speed differences between all types of vowelization. Unvowelized verbs were read significantly faster (*M*=2.19 s) than were fully vowelized and partially vowelized verbs (*p*=.01, *p*<.001, respectively), and fully vowelized verbs were read significantly faster (*M*=2.36 s) than were partially vowelized verbs (*M*=2.77 s), *p*=.001, (Figure 4.2).

Table 4.6: Speed mean of all proficiency groups by voice and vowelization type

Vowelization	voice	Mean	Std. Error	95% Wald Confidence Interval	
				Lower	Upper
Full vowelization	Active voice	2.16	.08	1.97	2.33
	Passive voice	2.36	.10	2.14	2.57
	Total	2.26	.09	2.06	2.44
Partial vowelization	Active voice	2.40	.12	2.14	2.65
	Passive voice	2.77	.16	2.44	3.08
	Total	2.58	.13	2.31	2.84
No vowelization	Active voice	2.39	.11	2.14	2.62
	Passive voice	2.19	.10	1.98	2.38
	Total	2.29	.10	2.07	2.49
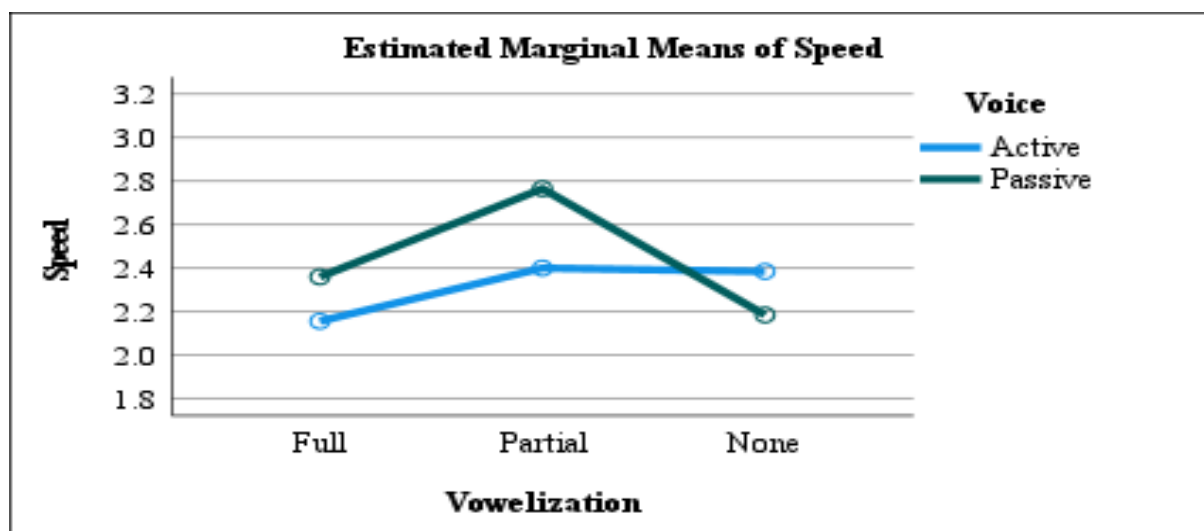
Figure 4.2: Mean reading speed of all proficiency groups by voice and vowelization
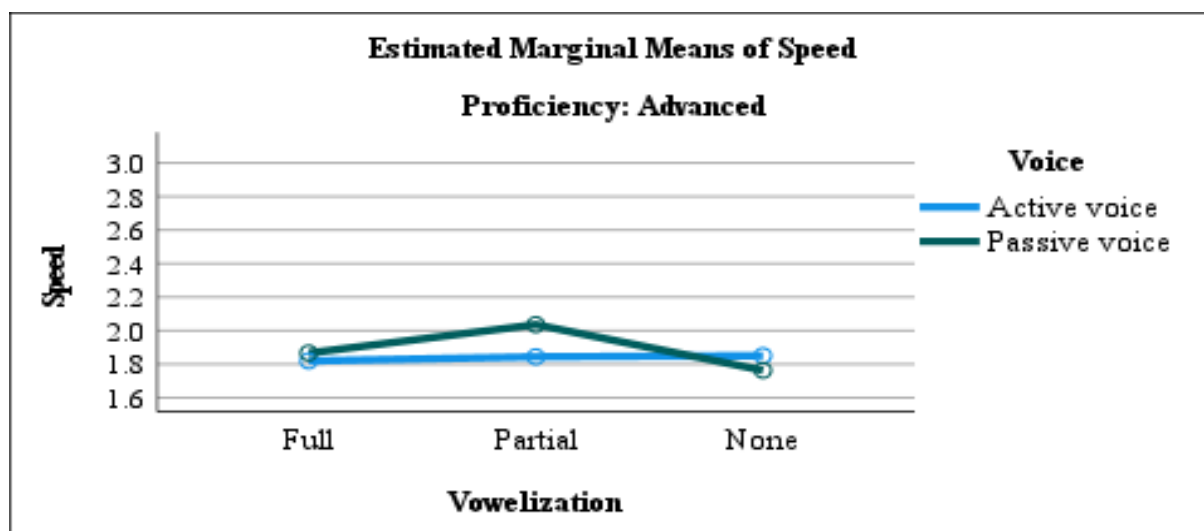
Figure 4.3: Mean reading speed of advanced readers by voice and vowelization type

In short, the speed findings revealed that while there were no significant speed differences between intermediate and beginner readers, advanced readers were significantly faster than intermediate and beginner readers in reading Arabic verbs. The speed of reading partially vowelized verbs was slower than reading fully vowelized and unvowelized verbs by all proficiency groups, but the difference was only significant for intermediate readers. Although isolated verbs were read faster than within context verbs, context only significantly slowed the reading speed of advanced readers, but not intermediate or beginner readers. All proficiency groups read active verbs significantly faster than they did passive verbs. The speed differences between all the three types of vowelization were significant when verbs were in passive voice. However, when verbs were in active voice, while the advanced readers showed no significant differences between the types of vowelization, intermediate and beginner readers read fully vowelized verbs significantly faster than they did partially and unvowelized verbs.

4.2   Reading Accuracy

A four-way mixed ANOVA was run to estimate the effects of proficiency, context, voice and vowelization on verb reading accuracy scores. The results showed that there was a statistically significant four-way interaction between proficiency, context, voice and vowelization, $F(3.2, 71.2) = 3.19$, $p=.02$, $\eta_p^2=.13$. There was no statistically significant three-way interaction in all possible three-way interactions between context, voice and vowelization, $F(1.6, 70.4) = 1.53$, $p=.23$, proficiency, context and voice, $F(2, 45) = 1.12$, $p=.34$, proficiency, context and vowelization, $F(4, 90) = .54$, $p=.71$, proficiency, voice and vowelization, $F(3.1, 70.5) = 1.15$, $p=.34$). In the two-way interactions, there was a statistically significant interaction between voice and vowelization $F(1.6, 70.5) = 67.7$, $p<.001$, $\eta_p^2=.60$. All the other two-way interactions

Table 4.7: Accuracy mean and standard deviation by proficiency groups

	Proficiency	Mean	SD	N
1. Isolated, active, and fully vowelized verbs	Beginner	4.86	.36	14
	Intermediate	4.82	.39	17
	Advanced	4.94	.24	17
	Total	4.87	.33	48
2. Isolated, active, and partially vowelized verbs	Beginner	4.29	1.06	14
	Intermediate	4.29	.92	17
	Advanced	4.00	1.17	17
	Total	4.19	1.04	48
3. Isolated, active, and unvowelized verbs	Beginner	3.71	.99	14
	Intermediate	4.12	1.21	17
	Advanced	3.88	.99	17
	Total	3.92	1.06	48
4. Isolated, passive, and fully vowelized verbs	Beginner	4.64	.63	14
	Intermediate	4.94	.24	17
	Advanced	4.82	.52	17
	Total	4.81	.49	48
5. Isolated, passive, and partially vowelized verbs	Beginner	1.57	2.02	14
	Intermediate	2.53	1.66	17
	Advanced	3.18	1.74	17
	Total	2.48	1.87	48
6. Isolated, passive, and unvowelized verbs	Beginner	.57	.75	14
	Intermediate	.47	.87	17
	Advanced	.53	.71	17
	Total	.52	.77	48
7. Within context, active, and fully vowelized verbs	Beginner	4.71	.61	14
	Intermediate	4.88	.33	17
	Advanced	4.94	.24	17
	Total	4.85	.41	48
8. Within context, active, and partially vowelized verbs	Beginner	4.07	1.20	14
	Intermediate	3.82	1.28	17
	Advanced	4.29	.98	17
	Total	4.06	1.15	48
9. Within context, active, and unvowelized verbs	Beginner	3.86	1.02	14
	Intermediate	3.59	1.83	17
	Advanced	3.76	1.20	17
	Total	3.73	1.39	48
10. Within context, passive, and fully vowelized verbs	Beginner	4.57	.51	14
	Intermediate	4.76	.43	17
	Advanced	4.82	.39	17
	Total	4.73	.44	48
11. Within context, passive, and partially vowelized verbs	Beginner	2.07	2.05	14
	Intermediate	2.94	1.78	17
	Advanced	3.18	1.94	17
	Total	2.77	1.93	48
12. Within context, passive, and unvowelized verbs	Beginner	.14	.36	14
	Intermediate	.59	.93	17
	Advanced	1.00	1.41	17
	Total	.60	1.06	48

were not statistically significant, proficiency and context $F(2, 45) = 1.05$, $p=.36$, proficiency and

voice $F(2, 45) = 2.21$, $p=.12$, proficiency and vowelization $F(3.2, 71.4) = .72$, $p=.55$, context and

voice $F(1, 45) = 3.26$, $p=.08$, context and vowelization, $F(2, 90) = .99$, $p=.37$. There was a

statistically significant main effect of voice $F(1, 45) = 192.4$, $p<.001$, $\eta_p^2=.81$, and vowelization,

$F(1.6, 71.4) = 215.4$, $p<.001$, $\eta_p^2=.83$, but not context $F(1, 45) = .02$, $p=.89$. Table 4.7 shows the

means and standard deviations of reading accuracy scores of all proficiency groups in the 12

combinations of independent variables (context, voice and vowelization). Then, the data file was

split by proficiency groups and repeated-measures ANOVA was run to determine the effect of

context, voice, and vowelization on reading accuracy for each proficiency group level.

4.2.1 *Proficiency*

The accuracy results of proficiency groups showed that there were no statistically

significant differences in accuracy scores between proficiency groups. The accuracy score of

advanced readers ($M=3.61$) was higher than the accuracy scores of intermediate readers

($M=3.48$), and beginner readers ($M=3.26$), but the differences were not statistically significant,

$p=1.00$, $p=.26$, respectively. Also, the difference between intermediate and beginner readers was

not statistically significant, $p=.83$.

4.2.2 *Context*

The accuracy results of all proficiency groups revealed that the main effect of context

was not statistically significant $F(1, 45) = .02$, $p=.89$. The accuracy score of isolated verbs

($M=3.45$) was almost similar to the accuracy score of within context verbs ($M=3.44$). The results

also showed that there was no statistically significant interaction between proficiency and

context $F(2, 45) = 1.05$, $p=.36$. The accuracy score of isolated verbs was similar to the accuracy

score of within context verbs for every proficiency group, and the main effect of context was not statistically significant for all of them; for beginner readers, $F(1, 13) = .08$, $p= .78$, intermediate readers, $F(1, 16) = .75$, $p=.40$, and advanced readers, $F(1, 16) = 1.84$, $p= .19$.

4.2.3   Voice

The accuracy results of all proficiency groups revealed that the main effect of voice was statistically significant $F(1, 45) = 192.4$, $p<.001$, $\eta_p^2=.81$. Active verbs were read significantly more accurately ($M=4.27$) than were passive verbs ($M=2.63$). However, the results showed that there was no statistically significant interaction between proficiency and voice $F(2, 45) = 2.21$, $p=.12$. All proficiency groups read active verbs significantly more accurately than they did passive verbs (Table 4.8). The main effect of voice was statistically significant for beginner readers, $F(1, 13) = 112.1$, $p<.001$, $\eta_p^2=.90$, intermediate readers, $F(1, 16) = 78.4$, $p<.001$, $\eta_p^2=.83$, and advanced readers, $F(1, 16) = 34.2$, $p<.001$, $\eta_p^2=.68$.

Table 4.8: Accuracy mean by voice and proficiency groups

Voice	Proficiency	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Active	Beginner	4.25	.17	3.88	4.61
	Intermediate	4.26	.16	3.92	4.58
	Advanced	4.30	.16	3.97	4.63
	Total	4.27	.09	4.07	4.46
Passive	Beginner	2.26	.19	1.87	2.65
	Intermediate	2.70	.17	2.35	3.05
	Advanced	2.92	.17	2.56	3.27
	Total	2.63	.10	2.41	2.84

4.2.4 Vowelization

The accuracy results of all proficiency groups revealed that the main effect of vowelization was statistically significant $F(1.6, 71.4) = 215.4$, $p<.001$, $\eta_p^2=.83$. The differences in accuracy scores between types of vowelization were statistically significant for all types of vowelization. Fully vowelized verbs were read significantly more accurately ($M=4.81$) than were partially vowelized verbs ($M=3.35$) and unvowelized verbs ($M=2.18$), $p<.001$, $p<.001$, respectively. The difference between partially vowelized verbs and unvowelized was also statistically significant, $p<.001$. The main effect of vowelization was statistically significant for beginner readers, $F(1.3, 17.1) = 65.5$, $p<.001$, $\eta_p^2=.83$, intermediate readers, $F(2, 32) = 70.8$, $p<.001$, $\eta_p^2=.82$, and advanced readers, $F(2, 32) = 83.6$, $p<.001$, $\eta_p^2=.84$. However, the results showed that there was no statistically significant interaction between proficiency and vowelization $F(3.2, 71.4) = .72$, $p =.55$. All proficiency groups read fully vowelized verbs more accurately than they did partially vowelized and unvowelized verbs, whereas partially vowelized verbs fell in between (Table 4.9).

Table 4.9: Accuracy mean by vowelization and proficiency groups

Vowelization	Proficiency	Mean	Std. Error	95% Wald Confidence Interval	
				Lower	Upper
Full vowelization	Beginner	4.70	.07	4.55	4.83
	Intermediate	4.85	.06	4.72	4.98
	Advanced	4.88	.06	4.75	5.00
	Total	4.81	.03	4.73	4.88
Partial vowelization	Beginner	3.00	.29	2.40	3.59
	Intermediate	3.40	.26	2.85	3.93
	Advanced	3.66	.26	3.12	4.20
	Total	3.35	.16	3.02	3.67
No vowelization	Beginner	2.07	.17	1.72	2.42
	Intermediate	2.19	.15	1.87	2.51
	Advanced	2.29	.15	1.97	2.61
	Total	2.18	.09	1.99	2.37

Further, the accuracy results of all proficiency groups revealed that there was a statistically significant interaction between voice and vowelization $F(1.6, 70.5) = 67.7$, $p<.001$, $\eta_p^2=.60$. Additionally, the accuracy results of each proficiency group showed that interaction between voice and vowelization was statistically significant for every proficiency group; for beginner readers, $F(1.4, 17.8) = 18.6$, $p<.001$, $\eta_p^2=.59$, intermediate readers, $F(2, 32) = 43.5$, $p<.001$, $\eta_p^2=.73$, and advanced readers, $F(1.4, 22.7) = 17.6$, $p<.001$, $\eta_p^2=.52$. Follow up pairwise comparisons were performed for voice and vowelization to determine significant differences.

With regard to differences in accuracy in relation to voice for all proficiency groups (Table 4.10), the results showed that there were statistically significant accuracy differences between active and passive voice in partially vowelized verbs, $p<.001$, and unvowelized verbs $p<.001$, but not in fully vowelized verbs, $p=.12$. Active voice verbs were read significantly more accurately than were passive voice verbs when verbs were partially vowelized (active $M=4.13$ vs. passive $M=2.58$) and unvowelized (active $M=3.82$ vs. passive $M=.55$). But when verbs were fully vowelized, active voice verbs were read slightly more accurately ($M=4.86$) than were passive voice verbs ($M=4.76$), and the difference was not statistically significant (Figure 4.4).

With regard to the accuracy differences between the three types of vowelization in each voice, (Table 4.10), the results of *active voice verbs* showed that there were statistically significant accuracy differences between fully vowelized verbs in comparison to partially vowelized verbs and unvowelized verbs, $p<.001$, $p<.001$, respectively. Fully vowelized verbs were read significantly more accurately ($M=4.86$) than were partially vowelized verbs ($M=4.13$), and unvowelized verbs ($M=3.82$). There was no statistically significant accuracy difference between partially vowelized verbs and unvowelized verbs, $p=.09$. *For passive voice verbs*, the

results showed that there were statistically significant accuracy differences between all types of vowelization. Fully vowelized verbs were read more accurately (*M*=4.76) than were partially vowelized verbs (*M*=2.58), and unvowelized verbs (*M*=.55), *p*<.001, *p*<.001, respectively; and partially vowelized verbs were read more accurately than were unvowelized verbs, *p*<.001 (Figure 4.4).

In short, the accuracy findings revealed that there were no significant differences between the proficiency groups, but accuracy scores increased as the number of vowels increased. All proficiency groups read fully vowelized verbs more accurately than partially vowelized and unvowelized verbs, and they read partially vowelized verbs more accurately than unvowelized verbs. Context did not show any effects on the reading accuracy of all proficiency groups. The reading accuracy of isolated verbs was similar to the reading accuracy of within context verbs. All proficiency groups read active verbs significantly more accurately than passive verbs when verbs were partially vowelized and unvowelized, but not when verbs were fully vowelized. The accuracy differences between all the three types of vowelization were significant when verbs were in passive voice. However, when verbs were in active voice, while there were no significant accuracy differences between partially vowelized and unvowelized verbs, fully vowelized verbs were read more accurately than partially vowelized and unvowelized verbs.

Table 4.10: Accuracy mean of all proficiency groups by voice and vowelization type

Vowelization	voice	Mean	Std. Error	95% Wald Confidence Interval	
				Lower	Upper
Full vowelization	Active voice	4.86	.03	4.78	4.93
	Passive voice	4.76	.05	4.64	4.87
	Total	4.81	.03	4.73	4.88
Partial vowelization	Active voice	4.13	.14	3.83	4.42
	Passive voice	2.58	.25	2.06	3.09
	Total	3.35	.16	3.02	3.67
No vowelization	Active voice	3.82	.16	3.49	4.15
	Passive voice	.55	.11	.32	.77
	Total	2.18	.09	1.99	2.37
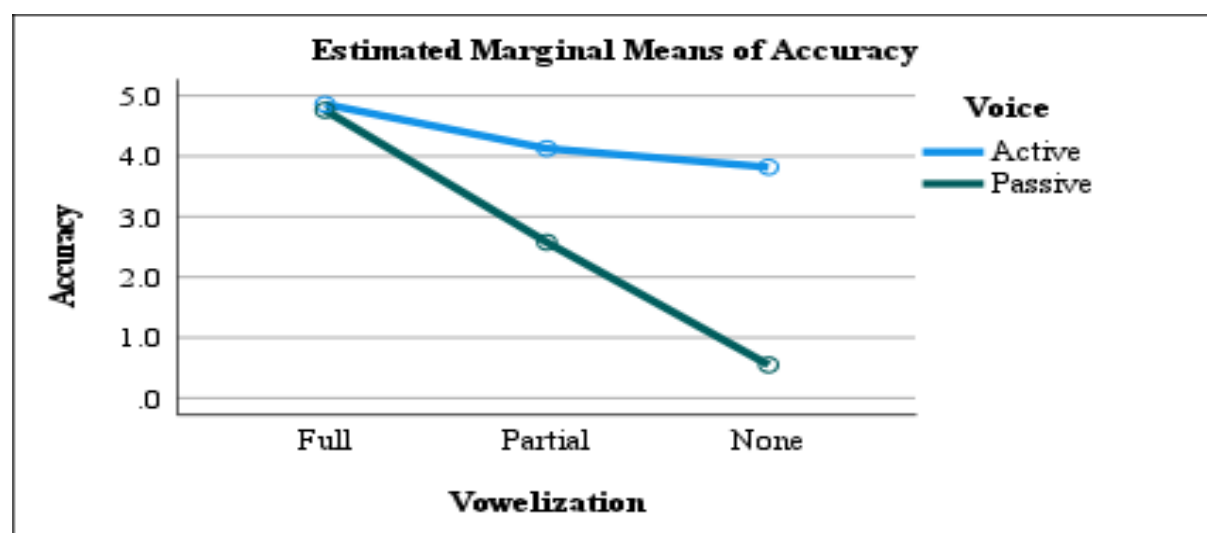
Figure 4.4: Accuracy mean of all proficiency groups by voice and vowelization

4.3   Reading Comprehension

A four-way mixed ANOVA was run to examine the effects of proficiency, context, voice and vowelization on verb reading comprehension. There was no statistically significant four-way interaction between proficiency, context, voice and vowelization, $F(2.9, 63.02) = 1.43$, $p=.24$. There was a statistically significant three-way interaction between context, voice and vowelization, $F(1.4, 63.02) = 3.73$, $p=.04$, $\eta_p^2=.08$. All other three-way interactions were not statistically significant, proficiency, context and voice, $F(2, 44) = .41$, $p=.66$, proficiency, context and vowelization, $F(3.4, 74.9) = 1.45$, $p=.23$, proficiency, voice and vowelization, $F(2.5, 55.02) = .58$, $p=.59$. In the two-way interactions, there was a statistically significant interaction between voice and vowelization $F(1.3, 55.02) = 11.8$, $p< .001$, $\eta_p^2=.21$. All the other two-way interactions were not statistically significant, proficiency and context $F(2, 44) = 1.80$, $p=.18$, proficiency and voice $F(2, 44) = .28$, $p=.76$, proficiency and vowelization $F(2.7, 60.06) = .52$, $p=.66$, context and voice $F(1, 44) = 3.67$, $p=.06$, context and vowelization, $F(1.7, 74.9) = 1.43$, $p=.27$. There was a statistically significant main effect of context $F(1, 44) = 6.98$, $p=.01$, $\eta_p^2=.14$, voice, $F(1, 44) = 86.8$, $p< .001$, $\eta_p^2=.66$, and vowelization, $F(1.4, 60.06) = 17.7$, $p<.001$, $\eta_p^2=.29$. Table 4.11 shows the means and standard deviations for the comprehension scores of all proficiency groups in the 12 combinations of independent variables (context, voice and vowelization). Then, the data file was split by proficiency groups and repeated-measures ANOVA was run to determine the effect of context, voice, and vowelization on reading comprehension for each proficiency group level.

Table 4.11: Comprehension Mean and standard deviation by proficiency groups

	Proficiency	Mean	SD	N
1. Isolated, active, and fully vowelized verbs	Beginner	3.50	1.60	14
	Intermediate	4.19	1.27	16
	Advanced	4.47	1.12	17
	Total	4.09	1.36	48
2. Isolated, active, and partially vowelized verbs	Beginner	3.71	1.26	14
	Intermediate	4.19	1.32	16
	Advanced	4.59	1.06	17
	Total	4.19	1.24	48
3. Isolated, active, and unvowelized verbs	Beginner	3.50	1.69	14
	Intermediate	4.12	1.31	16
	Advanced	4.47	1.06	17
	Total	4.06	1.38	48
4. Isolated, passive, and fully vowelized verbs	Beginner	1.07	1.59	14
	Intermediate	2.44	2.33	16
	Advanced	2.47	2.32	17
	Total	2.04	2.18	48
5. Isolated, passive, and partially vowelized verbs	Beginner	1.36	1.82	14
	Intermediate	2.31	2.21	16
	Advanced	2.18	2.06	17
	Total	1.98	2.04	48
6. Isolated, passive, and unvowelized verbs	Beginner	.57	.75	14
	Intermediate	.56	1.09	16
	Advanced	.59	1.17	17
	Total	.57	1.01	48
7. Within context, active, and fully vowelized verbs	Beginner	4.07	1.59	14
	Intermediate	4.13	1.36	16
	Advanced	4.59	.87	17
	Total	4.28	1.28	48
8. Within context, active, and partially vowelized verbs	Beginner	3.64	1.64	14
	Intermediate	3.94	1.18	16
	Advanced	4.53	1.17	17
	Total	4.06	1.35	48
9. Within context, active, and unvowelized verbs	Beginner	3.71	1.32	14
	Intermediate	3.62	1.40	16
	Advanced	4.47	.94	17
	Total	3.96	1.26	48
10. Within context, passive, and fully vowelized verbs	Beginner	1.64	1.98	14
	Intermediate	2.38	2.21	16
	Advanced	2.53	2.37	17
	Total	2.21	2.19	48
11. Within context, passive, and partially vowelized verbs	Beginner	1.64	1.98	14
	Intermediate	2.31	2.21	16
	Advanced	2.65	2.47	17
	Total	2.23	2.23	48
12. Within context, passive, and unvowelized verbs	Beginner	.79	1.31	14
	Intermediate	1.44	1.71	16
	Advanced	1.47	2.06	17
	Total	1.26	1.73	48

4.3.1 *Proficiency*

The comprehension results of proficiency groups showed that there were no statistically significant differences in comprehension scores between proficiency groups. The comprehension score of advanced readers (*M*=3.25) was higher than the comprehension scores of intermediate readers (*M*=2.97), and beginner readers (*M*=2.44), but the differences were not statistically significant, *p*=1.00, *p*=.13, respectively. Also, the difference between intermediate and beginner readers was not statistically significant, *p*=.55.

4.3.2 *Context*

The comprehension results of all proficiency groups revealed that the main effect of context was statistically significant $F(1, 44) = 6.98$, *p*=.01, η_p^2=.14. The comprehension score of within context verbs was significantly higher (*M*=2.98) than the comprehension score of isolated verbs (*M*=2.79) (Table 4.12). However, the results showed that there was no statistically significant interaction between proficiency and context $F(2, 44) = 1.80$, *p*=.18. The comprehension scores of within context verbs were higher than the comprehension scores of isolated verbs for all proficiency groups. The main effect of context was statistically significant for beginner readers, $F(1, 13) = 6.02$, *p*=.03, η_p^2=.32, and advanced readers, $F(1, 16) =$ 9.16, $p =.008$, η_p^2=.36, but not for intermediate readers, $F(1, 15) =.005$, $p =1.00$.

Table 4.12: Comprehension mean by context and proficiency groups

| Context | Proficiency | Mean | Std. Error | 95% Confidence Interval | |
				Lower Bound	Upper Bound
Isolated	Beginner	2.29	.27	1.72	2.84
	Intermediate	2.97	.26	2.44	3.49
	Advanced	3.13	.25	2.61	3.63
	Total	2.79	.15	2.48	3.10
Within Context	Beginner	2.58	.31	1.95	3.21
	Intermediate	2.97	.29	2.38	3.55
	Advanced	3.37	.28	2.80	3.94
	Total	2.98	.17	2.63	3.31

4.3.3   Voice

The comprehension results of all proficiency groups revealed that the main effect of voice was statistically significant $F(1, 44) = 86.8$, $p<.001$, $\eta_p^2=.66$. Active verbs were understood significantly better ($M=4.08$) than were passive verbs ($M=1.69$) (Table 4.13). However, the results showed that there was no statistically significant interaction between proficiency and voice $F(2, 44) = .28$, $p=.76$. All proficiency groups understood active verbs better than they did passive verbs. The main effect of voice was statistically significant for beginner readers, $F(1, 13) = 31.9$, $p<.001$, $\eta_p^2=.71$, intermediate readers, $F(1, 15) = 23.4$, $p<.001$, $\eta_p^2=.61$, and advanced readers, $F(1, 16) = 33.04$, $p<.001$, $\eta_p^2=.67$.

Table 4.13: Comprehension mean by voice and proficiency groups

Voice	Proficiency	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Active	Beginner	3.69	.29	3.09	4.29
	Intermediate	4.03	.27	3.47	4.59
	Advanced	4.52	.27	3.97	5.06
	Total	4.08	.16	3.75	4.40
Passive	Beginner	1.18	.43	.30	2.05
	Intermediate	1.91	.40	1.08	2.72
	Advanced	1.98	.39	1.18	2.77
	Total	1.69	.23	1.20	2.16

4.3.4 Vowelization

The comprehension results of all proficiency groups revealed that the main effect of vowelization was statistically significant $F(1.4, 60.06) = 17.7$, $p<.001$, $\eta_p^2=.29$. The differences in comprehension scores of types of vowelization showed that while there was no statistically significant difference between fully vowelized and partially vowelized verbs, $p<1.00$, unvowelized verbs were understood significantly less than fully vowelized and partially vowelized verbs, $p<.001$, $p<.001$, respectively. Unvowelized verbs were understood significantly less ($M=2.44$) than were fully vowelized verbs ($M=3.12$) and partially vowelized verbs ($M=3.09$) (Table 4.14). However, the results showed that there was no statistically significant interaction between proficiency and vowelization $F(2.7, 60.06) = .52$, $p =.66$. All proficiency groups understood unvowelized verbs less than they did fully vowelized and partially vowelized verbs, where partially vowelized verbs fell in between. The main effect of vowelization was statistically

significant for intermediate readers, $F(1.4, 20.8) = 9.07$, $p<.003$, $\eta_p^2=.38$, and advanced readers, $F(1.2, 18.8) = 8.43$, $p<.007$, $\eta_p^2=.35$, but not for beginner readers, $F(2, 26) = 2.23$, $p=.13$.

Table 4.14: Comprehension mean by vowelization and proficiency groups

Vowelization	Proficiency	Mean	Std. Error	95% Wald Confidence Interval	
				Lower	Upper
Full vowelization	Beginner	2.57	.37	1.82	3.31
	Intermediate	3.28	.34	2.58	3.98
	Advanced	3.52	.33	2.83	4.19
	Total	3.12	.20	2.71	3.53
Partial vowelization	Beginner	2.59	.35	1.86	3.31
	Intermediate	3.19	.33	2.51	3.86
	Advanced	3.49	.32	2.83	4.14
	Total	3.09	.19	2.69	3.48
No vowelization	Beginner	2.14	.20	1.73	2.54
	Intermediate	2.44	.18	2.05	2.81
	Advanced	2.75	.18	2.38	3.11
	Total	2.44	.11	2.22	2.66

Further, the comprehension results of all proficiency groups also revealed that there was a statistically significant interaction between voice and vowelization $F(1.3, 55.02) = 11.8$, $p<.001$, $\eta_p^2=.21$. However, the comprehension results of each proficiency group showed that while interaction between voice and vowelization was statistically significant for intermediate readers, $F(1.4, 21.7) = 4.55$, $p=.03$, $\eta_p^2=.23$, and advanced readers, $F(1.2, 17.9) = 9.87$, $p=.005$, $\eta_p^2=.38$. this interaction was not statistically significant for beginner readers, $F(1.1, 14.8) = 1.15$, $p=.31$.

Follow up pairwise comparisons were performed for voice and vowelization to determine significant differences.

With regard to voice (Table 4.15), the results showed that there were statistically significant comprehension differences between active and passive voice in all types of vowelization; fully vowelized verbs, $p<.001$, partially vowelized verbs, $p<.001$, and unvowelized verbs $p<.001$. Fully vowelized active verbs were understood significantly better ($M=4.16$) than were fully vowelized passive verbs ($M=2.09$), partially vowelized active verbs were understood significantly better ($M=4.10$) than were partially vowelized passive verbs ($M=2.08$), and unvowelized active verbs were understood significantly better ($M=3.98$) than were unvowelized passive verbs ($M=.90$).

With regard to the comprehension differences between the three types of vowelization in each voice (Table 4.15), the results of *active voice verbs* showed that there were no statistically significant comprehension differences between all types of vowelization. Fully vowelized verbs were understood better ($M=4.16$) than were partially vowelized verbs ($M=4.10$), and unvowelized verbs ($M=3.98$), but the differences were not statistically significant, $p=1.00$, $p=.28$, respectively. Also, the difference between partially vowelized verbs and unvowelized verbs was not statistically significant, $p=1.00$. *For passive voice verbs*, the results showed that there were statistically significant comprehension differences between unvowelized verbs in comparison to fully vowelized and partially vowelized verbs. Unvowelized verbs were understood significantly less ($M=.90$) than were fully vowelized verbs ($M=2.09$), and partially vowelized verbs ($M=2.08$), $p<.001$, $p<.001$, respectively. The difference between fully vowelized and partially vowelized verbs was not statistically significant, $p=1.00$.

Table 4.15: Comprehension mean of all proficiency groups by voice and vowelization type

Vowelization	voice	Mean	Std. Error	95% Wald Confidence Interval	
				Lower	Upper
Full vowelization	Active voice	4.16	.18	3.79	4.52
	Passive voice	2.09	.30	1.46	2.70
	Total	3.12	.20	2.71	3.53
Partial vowelization	Active voice	4.10	.17	3.74	4.45
	Passive voice	2.08	.30	1.45	2.69
	Total	3.09	.19	2.69	3.48
No vowelization	Active voice	3.98	.16	3.64	4.32
	Passive voice	.90	.17	.54	1.26
	Total	2.44	.11	2.22	2.66

Furthermore, the comprehension results of all proficiency groups revealed that there was a statistically significant interaction between context, voice and vowelization, $F(1.4, 63.02) = 3.73$, $p=.04$, $\eta_p^2=.08$. However, the comprehension results of each proficiency group showed that interaction between context, voice and vowelization was only statistically significant for intermediate readers, $F(1.4, 20.8) = 4.59$, $p=.03$, $\eta_p^2=.23$, but not for beginner readers, $F(2, 26) = .51$, $p=.60$, or advanced readers, $F(1.4, 22.8) = 1.58$, $p=.23$. Follow up pairwise comparisons were performed for context, voice and vowelization to determine significant differences.

With regard to context, there was a statistically significant difference in comprehension scores between isolated and within context verbs in passive and unvowelized verbs, $p=.005$. Within context unvowelized passive verbs were understood significantly better ($M=1.23$) than were isolated unvowelized passive verbs ($M=.57$) (Table 4.16). Other comparisons between isolated and within context verbs showed no statistically significant differences (Figures 4.5 & 4.6).

With regard to voice, the comprehension results of all proficiency groups showed that there were statistically significant differences in comprehension scores between active and passive voice in all types of vowelization in both context conditions (isolated and within context) (Figures 4.5 & 4.6).

With regard to vowelization, the comprehension results of all proficiency groups showed that the differences were statistically significant between unvowelized verbs in comparison to fully vowelized and partially vowelized verbs when verbs were in passive voice in both context conditions (isolated and within context). Other comparisons between the three types of vowelization showed no statistically significant differences (Figures 4.5 & 4.6).

Table 4.16:Comprehension mean of all proficiency groups by context, voice and vowelization

Context	Voice	Vowelization	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Isolated	Active	Full	4.05	.19	3.66	4.44
		Partial	4.16	.17	3.80	4.52
		None	4.03	.19	3.63	4.43
	Passive	Full	1.99	.31	1.36	2.62
		Partial	1.95	.30	1.34	2.55
		None	.57	.15	.26	.88
Within context	Active	Full	4.26	.18	3.88	4.64
		Partial	4.04	.19	3.64	4.43
		None	3.94	.18	3.57	4.30
	Passive	Full	2.18	.32	1.53	2.83
		Partial	2.20	.32	1.53	2.86
		None	1.23	.25	.71	1.74
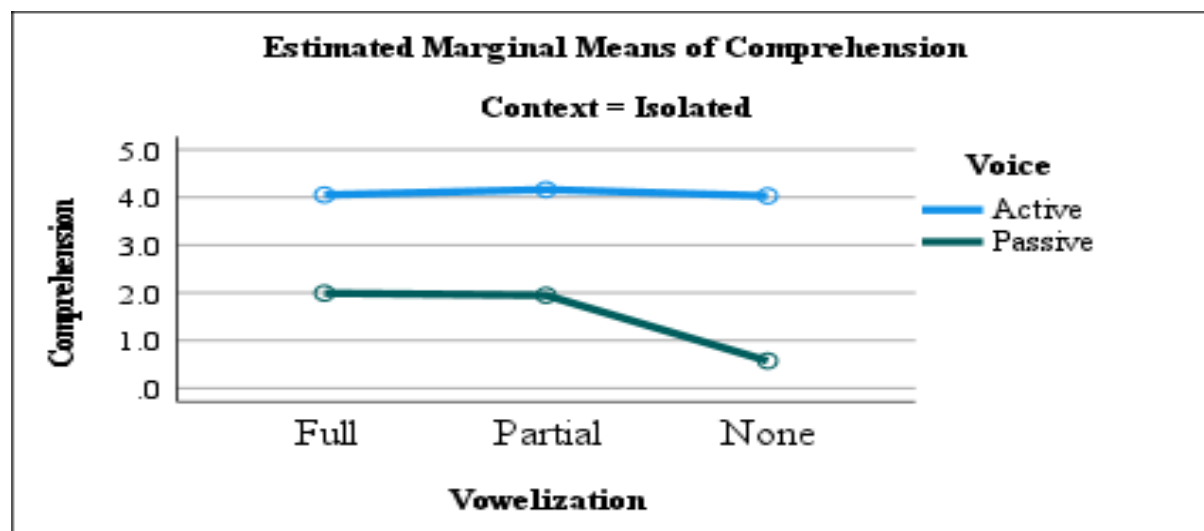
Figure 4.5: Comprehension mean of all proficiency groups in isolated condition by voice and vowelization
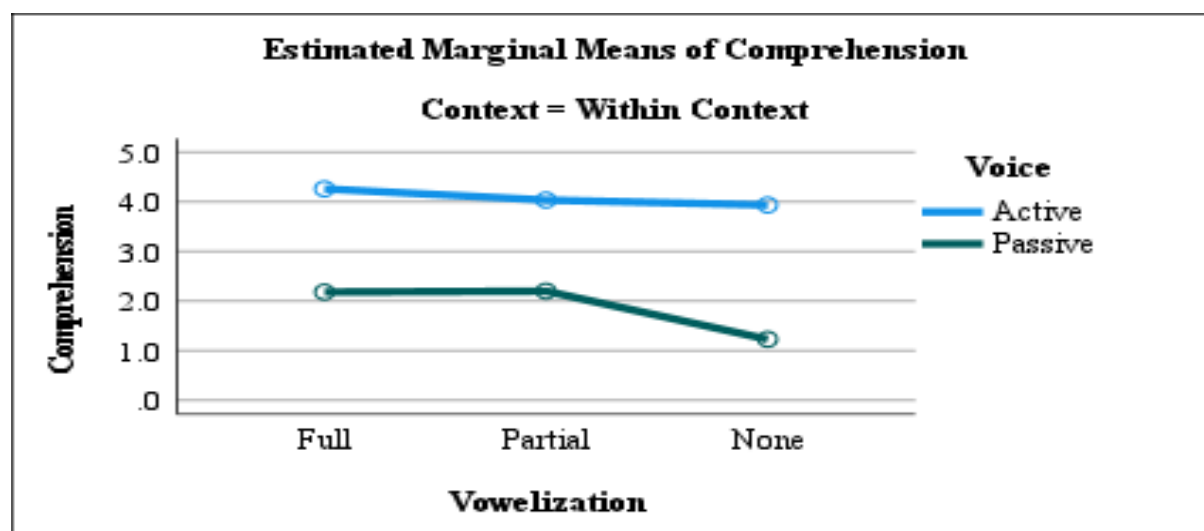
Figure 4.6: Comprehension mean of all proficiency groups in within context condition by voice and vowelization

In short, the comprehension findings revealed that there were no significant comprehension differences between the proficiency groups, but comprehension scores increased as the number of vowels increased. All proficiency groups comprehended vowelized verbs (fully and partially) better than unvowelized verbs, particularly for intermediate and advanced readers. Context has an important role on L2 reading comprehension. All proficiency groups comprehended within context verbs better than isolated verbs, particularly beginner and advanced readers and when verbs were unvowelized and passive. All proficiency groups comprehended active verbs significantly better than passive verbs. The comprehension differences between all the three types of vowelization were not significant when verbs were in active voice. However, when verbs were in passive voice, while there were no significant comprehension differences between fully and partially vowelized verbs, unvowelized verbs were comprehended significantly less than both fully and partially vowelized verbs.

4.4   Interview Results

Participants were asked ten questions about their thoughts, attitudes, and preferences in regard to the use of vowelization in Arabic. Their responses were analyzed thematically, and the results are presented in this section.

4.4.1   Participants' texts selection and preferences when reading Arabic texts

Participants were asked about what types of texts (vowelized or unvowelized) they select and prefer to read when they have the option to select what to read (something other than their assigned texts). Eleven participants (4 beginner, 2 intermediate and 5 advanced) reported that they usually select unvowelized texts to read when they have the option to self-select, and six of them (2 from each proficiency group) reported that they actually prefer to read unvowelized texts

rather than reading vowelized texts. They reported that they select and prefer to read unvowelized text because they want to improve their reading ability. Advanced readers specifically indicated that they want to be ready for university and to be familiar with unvowelized Arabic texts that are usually used in university textbooks.

However, most participants (*N*=42) reported that they prefer to read vowelized texts, and 37 of them reported that they usually select vowelized texts when they have the freedom to select what to read. They reported that they select vowelized texts because vowelized texts are a lot easier to read than unvowelized texts. They reported that vowelization helps them for accurate pronunciation, and sometimes for better comprehension. This self-reported finding seems to be supported by the findings for reading accuracy and reading comprehension reported in the previous section. The reading accuracy scores of all participants increased as the number of vowels increased, and the reading comprehension scores of vowelized verbs (full and partial) were significantly better than the comprehension scores of unvowelized verbs.

Some beginner and intermediate participants have even reported that they cannot read accurately without vowels, which appears to be untrue particularly when verbs were in active voice. However, this may indicate a serious issue which is the lack of confidence of some L2 Arabic readers in reading unvowelized texts. Their belief of being unable to read accurately without vowels while they did the opposite indicates that they are anxious of facing the reality that vowels are not always presented in Arabic texts, and that Arabic texts are written mostly unvowelized. Therefore, it is very important for L2 Arabic teachers to clearly articulate to their students that vowels are used temporarily to help them pick up the sound of the language and to train them to read Arabic words and texts, but eventually they have to learn how to read Arabic

without vowels. Thus, they should take advantage of vowels when they are present but to not depend on them in their reading learning and development.

4.4.2 Participants' insights about vowelization and their effects on reading accuracy, speed, and comprehension

Participants were asked about the effects of vowelization on their reading accuracy, speed, and comprehension. With regard to accuracy, all participants reported that diacritical marks (vowelization) help them to read more accurately because vowelization shows them how words should be pronounced, particularly unfamiliar words. This can be seen in the quantitative findings of reading accuracy of this study where participants were more accurate in reading vowelized verbs than they were in reading unvowelized verbs.

With regard to speed, two participants (1 beginner and 1 advanced) indicated that diacritical marks (vowelization) sometimes slow their reading, particularly with common words, or words they know how to read without vowels. However, other participants (*N*=46) reported that diacritical marks (vowelization) help them to read faster because with vowelization they do not need to think or guess for missing vowels. They reported that, if a text was unvowelized, they sometimes need to stop and think about how a given word should be pronounced. They might also have to pronounce it many times until they feel they got the correct pronunciation, which ultimately leads to slower reading. The speed findings concerning fully vowelized verbs, particularly for intermediate and beginner readers, clearly support these impressions. Fully vowelized verbs were read significantly faster than partially vowelized and unvowelized verbs, which indicates that when all vowels are present and there was no room left for guessing, participants read faster.

With regard to comprehension, five participants (1 beginner, 2 intermediate and 2 advanced) reported that diacritical marks (vowelization) do not lead to better comprehension. They reported that if they do not know a word, vowels will not make any difference in regard to understanding the meaning of the word. However, other participants (N=43) reported that diacritical marks (vowelization) help them to understand words better, particularly when it comes to syntactic roles or some kinds of words (i.e., homographic words). Some participants also reported that, if vowels are present, they would not need to think about missing vowels which allows them to think more about the meaning of the words and their context. These perceptions may explain the poor performance of participants in comprehending unvowelized verbs. Unvowelized verbs were understood significantly less than were fully and partially vowelized verbs, particularly when verbs were in passive voice.

4.4.3   *Participants' attitudes on where and how vowels should be used*

Participants were asked about where vowels should be used more, with isolated words or within context. All participants agreed that diacritical marks (vowels) are helpful in both isolated and within context; however, when they were asked to pick one over the other, fifteen participants chose isolated verbs because they believed that it is difficult, if not impossible, to know the correct pronunciation of isolated unvowelized verbs. The other participants thought that adding diacritical marks (vowels) to verbs within context is more helpful than adding them to isolated words. They reported that adding diacritical marks (vowels) to verbs within context helps with a better understanding of the context. Also, while isolated words may have many correct pronunciations, words within context have only one correct pronunciation, thus adding diacritical marks (vowels) to them leads to a more accurate reading.

Participants were also asked about how texts and words should be vowelized (fully, partially, or none). With regard to texts, eleven participants (6 beginner, 3 intermediate and 2 advanced) reported that they think all words should be vowelized. They either thought that they cannot read without vowels (particularly beginner readers) or that it would be better and easier for them to read text with vowels. However, other participants (37 participants) argued that not all words should be vowelized. They explained that while some words should be vowelized (e.g., homographic words, new words, less frequent words), other words do not need to be vowelized (e.g., common words or frequent words).

With regard to vowelizing words, fifteen participants (7 beginner, 5 intermediate and 3 advanced) reported that all letters should be vowelized. They thought that adding only one vowel to a word may be confusing, and that it is easier and clearer to have all vowels. On the other hand, the other thirty-three participants felt that not all letters should be vowelized. One or two diacritical marks (vowels) can be enough, depending on word length; however, they differ on which letters should be vowelized. Some participants argued that the first letter of every word should be vowelized, while others argued that the last letter of every word are the most important letters to be vowelized since they represent the syntactic case mark.

Lastly, when participants were asked about their thoughts on partial vowelization, all participants agreed that having some diacritical marks (vowels) is much better than having none. The participants here are probably referring to reading accuracy or comprehension, where the accuracy and comprehension scores of partially vowelized verbs were significantly higher than the accuracy and comprehension scores of unvowelized verbs. However, twenty-two participants (7 beginner, 9 intermediate and 6 advanced) added that partial vowelization is not always helpful. They reported that partial vowelization can be helpful in short and somehow familiar

words, but not for long or new words. These participants are probably referring to reading speed where partially vowelized verbs were read slower than fully vowelized and unvowelized verbs, particularly for intermediate readers.

4.4.4   Participants' prior knowledge of active and passive voice in Arabic

Participants were asked about whether or not they know how to differentiate active verbs from passive verbs in Arabic. Among the beginner readers, all participants but one reported that they had never learned about active/passive voice in Arabic and never studied them in their L2 Arabic courses. The one participant who claimed that he knew about active/passive voice in Arabic, reported that he had learned it outside his L2 Arabic courses.

Among the intermediate readers, only five participants claimed that they had never learned about active/passive voice in Arabic. The other participants reported that they had recently started to learn about active/passive voice in Arabic. Some of them even claimed that they had just learned about it for the first time on the same week they were interviewed. Thus, they knew just a little bit about it.

All advanced readers reported that they had already learned about active/passive voice in Arabic in their previous level, which may explain their outperformance, particularly in reading speed.

As to how to distinguish between active and passive verbs in Arabic, 11 participants from the advanced group and only 3 participants from the intermediate group felt that they could distinguish active and passive verbs by investigating their diacritical marks (vowels). And if the verb does not include diacritical marks (vowels), they reported that they would look at the verb context, particularly the following words. The other participants from the advanced group reported that they could distinguish active and passive verbs if verbs were vowelized, but if verbs

were unvowelized, it would be difficult for them to distinguish active and passive verbs. The

following chapter summaries and discusses the key findings of the study.

Chapter 5: Discussion and Conclusion

This chapter summaries and discusses the findings presented in the previous chapter. The study investigated the effects of L2 Arabic proficiency, context, voice and vowelization on L2 Arabic word reading speed, accuracy, and comprehension. Each variable is discussed separately followed by implications of the findings.

5.1   Summary and Discussion of Key Findings

5.1.1   Differences between L2 proficiency groups

The findings of this study revealed that there were significant speed differences between the three proficiency groups. Advanced readers were significantly faster than intermediate and beginner readers in reading Arabic verbs, while intermediate and beginner readers showed no significant speed differences.

The findings also showed significant interaction effects between proficiency and vowelization on reading speed. Advanced readers were significantly faster than intermediate and beginner readers in reading Arabic verbs in all types of vowelization (full, partial, none). Intermediate and beginner readers, on the other hand, showed no significant speed differences in all types of vowelization. However, while intermediate readers were faster than beginner readers in reading fully vowelized and unvowelized verbs, they were interestingly slower in reading partially vowelized verbs. Intermediate readers spent more time than beginner readers in reading partially vowelized verbs, but their reading accuracy of partially vowelized verbs (discussed below) was significantly higher than the reading accuracy of beginner readers, which suggests that they prioritized reading accuracy over reading speed. Fast and accurate word decoding is an essential prerequisite for good reading comprehension (Abu-Leil, et al., 2014), but research on

L1 and L2 reading development suggests that accuracy precedes automaticity (Vanniarajan, 2012), which means that reading accuracy must be attained before fluency (being able to read or process reading fast). Intermediate readers spent more time on reading partially vowelized verbs, probably because they were trying to guess the missing vowels, but, as a result, they seem to have achieved significantly higher accuracy. Meanwhile, beginner readers read partially vowelized verbs faster, but their readings were mostly inaccurate. Thus, it seems to be incorrect to conclude that partial vowelization increases the reading speed of beginner readers, but instead, a more appropriate interpretation of these finding is that, although partial vowelization slows the reading speed of intermediate readers, it increases their reading accuracy.

Finally, the findings of this study revealed that reading accuracy and reading comprehension increased as proficiency level increased. Advanced readers achieved higher accuracy scores and comprehension scores than did intermediate and beginner readers, while intermediate readers fell in between. However, the differences in accuracy and comprehension between proficiency groups were not statistically significant. These findings concerning reading accuracy and comprehension were obtained when all the other variables are combined (context, voice, and vowelization). However, when these variables are considered, reading accuracy and comprehension showed significant differences across the three L2 Arabic proficiency groups.

5.1.2   *The effects of context*

The findings revealed that context has little effects on verb reading speed. On average, isolated verbs were read faster than within context verbs by all proficiency groups, but the differences across contexts were only significant for the advanced readers who read isolated verbs significantly faster than they did within context verbs. The other proficiency groups (intermediate and beginner) showed no significant speed differences between isolated and within

context verbs. These findings indicate that context may slow the verb reading speed of L2 Arabic readers, particularly advanced readers, but to a limited extent. Indeed, the slightly slower reading of within context verbs is somehow expected due to the appearance of context. The context seemed to cause some distraction that led to slightly slower reading of within context verbs when they are compared to reading isolated verbs.

The findings showed no significant differences in reading accuracy between isolated and within context verbs for all proficiency groups. The accuracy scores of isolated verbs were similar to the accuracy scores of within context verbs, which indicates little effects of context on the reading accuracy of L2 Arabic readers.

The absence of context effects on reading speed and accuracy in this study may be attributed to the position of the target verbs. Participants were asked to read as fast and accurately as possible isolated verbs and irrelevant sentences, where each sentence begins with a target verb. Although context refers to any words, sentences, and ideas that come before or after target words, the target verbs in this study were always presented at the beginning of each sentence. Thus, it might be difficult for the participants to take advantage of the context when reading the first word of the sentence, particularly when they are asked to read them as fast as possible. However, the study placed the verbs at the beginning of the sentences because it aimed to measure verb reading speed alongside with verb reading accuracy. Placing the verbs at the beginning of the sentences made it easier to measure verb reading speed, which would be very difficult to do if the verbs had been placed elsewhere in the sentence. For instance, if verbs were placed at the end of the sentences, it would be very difficult to measure speed due to several methodological obstacles such as the number, length, and difficulty of the other words in the sentence. These variables, methodologically speaking, are very difficult to implement in a study

that aims to investigate the effects of different types of vowelization in different context and voice conditions.

There are no L2 Arabic studies, to the best of my knowledge, that have investigated the effect of context on L2 Arabic readers, but some L1 Arabic studies have suggested that context can increase the reading accuracy of L1 Arabic readers (e.g., Abu-Rabia, 1996; 1997a; 1997b; 1998), particularly when context is combined with vowelization (Abu-Rabia, 1996;1997a). Context seems to enhance the probability of word reading accuracy among L1 Arabic readers and to help both poor and skilled L1 Arabic readers achieve higher reading accuracy, where skilled readers tend to benefit from context more than their poor counterparts (Abu-Rabia, 1997a; 1997b; 1998; Hussien, 2014). L2 reading research has also shown that while proficient L2 readers tend to use context to guess unknown words, low proficient L2 readers are still at the stage where they cannot (Carrell, 1989; Ehri, 1998; Nassaji, 2003). However, the findings of this study showed that there were no significant differences between the three proficiency groups; none of the three groups appeared to benefit from context in their reading process. Additionally, the Arabic L1 studies indicated that when reading unvowelized Arabic texts, the reader must first understand the context in order to correctly recognize unknown words (Abu-Rabia, 1997a). This kind of cognitive activity entails high level processing skills (Abu-Rabia, 1997b) that may be difficult for L2 Arabic readers to attain. Therefore, they seemed to benefit less from context.

As for reading comprehension, the findings revealed that Arabic verbs presented within context (within a sentence) were understood better than were isolated verbs by all proficiency groups, particularly when verbs were passive and unvowelized. This finding confirms the positive effects of context on reading comprehension that have been found for L1 Arabic readers (Abu-Rabia,1999; Abu-Rabia, 2001; Abu-Liel et al., 2014), where context facilitates reading

comprehension. However, while L1 Arabic readers take more advantage of context when it was combined with vowelization, the L2 Arabic readers in this study benefited more from context when verbs were less frequent (passive voice) and unvowelized. The participants' comprehension of passive unvowelized verbs was better when these verbs were presented within context than when they were isolated. But when these two factors were absent, whether verbs were highly frequent (active voice) or vowelized, context appeared to have less effect on their comprehension. Frequency and vowelization seem to weaken the role of context for L2 Arabic readers as their comprehension was high when verbs were highly frequent or vowelized regardless of whether context was provided or not.

Context was found to facilitate word meaning selection either by selecting the most appropriate meaning when all the word meanings were activated in the reader's mind or by facilitating the activation of the most relevant meaning over the other less-relevant meanings (Koda, 2005). The findings of this study showed that context was used to verify the meaning of the verbs. That is, participants in their first attempt mostly read passive verbs in their active form even when verbs were presented within context, which means that they always initially activate the frequent meaning of verbs (active voice) in their mind. But when the active form did not align with the meaning of the passive sentence, participants reread the verb and used context to verify its meaning (the intended passive form). Thus, instead of using context to activate the appropriate meaning, L2 Arabic readers of this study used the context to verify the infrequent meaning. Nevertheless, they only used context for verification when verbs were unvowelized. But when verbs were vowelized (fully or partially), they seemed to ignore context and heavily rely on vowelization.

5.1.3   *The effects of voice*

The findings revealed that voice had a significant impact on verb reading speed. Active verbs were read significantly faster than were passive verbs by all proficiency groups. However, when analyzing voice in relation to the different types of vowelization, the study showed slightly different findings. That is, while the findings of fully vowelized and partially vowelized verbs showed that active verbs were read significantly faster than passive verbs, unvowelized verbs showed the opposite pattern. Surprisingly, unvowelized passive verbs were read faster than were unvowelized active verbs. However, it is worth noting that almost all unvowelized passive verbs were read inaccurately by readers form all proficiency groups. The verbs were read faster but inaccurately, thus it is misleading to conclude that unvowelized passive verbs can be read faster than unvowelized active verbs. Therefore, the appropriate interpretation is that L2 Arabic readers can only differentiate between active and passive verbs if verbs are vowelized (whether fully or partially), and when they do, they read active verbs faster than passive verbs.

The reason that unvowelized passive verbs were read faster than unvowelized active verbs could be attributed to the repetition of unvowelized verbs in the experiment. That is, participants in the study saw each unvowelized verb twice, the first one was assigned by the author to be active and the second one to be passive. Unvowelized verbs looked identical in both voices, and it is difficult to distinguish them when they are written unvowelized. The participants appeared to treat unvowelized active and passive verbs as if they were the same verb form. They were not able to differentiate active verbs from passive verbs even when verbs were presented within context. Therefore, when the participants saw each verb twice in a short time, they interpreted it as the same verb form, and, as a result, it was easier for them to read the verb the second time, which probably led to faster reading of verbs coded as passive.

The unvowelized verbs in this study were mostly read in the active voice whether verbs were active or passive, isolated or within context. The L2 Arabic readers in this study were not able to recognize the passive voice when verbs were written unvowelized. A difficulty that has also been observed with L1 Arabic readers. However, when passive verbs are presented within context, L1 Arabic readers are able to take advantage of context to recognize the intended (passive) voice, unlike their L2 counterparts in this study. L1 Arabic readers tend to initially read unvowelized passive verbs in their active voice, but when their reading is inconsistent with the context, they are able to recognize their mistake and reread the verb in the correct intended (passive) form (Hermena et al., 2015). The participants in this study, on the other hand, were not able to use this strategy and benefit from context. Although some participants reported that they were aware of the importance of using context to identify unvowelized words, the findings of this study showed that context did not help them to recognize passive verbs, which means that it is important to add vowelization on passive verbs in order to make them distinguishable for these readers. At the same time, it is also important for L2 Arabic readers to learn how to use context to differentiate between active and passive verbs. L1 Arabic readers use context to recognize unvowelized passive verbs, and L2 Arabic readers should learn to do the same.

The findings revealed that voice had a significant impact on verb reading accuracy. Active verbs were read more accurately than were passive verbs by all proficiency groups. However, when analyzing voice in relation to the different types of vowelization, the study showed slightly different findings. That is, the findings revealed that while active verbs were read significantly more accurately than were passive verbs in the partially vowelized and unvowelized conditions, fully vowelized verbs showed no significant differences in terms of accuracy scores between active and passive verbs for all proficiency groups. Active verbs are

more frequent than passive verbs in Arabic, but L2 Arabic readers were able to accurately read fully vowelized verbs whether verbs were highly frequent (active verbs) or less frequent (passive verbs), which suggests that full vowelization can be sufficient for accurate reading regardless of verb frequency. It seems that full vowelization can compensate for low verb frequency in Arabic. However, when verbs were partially vowelized or unvowelized, active verbs were read significantly more accurately than were passive verbs by all proficiency groups. Findings from L1 Arabic reading studies showed that when passive verbs are unvowelized, L1 Arabic readers have difficulties in recognizing them, and their first attempt to read unvowelized passive verbs is usually wrong (Hermena et al., 2015). Thus, the findings of this study concerning L2 Arabic readers appear to align with these findings for L1 Arabic readers, and that voice affects the reading accuracy of L2 Arabic reading as it does for L1 Arabic reading. Nevertheless, voice has been found to affect L1 reading accuracy when verbs are unvowelized, but this study showed that voice can affect L2 reading accuracy when verbs were unvowelized as well as when verbs were partially vowelized. Partial vowelization significantly improved the reading accuracy of passive verbs.

The findings also revealed that voice had a significant impact on verb reading comprehension. Active verbs were understood better than were passive verbs by all proficiency groups. However, when analyzing voice in relation to the different types of vowelization, the study showed slightly different findings. That is, the findings revealed that active verbs were understood better than were passive verbs in all types of vowelization, and the differences were statistically significant for advanced and intermediate readers. Active verbs were easier to comprehend than were passive verbs for all L2 proficiency groups. Similarly, L1 Arabic readers take more time to process passive verbs than they do active verbs (Hermena et al., 2015), which

indicates that they also have difficulties processing passive verbs. These comprehension difficulties could be attributed to their low frequency and low accuracy probability. Word knowledge requires knowledge of both word form and meaning (Nation, 2001), and if a reader does not know how to read a word, or they could not distinguish the form of the verb (i.e., passive verbs), they most likely will not be able to know its meaning.

5.1.4   *The effects of vowelization*

The findings revealed that there were no speed differences between fully vowelized and unvowelized verbs, while partially vowelized verbs were read slower than both fully vowelized and unvowelized verbs by all proficiency groups. Yet, when analyzing vowelization in regard to the two voice conditions (active and passive), the study showed different effects of vowelization. In active voice, advanced readers showed no significant speed differences between the three types of vowelization, which indicates that when verbs are in active voice, vowelization does not seem to affect the reading speed of advanced L2 Arabic readers. Beginner and intermediate readers, on the other hand, showed no significant speed differences between partially vowelized and unvowelized verbs, but both groups read fully vowelized verbs significantly faster than they did partially vowelized and unvowelized verbs. These findings suggest that in order to obtain faster reading by beginner and intermediate L2 Arabic readers, active verbs should be fully vowelized. Partial vowelization of active verbs does not seem to increase their reading speed.

When verbs were in passive voice, unvowelized verbs were read faster than were fully and partially vowelized verbs. However, as was explained earlier, this may simply occur because of the repetition of unvowelized verbs. Thus, this finding should be interpreted with great caution, particularly when the unvowelized passive verbs were mostly read inaccurately. Fully vowelized verbs were read significantly faster than partially vowelized verbs by all proficiency

groups, which indicates that when verbs are passive, every single vowel (diacritical mark) makes a difference. The more vowels are added to a passive verb, the faster it is read by L2 Arabic readers. Adding partial vowelization to passive verbs increases the reading speed of L2 Arabic readers. This is different from active verbs where partial vowelization does not seem to increase these readers reading speed.

While there are no L2 Arabic studies, to the best of my knowledge, that have investigated the effect of partial morphological vowelization or passive voice on L2 Arabic reading speed, the findings concerning active verbs in this study confirm the findings of previous L2 Arabic studies, particularly for advanced readers (Al Midhwah, 2018; Hansen, 2010). Al Midhwah (2018) found that while advanced L2 Arabic readers showed no significant speed differences in reading vowelized and unvowelized words and texts, beginner and intermediate readers read vowelized texts faster than they did unvowelized texts. The findings of Al Midhwah (2018) are similar to the findings of this study when verbs are in active voice. Hansen (2010), on the other hand, showed similar results for advanced readers, but not for beginner and intermediate readers. She found that vowelization slowed the reading speed of intermediate and beginner readers, while this study showed the opposite pattern. Hansen indicated that the orthographic information associated with vowelization was heavy for these low proficient readers. Adding vowelization increased the cognitive demands on their decoding processes, which ultimately led to more distraction and slower reading. However, this does not seem to be the case for the beginner and intermediate readers in this study who seemed to rely heavily on vowelization in their decoding process. Vowelization represents necessary phonological information that appears to help low proficient readers read faster. On the other hand, when vowelization was absent, beginner and intermediate readers spent more time reading the unvowelized verbs because they were trying to

guess the missing phonological information (the missing vowels). Additionally, Hansen did not measure reading accuracy which is an important aspect of the word reading process. Thus, it is possible that although vowelization decelerated the decoding process of Hansen's participants, it may increase their reading accuracy, which means that they were reading slower because they were trying to read more accurately.

The findings of this study concerning reading speed seem to contradict the findings of studies on L1 Arabic readers. This study showed that vowelization increased reading speed of L2 Arabic readers, particularly when verbs were in passive voice. However, the findings of research on L1 Arabic readers indicate that adding vowelization decelerates L1 Arabic reading speed (e.g., Hussien, 2014; Ibrahim, 2013; Taha, 2016). Native Arabic readers tend to spend more time reading vowelized words and texts than they do with unvowelized words and texts. The differences between the effect of vowelization on L1 and L2 reading speed could be attributed to differences in L1 and L2 readers' decoding methods. L1 Arabic readers are skilled readers who prefer to read using the orthographic decoding route, thus providing vowelization to words or texts adds more visual complexity that leads to slower reading processes (Coltheart, et al., 2001; Fender, 2008; Roman and Pavard, 1987; Taha, 2016; Taouk & Coltheart, 2004). By contrast, L2 Arabic readers are usually less proficient readers who rely heavily on phonological information (phonological decoding route), particularly when context is provided (Khaldieh, 1996). Thus, adding vowelization provides all the necessary phonological information they need, which ultimately leads to faster word reading.

Another possible explanation could be related to the nature of language learning. While the phonological system of L1 readers is usually well developed before they start to learn how to read, L2 readers develop phonological and orthographical information at the same time as they

learn how to read in their L2. It is easier for L1 readers to retrieve the phonological information from their lexicon if they are able to recognize the orthographic information. Their phonological system should be developed before they learn how to read. In contrast, L2 readers develop phonological and orthographical information at the same time which increases their cognitive activity. The participants of this study were native English speakers who were learning Arabic as a second language, and the significant phonological and orthographical differences between English and Arabic seem to burden their cognitive processes and make it very difficult for them to read faster while some phonological information is missing.

However, while the findings of this study contradict the findings of research on L1 Arabic readers concerning the reading speed for active verbs, they are consistent with the findings of L1 Arabic reading research concerning passive verbs. Passive voice greatly slowed the reading speed of L2 Arabic readers, where passive verbs were read significantly slower than were active verbs by all proficiency groups. However, adding vowelization to passive verbs increased the participants' reading speed, where fully vowelized verbs were read significantly faster than partially vowelized verbs by all proficiency groups. Similar results were found for L1 Arabic readers. Passive voice slowed their reading speed, but adding vowelization to passive verbs increased their speed. Vowelizing passive verbs in a text seems to attract the attention of L1 Arabic readers which leads to faster and more accurate reading of passive verbs (Hermena et al., 2015). Thus, vowelization may have different effects on L1 Arabic readers. While it slows their reading speed on active verbs, it may increase their decoding process on passive verbs.

Further, the findings showed that reading accuracy increased as the number of vowels increased. Fully vowelized verbs were read more accurately than were partially vowelized and unvowelized verbs, and partially vowelized verbs were read more accurately than were

unvowelized verbs. Yet, when analyzing vowelization in regard to the two voice conditions (active and passive), the study showed different effects of vowelization. In active voice, fully vowelized verbs were read significantly more accurately than were both partially vowelized and unvowelized verbs. Although the accuracy scores of active verbs were high for all proficiency groups in all types of vowelization, adding full vowelization on active verbs significantly increased the reading accuracy of L2 Arabic readers. Partially vowelized verbs were read slightly more accurately than unvowelized verbs, but the difference was not significant.

The findings concerning passive verbs showed that there were significant accuracy differences between all types of vowelization. Fully vowelized verbs were read significantly more accurately than were partially vowelized verbs and unvowelized verbs, and partially vowelized verbs were read significantly more accurately than were unvowelized verbs. This suggests that when verbs were in passive voice, every single vowel makes a difference. The more vowels are added to a passive verb, the more accurately it is read by L2 Arabic readers.

These findings concerning reading accuracy in relation to active and passive verbs confirm the positive effect of vowelization that was found in previous L1 and L2 Arabic reading studies. Vowelized words and texts tend to be read more accurately than are unvowelized words and texts by L1 Arabic readers (Abu-Rabia, 1996; 1997a; 1997b; 1998) and L2 Arabic readers (Al Midhwah, 2018). Vowelization enhanced the reading accuracy of all L2 Arabic proficiency groups in this study, which is consistent with findings concerning its effect on L1 Arabic readers where vowelization increased the reading accuracy of poor and skilled L1 Arabic readers (Abu-Rabia, 1997a; 1997b; 1998; Hussien, 2014). In the current study, readers at all proficiency levels benefited in their reading accuracy from the presence of vowelization.

Partial vowelization in this study was found to be beneficial for the reading accuracy of all proficiency groups, where partial vowelization increased their reading accuracy, particularly with passive verbs. Similar results were found for L1 Arabic readers where partial vowelization tended to increase their reading accuracy (Abu-Rabia, 1997b). However, it is worth noting that partial vowelization in Abu-Rabia's study (1997b) was applied to the last letter of words, while partial vowelization in this study was applied to the first letter of words. Nevertheless, both types of partial vowelization were found to be helpful for Arabic reading accuracy. Vowelizing the last letter of words tends to increase the reading accuracy of L1 Arabic readers (Abu-Rabia, 1997b), while vowelizing the first letter of words seems to increase the reading accuracy of L2 Arabic readers (as found in this study). These findings indicate that partial vowelization is beneficial for word reading accuracy for both L1 and L2 Arabic readers regardless of where partial vowelization is placed on the word.

The findings concerning reading speed and accuracy in this study show that when verbs were in active voice, full vowelization makes a difference in the reading speed and accuracy of L2 Arabic readers. L2 Arabic readers will read active verbs faster and more accurately if the verbs are fully vowelized, but not when the verbs are partially vowelized. Partial vowelization in active voice is similar to no vowelization for the reading speed and accuracy of L2 Arabic readers. However, when verbs were in passive voice, every single vowel makes a difference. Adding a vowel to passive verbs increased the reading speed and accuracy of L2 Arabic readers, and the more vowels are added, the faster and more accurately words are read by L2 Arabic readers. These findings concerning the passive verbs align with the claims of the Orthographic Depth Hypothesis (Katz & Frost, 1992) that reading is easier in shallow writing systems as opposed to deep (or opaque) writing systems. In Arabic, the writing system is considered shallow

when vowels are provided, and deep when they are absent (Asaad & Eviatar, 2013). Arabic vowels represent phonological information that limit the graphemes-phonemes relationship to be one-to-one correspondence that is considered very shallow. The speed and accuracy findings (particularly for passive verbs) showed that when vowelization was added and verbs became shallower, the reading of L2 Arabic readers became faster and more accurate. But when verbs were unvowelized, L2 Arabic readers had difficulties reading the verbs. Their readings were slower and less accurate because the writing system was deeper and each letter or verb can be read in different ways. Readers had to figure out the missing phonological information which makes them slower and less accurate as opposed to when vowelization was provided.

Furthermore, the findings showed that while there were no comprehension differences between fully and partially vowelized verbs, unvowelized verbs were understood significantly less than were vowelized verbs (fully and partially vowelized), particularly for intermediate and advanced readers. Yet, when analyzing vowelization in relation to the two voice conditions (active and passive), the study showed different effects of vowelization. When verbs were in active voice, there were no significant comprehension differences between all types of vowelization, which means that there are no effects of vowelization on the reading comprehension of active verbs. However, the findings concerning the comprehension of passive verbs for intermediate and advanced readers showed that while there were no significant comprehension differences between fully and partially vowelized passive verbs, both types of vowelization were understood significantly better than were unvowelized verbs.

The findings concerning active verbs confirm the findings of previous L2 Arabic studies (Hansen, 2010; Khaldieh, 2001) that vowelization does not improve the reading comprehension of L2 Arabic readers. This means that when verbs are in the active voice, the comprehension of

verbs will be the same whether vowelization is added or not. However, while these findings contradict findings from L1 Arabic readers, the findings concerning passive verbs support findings from L1 Arabic readers. Vowelization tends to improve the reading comprehension of beginner and advanced L1 Arabic readers (Abu-Liel et al., 2014; Abu-Rabia, 1999; 2001). Abu-Rabia (2001) attributed this to the additional phonological information that is provided by vowelization, which assists L1 Arabic readers in disambiguating homographs and recognizing the precise meaning of words. As a result, working memory is freed and less cognitive effort is needed to recognize words, while more effort is allocated for word and text comprehension. This idea of freeing the working memory and allocating the effort to comprehension seems to be operating with passive verbs in this study. Vowelizing (fully or partially) passive verbs significantly improved the reading comprehension of L2 Arabic readers. In contrast, if verbs were unvowelized, L2 Arabic readers, like L1 readers, tend to read passive verbs in their (unintended) active form even within context. Context does not seem to help L2 Arabic readers as it does for L1 Arabic readers (Hermena et al., 2015). Only vowelization can get L2 Arabic readers' attention to the (intended) passive voice, and as a result their reading comprehension improved. In fact, the idea of freeing working memory and allocating the effort to comprehension was repeatedly reported by the participants in study. For example, several participants reported that when vowelization is present, reading is easier, and this helps them to direct their efforts to reading comprehension instead of focusing on reading accuracy. Word recognition includes extracting phonological information (Koda, 2005), and if all phonological information is present (i.e., vowels), word recognition should be rapid and effortless.

The findings of this study concerning the effects of vowelization on reading speed, accuracy, and comprehension seem to align with what participants reported on the effects of

vowelization. Participants reported that vowelization is an important factor for their reading accuracy and comprehension in Arabic. The presence of vowelization helps them to read more accurately and to better understand the verbs, while their absence leads to slower, less accurate, and less comprehended reading. Vowelization provides the necessary phonological information that helps them know how words should be pronounced, which leads to faster and more accurate reading that facilities reading comprehension and enables readers to allocate cognitive effort to reading comprehension rather than reading accuracy.

5.2   Limitations

Each study comes with its limitations, and this study has two main limitations to its design that seem to have affected the results. The first issue is the selection of unvowelized verbs and the order in which they were presented to the participants. That is, the study used the same unvowelized verbs for both active and passive voices. The first appearance of each unvowelized verb was considered by the author as active, and the second appearance was considered as passive. The verb forms looked identical in both appearances. However, it would have been preferable to select different verbs for each voice or alternate the order of their appearance instead of presenting all active verbs before passive verbs. Although the alternation may have little effect on the outcomes of reading accuracy and comprehension, it could have an important effect on the outcomes of reading speed. The study showed that unvowelized passive verbs were read faster than unvowelized active verbs, but if the order of verb forms were alternated, the results may have been different.

The second limitation that may have affected the results is the placement of target verbs within context. The context used in this study was short sentences where each sentence included

one target verb. Target verbs were always placed at the beginning of each sentence to make it possible to measure reading speed along with reading accuracy and comprehension. However, this method might have prevented the participants from taking full advantage of the context. Context came after target verbs, which makes the use of context more difficult for L2 Arabic readers, particularly when they were asked to read as quickly as possible. Therefore, if context was presented differently, the effects of context may have been greater.

5.3 Implications

5.3.1 Proficiency

The findings showed that while there were no significant differences between the three proficiency groups in reading accuracy and comprehension, advanced L2 Arabic readers were significantly faster than both intermediate and beginner readers. Accuracy and automaticity are two important aspects of the bottom-up approach where accuracy precedes automaticity (Asadi, et al., 2017; LaBerge & Samuels, 1974; Vanniarajan, 2012). Lower proficiency L2 Arabic readers (intermediate and beginner) seemed to attend more to reading accuracy and comprehension than reading speed. They did not seem to take reading speed as an important aspect of their reading, which suggests that reading speed may not be an appropriate criterion to differentiate between lower L2 Arabic proficiency levels (intermediate and beginner levels). On the other hand, advanced readers were significantly faster than intermediate and beginner readers. They have achieved a sufficient level of accuracy that led them to make some progress in their reading speed. Therefore, these findings suggest two important implications for Arabic language standardized test makers and Arabic language teachers. First, reading speed should be used as a criterion to differentiate between advanced and lower proficiency levels of L2 Arabic

readers. Arabic language institutions need to set specific reading speed expectations for each level in order to place their students in the appropriate level. These findings suggest that reading speed can be used to differentiate between lower and advanced L2 Arabic readers. Second, L2 Arabic teachers should emphasize the importance of reading speed to their students, particularly among lower levels, and they should train them to read faster as they progress in their learning. Reading faster is an important aspect of reading that helps readers to allocate more cognitive resources to reading comprehension, which is the ultimate goal of reading, particularly when reading long texts.

The dual-route model (Coltheart, et al., 2001) showed that there are two routes for decoding and reading a printed word, phonological route and lexical route (or whole word recognition). Which route is used in a given language, or which route readers prefer to use, is usually attributed to the writing system of that language as well as the proficiency level of readers (Abu-Leil, et al., 2014; Coltheart, et al., 2001; Cook & Bassetti, 2005; Perfetti & Dunlap, 2008). In Arabic, native beginner readers who usually read vowelized words and texts prefer to use the phonological route, while fluent readers who usually read unvowelized words and texts prefer the lexical route (Abu-Leil, et al., 2014; Fender, 2008; Maroun & Hanley, 2017; Taouk & Coltheart, 2004). Thus, the way Arabic words and texts are written (vowelized or unvowelized) as well as the proficiency level of the readers determine which decoding route native Arabic readers would choose or prefer. As a result, preferring one decoding route over the other in reading Arabic may indicate the reading proficiency level of L2 Arabic readers. That is, if readers prefer the lexical route, it means that they have acquired a higher proficiency level, and if they prefer the phonological route, it means that they still at the beginner or intermediate levels.

5.3.2   Context

The study findings showed that context helped L2 Arabic readers comprehend Arabic verbs better than verbs that were presented without context (isolated). However, context only helped L2 Arabic readers to understand Arabic verbs when verbs were unvowelized, but not when verbs were vowelized. Similar results were found for the reading accuracy of L1 Arabic readers. Context helps L1 Arabic readers reach a higher level of accuracy, particularly when vowelization is absent (Abu-Rabia, 2001). The role of context has been found to be more prominent when vowelization is absent. The presence of vowelization, where all the phonological information is there, seems to weaken the role of context. Vowelization seemed to distract L2 Arabic readers from taking advantage of context and to make them rely heavily on vowelization in their reading process. This suggests that if L2 Arabic teachers want to teach and train their L2 Arabic students on how to use context as a strategy to recognize unknown words, they should present their students with unvowelized sentences or texts. They should not add any types of vowelization. Although partial vowelization was very helpful for reading accuracy, no type of vowelization should be added when the purpose of the lesson is to train L2 Arabic readers on how to use context. Providing vowelization will encourage learners to focus on vowelization and ignore context.

5.3.3   Voice

The findings concerning voice effects showed that L2 Arabic readers were not able to recognize passive verbs when verbs were unvowelized, and context did not help them to differentiate between active and passive verbs as it does for native readers. Although passive verbs do not appear frequently in Arabic texts, they are a very important aspect of the language

that should receive appropriate attention, particularly in Arabic because of the heterophonic homographs phenomenon of unvowelized Arabic verbs. Voice can completely change the meaning of a sentence, and L2 Arabic readers, similar to L1 Arabic readers, tend to read unvowelized passive verbs in their (unintended) active form. Therefore, L2 Arabic teachers should address this issue in their classrooms and train their students to learn how to differentiate between active and passive verbs when context is provided. They should train them on how to use context to differentiate between them as native Arabic readers do. On the other hand, if Arabic linguists come to an agreement that there is an issue in recognizing unvowelized passive verbs when they look identical to their active forms, then they may try to solve this problem for L1 and L2 Arabic readers. Adding partial vowelization (i.e., vowelizing the first letter) may solve this problem for both L1 and L2 Arabic readers. This study found that adding one vowel (one diacritical mark) to the first letter of passive verbs helped L2 Arabic readers recognize and distinguish passive verbs form their active counterparts. Thus, if this technique or approach is generalized and publishers, for example, require writers to always orthographically distinguish passive verbs form active verbs by adding a vowel to the first letter, or any other means, this problem might be solved.

5.3.4 Vowelization

The findings concerning partial vowelization showed that although adding partial vowelization may slow the reading process of L2 Arabic readers, it improved their reading accuracy. This indicates that vowelization may simultaneously have different effects. While it may have negative effects on reading speed, it may have positive effects on reading accuracy, or vice versa. However, some L1 and L2 Arabic studies have investigated the effects of vowelization on either reading speed (Hansen, 2010) or reading accuracy (i.e., Abu-Rabia, 1996;

1997a; 1997b; 1998; 2001) without taking into account the effects on the other aspect. These types of studies may provide limited conclusions on the effects of vowelization. Thus, it is important to take both reading speed and reading accuracy, as well as reading comprehension, into consideration when investigating the effects of vowelization, particularly partial vowelization.

The orthographic depth hypothesis (Katz & Frost, 1992) claims that reading is easier in shallow writing systems as opposed to deep (or opaque) writing systems. Adding vowelization to Arabic verbs makes them shallower and more transparent, which should lead to faster and more accurate reading based on their hypothesis. However, the findings of active verbs showed that this is not always the case. Adding vowelization to active verbs did not increase accuracy or speed of L2 Arabic readers, and active verbs were read faster and more accurately whether or not they were vowelized. This could indicate that transparency in the Arabic writing system is not always needed, particularly for the active form of verbs. Nevertheless, while this finding contradicts with the claims of the hypothesis, it could be attributed to the fact that the active form is the default form of Arabic verbs, and it appears more frequently in texts and spoken language than its passive counterpart.

The findings showed that adding vowelization to active verbs did not improve the reading of L2 Arabic readers. They were able to read active verbs quickly and accurately whether or not verbs were vowelized. This indicates that it is important to remove vowelization (particularly from active verbs) for L2 Arabic readers and let them practice reading Arabic without vowelization because this is the way Arabic texts are usually written. However, how and when to remove vowelization for L2 Arabic readers is still an important question that needs to be answered. This study suggests that we should remove vowelization gradually as learners

progress in their L2 Arabic learning. That is, Arabic textbook writers should add full vowelization for novice readers, but as they develop their phonological knowledge of the Arabic writing system, vowelization should be gradually removed from frequent and easy words. Less frequent words, on the other hand, should be fully vowelized at this stage. After L2 Arabic readers make more progress, the next step is to partially remove vowelization from less frequent words to increase the opportunity for L2 Arabic readers to improve their phonological knowledge and learn to read less frequent words with minimum vowelization. The last step should be removing vowelization completely form all words in order to train L2 Arabic readers to use context and take advantage of it as their L1 counterparts do. Arabic texts are mostly written unvowelized, thus L2 Arabic readers should be able to achieve that level by the end of their L2 Arabic learning.

Additionally, word frequency affects the decoding processes and readers' decoding preferences. While high frequency words favor the lexical route, less frequent words favor the phonological route (Scholfield & Chwo, 2005). Passive verbs in Arabic are less frequent, and the findings of this study showed that vowelization increased reading speed of L2 Arabic readers when verbs were in passive voice, while there were no significant effects of vowelization on reading speed, particularly for advanced readers, when verbs were in active voice (high frequency). Thus, L2 Arabic readers relied more on phonological information that was provided by vowelization to read less frequent verbs (passive verbs) faster, but when they read the frequent form of verbs (active verbs), they seemed to use the lexical decoding route (or whole word recognition).

Finally, this study investigated the effects of context, voice, and vowelization on the reading speed, accuracy, and comprehension of L2 Arabic readers at different proficiency levels.

The findings showed that while context had no effect on reading speed and accuracy of all proficiency groups, it enhanced their reading comprehension, particularly for intermediate and advanced readers. Second, the findings revealed that active verbs were read faster and more accurately and were understood better than were passive verbs when verbs were partially vowelized or unvowelized. But when verbs were fully vowelized, there were no differences between active and passive verbs. However, little research has been done on the effects of voice in Arabic. Thus, more research is needed to learn more about its effects on the reading speed, accuracy, and comprehension of L2 Arabic readers as well as native Arabic readers. One good method to investigate the effects of voice in Arabic is by using heterophonic homographs verbs. Such verbs are orthographically identical in active and passive voices if they are written unvowelized. Investigating such verbs, particularly within context, could tell us more about how Arabic readers prefer to read such verbs and how their preference may affect their reading speed, accuracy, and comprehension. Third, the findings showed that vowelization improved the reading speed, accuracy, and comprehension of L2 Arabic readers, particularly for less frequent words like passive verbs. Adding vowelization (whether full or partial) to Arabic passive verbs increased the reading speed, accuracy, and comprehension of L2 Arabic readers. Lastly, partial vowelization was found to be very beneficial in this study, particularly when verbs were in passive voice. Partial vowelization significantly increased the reading accuracy and comprehension of L2 Arabic readers. However, this study may be the first study that empirically examined the effects of morphological partial vowelization. Thus, more research is needed on the effects of partial vowelization, and how it affects the reading process of native and L2 Arabic readers. This study investigated the effects of partial vowelization on the first letter of verbs. Future research may investigate the effect of the partial vowelization of different letters (e.g.,

penultimate letter), particularly when verbs have more than three letters (i.e., four, five, or six

letters). Such research would enhance our knowledge about the role of partial vowelization and

its effects on the reading processes of native and L2 Arabic readers.

References

Abdelhadi, S., Ibrahim, R., & Eviatar, Z. (2011). Perceptual load in the reading of Arabic: Effects of orthographic visual complexity on detection. *Writing Systems Research, 3*(2), 117-127.

Abu-Leil, A. K., Share, D. L., & Ibrahim, R. (2014). How does speed and accuracy in reading relate to reading comprehension in Arabic? *Psicológica*, 35, 251–276.

Abu-Rabia, S. (1996). The role of vowels and context in reading of highly skilled native Arabic readers. *Journal of Psycholinguistic Research, 25*, 629–641.

Abu-Rabia, S. (1997a). Reading in Arabic orthography: The effect of vowels and context on reading accuracy of poor and skilled native Arabic readers. *Reading and Writing: An Interdisciplinary Journal, 9*(1), 65–78.

Abu-Rabia, S. (1997b). Reading in Arabic orthography: The effect of vowels and context on reading accuracy of poor and skilled native Arabic readers in reading paragraphs, sentences, and isolated words. *Journal of Psycholinguistic Research, 26*(4), 465–482.

Abu-Rabia, S. (1998). Reading Arabic texts: Effects of text type, reader type and vowelization. *Reading and Writing, 10* (2), 105-119.

Abu-Rabia, S. (1999). The effect of Arabic vowels on the reading comprehension of second and sixth-grade native Arab children. *Journal of Psycholinguistic Research, (28)*1, 93–101.

Abu-Rabia, S. (2001). The role of vowels in reading Semitic scripts: Data from Arabic and Hebrew. *Reading and Writing: An Interdisciplinary Journal, 14*(1-2), 39–59.

Abu-Rabia, S. (2002). Reading in a root-based-morphology language: The case of Arabic. *Journal of Research in Reading, 25*, 299–309.

Abu-Rabia, S., & Abu-Rahmoun, N. (2012). The role of phonology and morphology in the development of basic reading skills of dyslexic and normal native Arabic readers. *Creative Education, 3*(07), 1259-1268.

Abu-Rabia, S. & Siegel, L.S. (1995). Different orthographies, different context effects: The effects of Arabic sentence context on skilled and poor readers. *Reading Psychology* 16, 1-19.

Akamatsu, N. (2005). Effects of Second Language Reading Proficiency and First Language Orthography on Second Language Word Recognition. In V. Cook, & B, Bassetti (Eds.), *Second Language Writing Systems* (pp. 238-259). Clevedon: Multilingual Matters Ltd.

Al Midhwah, A. (2018). *The Role of Diacritics in Word Recognition and their Impact on Arabic L2 Learners' Reading Speed, Accuracy, and Comprehension at Different Stages of Arabic L2 Acquisition*. (Doctoral dissertation, The University of Michigan).

Al-shdifat, K. G. (2014). *The effect of short vowels on Arabic reading accuracy.* (Doctoral dissertation, University of North Carolina at Greensboro).

Al-Toma, S. (1961). The Arabic Writing System and Proposals for Its Reform. *Middle East Journal, 15*(4), 403-415.

Anderson, N. (2009). ACTIVE reading. In Z.H. Han, & N.J. Anderson. (Eds.), *Second language reading research and Instruction: Crossing the boundaries* (pp. 117-143). Ann Arbor, MI: University of Michigan Press.

Angermeyer, P. S. (2005). Spelling bilingualism: Script choice in Russian American classified ads and signage. *Language in Society*, *34*(4), 493-531.

Angermeyer, P. S. (2012). Bilingualism Meets Digraphia: Script Alternation and Hybridity in Russian-American Writing and Beyond: Philipp Sebastian Angermeyer. In *Language Mixing and Code-Switching in Writing* (pp. 264-281). Routledge.

Asaad, H., & Eviatar, Z. (2013). The effects of orthographic complexity and diglossia on letter naming in Arabic: A developmental study. *Writing Systems Research, 5*(2), 156-168.

Asadi, I. A., Khateb, A., Ibrahim, R., & Taha, H. (2017). How do different cognitive and linguistic variables contribute to reading in Arabic? A cross-sectional study from first to sixth grade. *Reading and Writing 30*(9), 1835–1867.

Azzam, R. (1984). Orthography and reading of the Arabic language. In Aaron, J. and Joshi, R. M. (Eds), *Reading and Writing Disorders in Different Orthographic Systems*. London: Kluwer Academic, pp. 1 – 29.

Baluch, B., & Besner, D. (1991). Visual word recognition: Evidence for strategic control of lexical and nonlexical routines in oral reading. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *17*(4), 644-652.

Bentin, S., & Ibrahim, R. (1996). New evidence for phonological processing during visual word recognition: The case of Arabic. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 22,* 309–323.

Bernhardt, E. (1991). *Reading Development in A Second Language: Theoretical, Empirical, And Classroom Perspectives.* Norwood, NJ: Ablex Publishing Corp.

Bernhardt, E. B. (2000). Second language reading as a case study of reading scholarship in the twentieth century. In M. Kamil, P. Mosenthal, P. D. Pearson., & R. Barr, (Eds.), *Handbook of reading research*, Volume III (pp. 793–811). Hillsdale, NJ: Erlbaum.

Bernhardt, E. (2005). Progress and procrastination in second language reading. *Annual Review of Applied Linguistics*, *25*, 133-150.

Brantmeier, C. (2004). Building a comprehensive theory of adult foreign language reading: A variety of variables and research methods. In C. Brantmeier (Ed.), *Adult Foreign Language Reading: Theory, Research, and Implications*. *The Southern Journal of Linguistics* (pp.1 - 6). Charlotte, NC: The University of North Carolina at Charlotte Press.

Brown, T., & Haynes, M. (1985). Literacy background and reading development in a second language. *New Directions for Child and Adolescent Development*, *1985*(27), 19-34.

Carrell, P. (1989). Metacognitive awareness and second language reading. *The Modern Language Journal*, *73*(2), 121-134.

Coltheart, M., Rastle, K., Perry, C., Langdon, R., & Ziegler, J. (2001). DRC: A dual route cascaded model of visual word recognition and reading aloud. *Psychological Review*, 108, 204–256.

Cook, V, & Bassetti B, (2005). An Introduction to Researching Second Language Writing Systems. In V. Cook, & B, Bassetti (Eds.), *Second Language Writing Systems* (pp. 1-70). Clevedon: Multilingual Matters Ltd.

Coulmas, F. (2003). Psycholinguistics of Writing. In *Writing Systems: An introduction to their linguistic analysis* (pp. 210-222). New York, NY: Cambridge University Press.

Dai, J., Ibrahim, R., & Share, D. L. (2013). The influence of orthographic structure on printed word learning in Arabic. *Writing Systems Research, 5*(2), 189-213.

Daniels, P. (2006). On beyond alphabets. *Written Language and Literacy, 9*(1), 7–24.

Daniels, P. (2013). The Arabic writing system. In J. Owens (Eds.), *Oxford handbook of Arabic linguistics*. New York: Oxford University Press.

Ehri, L. C. (1998). Grapheme—phonerne knowledge is essential for learning to read words in English. *Word recognition in beginning literacy*, 3-40.

Ehri, L. (2005). Learning to read words: Theory, findings, and issues. *Scientific Studies of Reading*, *9*, 167–188.

Eviatar, Z., & Share, D. (2013). Processing Semitic writing systems: Introduction to a special issue of Writing Systems Research. *Writing Systems Research, 5*(2), 131-133.

Fender, M. (2008). Arabic literacy development and cross-linguistic effect in subsequent L2 literacy development. In K. Koda, & A. Zehler (Eds.), *Learning to read across languages: Cross-linguistic relationships in first-and second-language literacy development* (pp. 101-124)*.* New York, NY: Routledge Publishers.

Frost, R. (1998). Toward a strong phonological theory of visual word recognition: True issues and false trails. *Psychological Bulletin*, 123, 71–99.

Frost, R., Katz, L., & Bentin, S. (1987). Strategies for visual word recognition and orthographical depth: a multilingual comparison. *Journal of Experimental Psychology: Human Perception and Performance, 13*(1), 104-115.

Gathercole, S., & Baddeley, A. (1993). Phonological working memory: A critical building block for reading development and vocabulary acquisition?. *European Journal of Psychology of Education*, *8*(3), 259-272.

Grabe, W. (2009). *Reading in a second language: Moving from Theory to Practice*. Cambridge: Cambridge University Press.

Hamada, M., & Koda, K. (2008). Influence of first language orthographic experience on second language decoding and word learning. *Language Learning, 58*, 1–31.

Hansen, G. F. (2010). Word recognition in Arabic as a foreign language. *The Modern Language Journal, 94*, 567–581.

Haynes, M., & Carr, T. (1990). Writing system background and second language reading: A component skills analysis of English reading by native speaker-readers of Chinese. In T. H. Carr & B. A. Levy (Eds.), *Reading and its development: Component skills approaches* (pp. 375-421). San Diego, CA, US: Academic Press.

Hermena, E. W., Drieghe, D., Hellmuth, S., & Liversedge, S. P. (2015). Processing of Arabic diacritical marks: Phonological–syntactic disambiguation of homographic verbs and visual crowding effects. *Journal of Experimental Psychology: Human Perception and Performance*, *41*(2), 494-507.

Holm, A., & Dodd, B. (1996). The effect of first written language on the acquisition of English literacy. *Cognition*, *59*(2), 119-147.

Hudson, T. (2007). *Teaching second language reading*. Oxford: Oxford university press.

Humphreys, G. W., & Evett, L. J. (1985). Are there independent lexical and nonlexical routes in word processing? An evaluation of the dual-route theory of reading. *Behavioral and Brain Sciences*, *8*(4), 689-705.

Hussien, A. M. (2014). Reading Arabic Shallow and Deep Genres: Indispensible Variables to Science of Reading. *Journal of Education and Learning*, *3*(1), 60-69.

Ibrahim, R. (2013). Reading in Arabic: New evidence for the role of vowel diacritics. *Creative Education*, (4), 248–253

Ibrahim, R., Eviatar, Z., & Aharon-Peretz, J. (2002). The characteristics of Arabic orthography slows its processing. *Neuropsychology,* 16, 322–326.

Ibrahim, R., Eviatar, Z., & Aharon-Peretz, J. (2007). Metalinguistic awareness and reading performance: A cross-language comparison. *Journal of Psycholinguistic Research, 36,* 297-317.

Katz, L., & Frost, R. (1992). The reading process is different for different orthographies: The orthographic depth hypothesis. In *Advances in psychology* 94, 67-84.

Khaldieh, S. (1996). Word Recognition of Arabic as a Foreign Language by American Learners: The Role of Phonology and Script. *Al-'Arabiyya, 29*, 129-152.

Khaldieh, S. (1999). An investigation into reader-text interaction: Native, proficient, and less proficient non-native readers of Arabic. *Arabiyya: Journal of the American Association of Teachers of Arabic, 32,* 117–156.

Khaldieh, S. (2001). The relationship between knowledge of Ic'raab, lexical knowledge, and reading comprehension of nonnative readers of Arabic. *The Modern Language Journal, 85*(3), 416–431.

Khateb, A., Taha, H. Y., Elias, I., & Ibrahim, R. (2013). The effect of the internal orthographic connectivity of written Arabic words on the process of the visual recognition: A comparison between skilled and dyslexic readers. *Writing Systems Research, 5*(2), 214-233.

Kintsch, W. (1988). The role of knowledge in discourse comprehension: A construction-integration model. *Psychological review*, *95*(2), 163-182.

Koda, K. (1989). Effects of L1 orthographic representation on L2 phonological coding strategies. *Journal of Psycholinguistic Research*, *18*(2), 201-222.

Koda, K. (1990). The use of L1 reading strategies in L2 reading: Effects of L1 orthographic structures on L2 phonological recoding strategies. *Studies in Second Language Acquisition*, *12*(4), 393-410.

Koda, K. (2005). *Insights into second language reading: A cross-linguistic approach*. Cambridge: Cambridge University Press.

Koda, K. (2005). Learning to Read Across Writing Systems: Transfer, Metalinguistic Awareness, and Second-language Reading Development. In V. Cook, & B. Bassetti (Eds.), *Second Language Writing Systems* (pp. 311-334). Clevedon: Multilingual Matters Ltd.

Koda, K. (2007). Reading and language learning: Crosslinguistic constraints on second language reading development. *Language learning*, *57*(s1), 1-44.

Kurzon, D. (2008). A brief note on diacritics. *Written Language and Literacy, 11*(1), 90–94.

Kurzon, D. (2013). Diacritics and the Preso-Arabic Script. *Writing Systems Research, 5*(2), 234-243

LaBerge, D., & Samuels, S.J. (1974). Toward a theory of automatic information processingin reading. *Cognitive Psychology, 6*, 293-323.

Mahmoud, Y. (1980). On the Reform of the Arabic Writing System. *Journal of Reading, 23*(8), 727-729.

Maroun, M., & Hanley, J. R. (2017). Diacritics improve comprehension of the Arabic script by providing access to the meanings of heterophonic homographs. *Reading and Writing, 30*(2), 319-335.

Nassaji, H. (2003). L2 vocabulary learning from context: Strategies, knowledge sources, and their relationship with success in L2 lexical inferencing. *TESOL Quarterly, 37*,645-70.

Nassaji, H. (2011). Issues in second-language reading: Implications for acquisition and instruction. *Reading Research Quarterly, 46*(2), 173-184.

Nation, P. (1990). *Teaching and Learning Vocabulary.* New York: Newbury House.

Nation, P. (2001). *Learning Vocabulary in Another Language*. Cambridge: Cambridge University Press.

Perfetti, C. (1992). The representation problem in reading acquisition. In P.B. Gough, L.C. Ehri & R. Treiman (Eds.), *Reading acquisition* (pp. 145-174). Hillsdale, New Jersey: Erlbaum.

Perfetti, C. (2007). Reading ability: Lexical quality to comprehension. *Scientific studies of Reading, 11*(4), 357-282.

Perfetti, C & Dunlap, S. (2008). Learning to read: general principle and writing system variations. In K. Koda, & A. Zehler (Eds.), *Learning to read across languages: Cross-linguistic relationships in first-and second-language literacy development* (pp. 13-38)*.* New York, NY: Routledge Publishers.

Perfetti, C. A., & Zhang, S. (1995). Very early phonological activation in Chinese reading. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *21*(1), 24-33.

Pulido, D. (2009). Vocabulary processing and acquisition through reading: Evidence for the rich getting richer. In Z. H. Han & N. J. Anderson (Eds.), *Second language reading research and instruction: Crossing the boundaries* (pp. 65-82). Ann Arbor, MI: University of Michigan Press.

Rogers, H. (2005). *Writing systems: A linguistic approach*. Malden, MA: Blackwell.

Roman, G., & Pavard, B. (1987). A comparative study: How we read Arabic and French. In J. K. O'Regan & A. Levy-Schoen (Eds.), *Eye movements: From physiology to cognition* (pp. 431-440). Amsterdam' The Netherlands: North Holland Elsevier.

Rupp, A. A., Ferne, T., & Choi, H. (2006). How assessing reading comprehension with multiple-choice questions shapes the construct: A cognitive processing perspective. *Language Testing, 23*(4), 441-474.

Scholfield, P & Chwo, G. (2005). Are the L1 and L2 Word Reading Processes Affected More by Writing System or Instruction? In V. Cook, & B, Bassetti (Eds.), *Second Language Writing Systems* (pp. 215-237). Clevedon: Multilingual Matters Ltd.

Shankweiler, D. (1989). How problems of comprehension are related to difficulties in word reading. In D. Shankweiler & I.Y. Liberman (Eds*.), phonology and reading disability: Solving the reading puzzle* (pp.35-68). Ann Arbor: University of Michigan Press.

Share, D. (2008). On the Anglocentricities of Current Reading Research and Practice: The Perils of Overreliance on an "Outlier" orthography. *Psychological Bulletin*, *134(4),* 584-615.

Showalter, C. E., & Hayes-Harb, R. (2013). Unfamiliar orthographic information and second language word learning: A novel lexicon study. *Second Language Research, 29*(2), 185-200.

Sproat, R (2006). *A Computational Theory of Writing Systems*. New York, NY: Cambridge University Press.

Stanovich, K. (1980). Toward an interactive-compensatory model of individual differences in the development of reading fluency. *Reading research quarterly*, 32-71.

Taha, H. (2016). Deep and shallow in Arabic orthography: New evidence from reading

    performance of elementary school native Arab readers. *Writing Systems*

    Research, 8(2), 133-142.

Taha, H., Ibrahim, R., & Khateb, A. (2012). How does Arabic orthographic connectivity

    modulate brain activity during visual word recognition: an ERP study. *Brain*

    topography, *26*(2), 292-302.

Taouk, M., & Coltheart, M. (2004). The cognitive processes involved in learning to read in

    Arabic. *Reading and Writing, 17*(1-2), 27-57.

Van Heuven, W. (2005). Bilingual Interactive Activation Models of Word Recognition in a

    Second Language. In V. Cook, & B, Bassetti (Eds.), *Second Language Writing*

    Systems (pp. 260-288). Clevedon: Multilingual Matters Ltd.

Vanniarajan, S. M. (2012). Understanding L2 reading: A cognitive perspective. In W. M.

    Chan, K. N. Chin, S. Bhatt, & I. Walker (Eds.). *Perspectives on Individual*

    Characteristics and Foreign Language Education (pp. 71–92). Berlin: Walter de

    Gruyter.

Vellutino, F. R., Fletcher, J. M., Snowling, M. J., & Scanlon, D. M. (2004). Specific reading

    disability (dyslexia): What have we learned in the past four decades?. *Journal of child*

    psychology and psychiatry, *45*(1), 2-40.

Wells, J. (2001). Orthographic diacritics and multilingual computing. Language Problems and

    Language Planning, 24(3), 249–272.

Wolter, B., & Helms-Park, R. (2016). The role of lexical knowledge in second language

    reading.In X. Chen, V. Dronjic, & R. Helms-Park (Eds.), *Second Language Reading:*

Cognitive and Psycholinguistic issues (pp. 133-158). New York, NY: Routledge
Publishers.

Arabic References

Abu Ashmah, K. (2017). Arabic writing system in writing transparency theory. In Jasem, J. et
al. (Eds.), *Dictation in Arabic writing system* (pp. 15-46). Riyadh: Wojooh Publishing
& Distribution House.

Abu Eid, M. (2015). A Linguistic Study of Contemporary Efforts of Arabic Spelling
(Orthography) System. *Journal of Arts and Social Sciences, 2*(9), 122-133.

Abū Ḥamdiyya, Z. (2017). Writing the Diacritics in Arabic Texts and Its Impact on
Comprehension: An Experimental Study. *The Journal of The Jordan Academy for
Arabic*, (57), 39-61. Retrieved
from https://www.majma.org.jo/ojs/index.php/JJaa/article/view/390

Aldosoqi, M. (1939). Ekhtezal Alshakel (Diacritics Reduction). *Dar Aloloom journal (5)*4, 9-
27.

Alshehri, M. (2019). Motivations for learning Arabic as a second language among female
students in the Arabic language institution at King Saud University. *L2 Arabic
Teaching Journal*, (1), 7-34.

Hejazi, M. (1982). Tayseer Alketabh Alarabiah (Simplifying Arabic writing). *Annual journal
of humanities and social sciences - Qatar University (5)*, 127-152.

Members of the Academy of the Arabic Language in Cairo. (1959). Tayseer Alketabh

Alarabiah (Simplifying Arabic writing). *Journal of the Academy of the Arabic*

Language in Cairo (11), 273-276.

أبو حمدية، زكريا. (٢٠١٧). حركات التشكيل في الكتابة العربية وأثرها في مستوى الاستيعاب. مجلة مجمع اللغة العربية

الأردني (٥٧)، ٣٩-٦١ اقتبست من https://www.majma.org.jo/ojs/index.php/JJaa/article/view/390

أبو عمشة، خالد. (٢٠١٧). نظام الكتابة العربية ونظرية الشفافية الإملائية. في جاسم واخرون (محررون)، *الإملاء في نظام*

الكتابة العربية (١٥-٤٦). الرياض: دار وجوه للنشر والتوزيع.

أبو عيد، محمد. (٢٠١٥). قراءة لغوية للجهود المعاصرة في إصلاح الكتابة العربية. *مجلة الآداب والعلوم الاجتماعية* ٢ (٩)،

١٢٢-١٣٣

أعضاء مجمع اللغة العربية بالقاهرة. (١٩٥٩). تيسير الكتابة العربية. *مجلة مجمع اللغة العربية بالقاهرة (١١)*، ٢٧٣-٢٧٦.

الدسوقي، محمد علي. (١٩٣٩). اختزال الشكل. *صحيفة دار العلوم (٥)* ٤، ٩-٢٧.

الشهري، مريم عبدالرحمن. (٢٠١٩). دوافع تعلم اللغة العربية لدى طالبات معهد اللغويات العربية في جامعة الملك سعود.

مجلة تعليم اللغة العربية لغة ثانية (١)، ٧-٣٤.

حجازي، محمود فهمي. (١٩٨٢). تيسير الكتابة العربية. *حولية كلية الانسانيات والعلوم الاجتماعية- جامعة قطر (٥)*، ١٢٧-

.١٥٢

Appendices

Appendix A: Readers' Level of Education, Country, and Other Spoken Languages

Participant's ID	Level of Education	Country	Other Spoken Languages
Beginner 1	High School	Canada	Somali
Beginner 2	High School	Rwanda	None
Beginner 3	Post-Secondary	Canada	None
Beginner 4	Post-Secondary	Rwanda	Swahili, Kinyarwanda
Beginner 5	Post-Secondary	UK	None
Beginner 6	High School	Ghana	Hausa
Beginner 7	High School	USA	None
Beginner 8	Post-Secondary	South Africa	Afrikaans
Beginner 9	High School	Ghana	None
Beginner 10	Post-Secondary	UK	None
Beginner 11	High School	Nigeria	Etsako (Afenmai)
Beginner 12	High School	Seychelles	Creole, French
Beginner 13	High School	Seychelles	Creole
Beginner 14	Post-Secondary	Cameroon	French
Intermediate 1	High School	UK	None
Intermediate 2	High School	Jamaica	None
Intermediate 3	High School	Sri Lanka	Tamil, Sinhala
Intermediate 4	Post-Secondary	Switzerland	French
Intermediate 5	Post-Secondary	Ghana	Hausa
Intermediate 6	Post-Secondary	USA	None
Intermediate 7	Post-Secondary	Canada	None
Intermediate 8	High School	Jamaica	Creole
Intermediate 9	Post-Secondary	Canada	None
Intermediate 10	High School	USA	None
Intermediate 11	High School	Ghana	Twi
Intermediate 12	High School	Germany	German

Intermediate 13	High School	Belize	None
Intermediate 14	High School	South Africa	None
Intermediate 15	Post-Secondary	UK	German
Intermediate 16	Post-Secondary	Benin	French
Intermediate 17	Post-Secondary	UK	None
Advanced 1	Post-Secondary	USA	None
Advanced 2	High School	Sierra leone	None
Advanced 3	Post-Secondary	USA	None
Advanced 4	High School	South Africa	Afrikaans
Advanced 5	Master's degree	Denmark	Danish, Bosnian
Advanced 6	High School	Canada	None
Advanced 7	Post-Secondary	USA	None
Advanced 8	Post-Secondary	New Zealand	Somali
Advanced 9	High School	Malawi	Chewa
Advanced 10	High School	Uzbekistan	Uzbek, Bosnian, Turkish, Russian
Advanced 11	High School	Nigeria	Igala
Advanced 12	High School	Rwanda	Kinyarwanda
Advanced 13	Post-Secondary	Ghana	Twi
Advanced 14	Post-Secondary	Nigeria	Yoruba
Advanced 15	High School	Zimbabwe	Shona
Advanced 16	High School	Zimbabwe	Shona
Advanced 17	High School	Canada	None

Appendix B: the five sets of vowelizing the target verbs

	Section 1: For Beginner Readers				
N	Set # 1	Set # 2	Set # 3	Set # 4	Set # 5
1	بَحَثَ	بَعَثَ	جَعَلَ	جَمَعَ	أَخَذَ
2	جُمِع	أُخذ	بُحث	بُعث	جُعل
3	أخذ	بحث	بعث	جعل	جمع
4	بَعث	جَعل	جَمع	أخذ	بَحث
5	جُعِلَ	جُمَعَ	أُخِذَ	بُحِثَ	بُعِثَ
6	أخذ	بحث	بعث	جعل	جمع
7	دَفَعَ	دَفَنَ	ذَكَرَ	رَفَضَ	حَرَقَ
8	رُفُض	حُرق	دُفع	دُفن	ذُكر
9	حرق	دفع	دفن	ذكر	رفض
10	دَفن	ذَكر	رَفض	حَرق	دَفع
11	ذُكِرَ	رُفِضَ	حُرقَ	دُفِعَ	دُفِنَ
12	حرق	دفع	دفن	ذكر	رفض
13	زَرَعَ	سَبَقَ	سَجَنَ	صَنَعَ	رَفَعَ
14	صُنع	رُفِع	زُرع	سُبق	سُجن
15	رفع	زرع	سبق	سجن	صنع
16	سَبق	سَجن	صَنع	رَفع	زَرع
17	سُجنَ	صُنعَ	رُفعَ	زُرِعَ	سُبِقَ
18	رفع	زرع	سبق	سجن	صنع
19	عَرَفَ	غَرَسَ	قَتَلَ	قَصَدَ	طَبَخَ
20	قُصد	طُبخ	عُرف	غُرس	قُتل
21	طبخ	عرف	غرس	قتل	قصد
22	غَرس	قَتل	قَصد	طَبخ	عَرف
23	قُتِلَ	قُصِدَ	طُبِخَ	عُرِفَ	غُرِسَ
24	طبخ	عرف	غرس	قتل	قصد
25	مَنَعَ	نَسَخَ	هَجَرَ	وَجَدَ	مَنَحَ
26	وُجد	مُنح	مُنَع	نُسخ	هُجر
27	منح	منع	نسخ	هجر	وجد
28	نَسخ	هَجر	وَجد	مَنح	مَنع
29	هُجِرَ	وُجِدَ	مُنِحَ	مُنِعَ	نُسِخَ
30	منح	منع	نسخ	هجر	وجد

		Section 2: For Intermediate Readers			
1	حَفَرَ	حَكَمَ	حَرَمَ	خَلَقَ	أَمَرَ
2	خُلق	أُمر	حُفر	حُكم	حُرم
3	أمر	حفر	حكم	حرم	خلق
4	حَكم	حَرم	خَلق	أمر	حَفر
5	حُرمَ	خُلِقَ	أُمِرَ	حُفِرَ	حُكِمَ
6	أمر	حفر	حكم	حرم	خلق
7	ذَرَفَ	رَبَطَ	رَزَقَ	سَرَقَ	ذَبَحَ
8	سُرق	ذُبح	ذُرف	رُبط	رُزق
9	ذبح	ذرف	ربط	رزق	سرق
10	رَبط	رَزق	سَرق	ذَبح	ذَرف
11	رُزِقَ	سُرِقَ	ذُبِحَ	ذُرِفَ	رُبِطَ
12	ذبح	ذرف	ربط	رزق	سرق
13	سَلَكَ	شَغَلَ	شَكَرَ	ضَرَبَ	سَكَبَ
14	ضُرب	سُكب	سُلك	شُغل	شُكر
15	سكب	سلك	شغل	شكر	ضرب
16	شَغل	شَكر	ضَرب	سكب	سَلك
17	شُكِرَ	ضُرِبَ	سُكِبَ	سُلِكَ	شُغِلَ
18	سكب	سلك	شغل	شكر	ضرب
19	ظَلَمَ	عَطَفَ	عَقَدَ	غَفَرَ	طَرَدَ
20	غُفر	طُرد	ظُلم	عُطف	عُقد
21	طرد	ظلم	عطف	عقد	غفر
22	عَطف	عَقد	غَفر	طَرد	ظَلم
23	عُقِدَ	غُفِرَ	طُرِدَ	ظُلِمَ	عُطِفَ
24	طرد	ظلم	عطف	عقد	غفر
25	قَصَرَ	قَذَفَ	لَعَنَ	مَسَحَ	غَمَرَ
26	مُسح	غُمر	قُصر	قُذف	لُعن
27	غمر	قصر	قذف	لعن	مسح
28	قَذف	لَعن	مَسح	غَمر	قَصر
29	لُعِنَ	مُسِحَ	غُمِرَ	قُصِرَ	قُذِفَ
30	غمر	قصر	قذف	لعن	مسح

		Section 3: For Advanced Readers			
1	بَسَطَ	جَرَفَ	حَمَلَ	خَبَزَ	بَدَلَ
2	خُبز	بُذل	بُسط	جُرف	حُمل
3	بذل	بسط	جرف	حمل	خبز
4	جَرف	حَمل	خَبَز	بَذل	بَسط
5	حُمِلَ	خُبِزَ	بُذِلَ	بُسطَ	جُرِفَ
6	بذل	بسط	جرف	حمل	خبز
7	خَدَمَ	خَلَقَ	دَحَضَ	زَعَمَ	خَتَمَ
8	زُعم	خُتم	خُدم	خُلق	دُحض
9	ختم	خدم	خلق	دحض	زعم
10	خَلق	دَحض	زَعم	خَتَم	خَدم
11	دُحِضَ	زُعِمَ	خُتِمَ	خُدِمَ	خُلِقَ
12	ختم	خدم	خلق	دحض	زعم
13	عَبَدَ	عَرَضَ	غَفَرَ	غَلَبَ	سَكَنَ
14	غُلب	سُكن	عُبد	عُرض	غُفر
15	سكن	عبد	عرض	غفر	غلب
16	عَرض	غَفر	غَلب	سَكن	عَبد
17	غُفِرَ	غُلِبَ	سُكِنَ	عُبِدَ	عُرِضَ
18	سكن	عبد	عرض	غفر	غلب
19	قَسَمَ	لَمَزَ	لَمَسَ	مَنَعَ	فَعَلَ
20	مُنع	فُعل	قُسم	لُمز	لُمس
21	فعل	قسم	لمز	لمس	منع
22	لَمز	لَمس	مَنَع	فَعل	قَسم
23	لُيسَ	مُنِعَ	فُعِلَ	قُسِمَ	لُمِزَ
24	فعل	قسم	لمز	لمس	منع
25	نَشَرَ	نَظَرَ	وَصَفَ	وَضَعَ	نَذَرَ
26	وُضع	نُذر	نُشر	نُظر	وُصف
27	نذر	نشر	نظر	وصف	وضع
28	نَظر	وَصف	وَضع	نَذر	نَشر
29	وُصِفَ	وُضِعَ	نُذِرَ	نُشِرَ	نُظِرَ
30	نذر	نشر	نظر	وصف	وضع

Appendix C: Differently vowelized verbs and sentences of beginner readers

Number	Selected Verbs	
	Isolated	Within Context ﴾Within Sentence﴿
1	بَحَثَ	بَحَثَ المَوْضُوعَ بِشَكْلٍ دَقِيقٍ
2	جُمِع	جُمِع المُتَخَاصِمُونَ فِي مَكَانٍ وَاحِدٍ
3	أخذ	أخذ المُجْرِمَ إِلى السِّجْنِ
4	بَعث	بَعث الرَّجُلَ بِرسَالةٍ
5	جُعِلَ	جُعِلَ الأَمْرُ سَهْلاً
6	أخذ	أخذ المُجْرِمُ إِلى السِّجْنِ
7	دَفَعَ	دَفَعَ زَمِيلَهُ إِلى الهَاوِيَة
8	رُفض	رُفض قَرَارُ المُدِيرِ
9	حرق	حرق إِصْبَعَهُ بالنَّارِ
10	دَفن	دَفن المَيْتَ بَعْدَ غَسْلِهِ
11	ذُكِرَ	ذُكِرَ اللهُ كَثِيرًا
12	حرق	حرق إِصْبَعُهُ بالنَّارِ
13	زَرَعَ	زَرَعَ الخَيْرَ فِي كُلِّ مَكَانٍ
14	صُنع	صُنع المَعْرُوفُ دُونَ اِنْتِظَارٍ لِلجَزَاء
15	رفع	رفع الأَمْرَ إِلى الوَزِير
16	سَبق	سَبق جَارَهُ إِلى الخَيْر
17	سُجِنَ	سُجِنَ المُجْرِمُ
18	رفع	رفع الأَمْرُ إِلى الوَزِير
19	عَرَفَ	عَرَفَ الحَقَّ مِنَ البَاطِلِ
20	قُصد	قُصد الأَمِيرُ فِي أَمْرٍ مُهِمٍّ
21	طبخ	طبخ الأَكْلَ بِطَرِيقَةٍ مُحْتَرَفَةٍ
22	غَرس	غَرس الخَيْرَ فِي قُلُوبِ النَّاسِ
23	قُتِلَ	قُتِلَ عَدُوُّهُ بالسَّيْفِ
24	طبخ	طبخ الأَكْلُ بِطَرِيقَةٍ مُحْتَرَفَةٍ
25	مَنَعَ	مَنَعَ الظُّلْمَ عَنِ الضُّعَفَاء
26	وُجد	وُجد الأَمْرُ سَهْلاً
27	منح	منح الطَّالِبَ جَائِزَةَ التَّفَوُّقِ
28	نَسخ	نَسخ الْكِتَابَ مَرَّتَيْنِ
29	هُجِرَ	هُجِرَ صَدِيقُهُ ثَلاَثَةَ أَيَّامٍ
30	منح	منح الطَّالِبُ جَائِزَةَ التَّفَوُّقِ

	Second set for beginners	
Number	Selected Verbs	
	Isolated	Within Context ⟨Within Sentence⟩
1	بَعَثَ	بَعَثَ الرَّجُلَ بِرِسَالةٍ
2	أُخِذ	أُخِذ المُجْرِمُ إِلى السِّجْنِ
3	بحث	بحث المَوْضُوعَ بِشَكْلٍ دَقِيقٍ
4	جَعل	جَعل الأَمْرَ سَهْلاً
5	جُمِعَ	جُمِعَ المُتَخَاصِمُونَ فِي مَكَانٍ وَاحِدٍ
6	بحث	بحث المَوْضُوعُ بِشَكْلٍ دَقِيقٍ
7	دَفَنَ	دَفَنَ المَيْتَ بَعْدَ غَسْلِهِ
8	حُرق	حُرق إِصْبَعُهُ بِالنَّار
9	دفع	دفع زَمِيلَهُ إِلى الهَاوِيَةِ
10	ذَكر	ذَكر اللهَ كَثِيرًا
11	رُفِضَ	رُفِضَ قَرَارُ المُدِير
12	دفع	دفع زَمِيلَهُ إِلى الهَاوِيَةِ
13	سَبَقَ	سَبَقَ جَارَهُ إِلى الخَيْرِ
14	رُفع	رُفع الأَمْرُ إِلى الوَزِير
15	زرع	زرع الخَيْرَ فِي كُلِّ مَكَانٍ
16	سَجن	سَجن المُجْرِمَ
17	صُنعَ	صُنعَ المَعْرُوفُ دُونَ اِنْتِظَارِ لِلجَزَاء
18	زرع	زرع الخَيْرُ فِي كُلِّ مَكَانٍ
19	غَرَسَ	غَرَسَ الخَيْرَ فِي قُلُوب النَّاسِ
20	طُبخ	طُبخ الأَكْلُ بِطَرِيقَةٍ مُحْتَرَفَةٍ
21	عرف	عرف الحَقَّ مِنَ البَاطِلِ
22	قَتل	قَتل عَدُوَّهُ بِالسَّيْفِ
23	قُصِدَ	قُصِدَ الأَمِيرُ فِي أَمْرٍ مُهِمٍّ
24	عرف	عرف الحَقُّ مِنَ البَاطِلِ
25	نَسَخَ	نَسَخَ الكِتَابَ مَرَّتَيْنِ
26	مُنح	مُنح الطَّالِبُ جَائِزَةَ التَّفَوُّقِ
27	منع	منع الظُّلْمَ عَنِ الضُّعَفَاء
28	هَجر	هَجر صَدِيقَهُ ثَلَاثَةَ أَيَّام
29	وُجِدَ	وُجِدَ الأَمْرُ سَهْلاً
30	منع	منع الظُّلْمُ عَنِ الضُّعَفَاء

Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	جَعَلَ	جَعَلَ الأَمْرَ سَهْلاً
2	بُحث	بُحث المَوْضُوعُ بِشَكْلٍ دَقِيقٍ
3	بعث	بعث الرَّجُلَ بِرِسَالةٍ
4	جَمع	جَمع المُتَخَاصِمَيْنِ فِي مَكَانٍ وَاحِدٍ
5	أُخِذَ	أُخِذَ المُجْرِمُ إلى السِّجْنِ
6	بعث	بعث الرَّجُلُ بِرِسَالةٍ
7	ذَكَرَ	ذَكَرَ اللهَ كثيرًا
8	دُفع	دُفع زَمِيلُهُ إلى الهَاوِيَةِ
9	دفن	دفن المَيْتَ بَعْدَ غَسْلِهِ
10	رَفض	رَفض قَرَارَ المُدِير
11	حُرِقَ	حُرِقَ إصْبُعُهُ بالنَّار
12	دفن	دفن المَيْتُ بَعْدَ غَسْلِهِ
13	سَجَنَ	سَجَنَ المُجْرِمَ
14	زُرع	زُرع الخَيْرُ فِي كُلِّ مَكَانٍ
15	سبق	سبق جَارَهُ إلى الخَيْر
16	صَنع	صَنع المَعْرُوفَ دُونَ انْتِظَارٍ لِلجَزَاء
17	رُفعَ	رُفعَ الأَمْرُ إلى الوَزِير
18	سبق	سبق جَارُهُ إلى الخَيْر
19	قَتَلَ	قَتَلَ عَدُوَّهُ بالسَّيْفِ
20	عُرف	عُرف الحَقُّ مِنَ البَاطِلِ
21	غرس	غرس الخَيْرَ فِي قُلُوبِ النَّاسِ
22	قَصد	قَصد الأَمِيرَ فِي أَمْرٍ مُهِمٍّ
23	طُبخَ	طُبخَ الأَكْلُ بِطَرِيقَةٍ مُحْتَرِفَةٍ
24	غرس	غرس الخَيْرُ فِي قُلُوبِ النَّاسِ
25	هَجَرَ	هَجَرَ صَدِيقَهُ ثَلَاثَةَ أَيَّام
26	مُنع	مُنع الظُّلْمُ عَنِ الضُّعَفَاء
27	نسخ	نسخ الكِتَابَ مرَّتَين
28	وَجد	وَجد الأَمْرَ سَهْلاً
29	مُنِحَ	مُنِحَ الطَّالِبُ جَائِزَةَ التَّفَوُّق
30	نسخ	نسخ الكِتَابُ مرَّتَين

		Fourth set for beginners	
Number	Selected Verbs		
	Isolated	Within Context (Within Sentence)	
1	جَمَعَ	جَمَعَ المُتَخَاصِمَيْنِ فِي مَكَانٍ وَاحِدٍ	
2	بُعِث	بُعِث الرَّجُلُ بِرِسَالةٍ	
3	جعل	جعل الأَمْرَ سَهْلاً	
4	أخذ	أخذ المُجْرِمَ إِلى السِّجْنِ	
5	بُحِثَ	بُحِثَ المَوْضُوعُ بِشَكْلٍ دَقِيقٍ	
6	جعل	جعل الأَمْرُ سَهْلاً	
7	رَفَضَ	رَفَضَ قَرَارَ المُدِير	
8	دُفِن	دُفِن المَيْتُ بَعْدَ غَسْلِهِ	
9	ذكر	ذكر اللهَ كَثِيرًا	
10	حَرق	حَرق إِصْبَعَهُ بِالنَّار	
11	دُفِعَ	دُفِعَ زَمِيلُهُ إِلى الهَاوِيَةِ	
12	ذكر	ذكر اللهَ كَثِيرًا	
13	صَنَعَ	صَنَعَ المَعْرُوفَ دُونَ اِنْتِظَارٍ لِلجَزَاء	
14	سُبِق	سُبِق جَارُهُ إِلى الخَيْرِ	
15	سجن	سجن المُجْرِمَ	
16	رَفع	رَفع الأَمْرَ إِلى الوَزِير	
17	زُرِعَ	زُرِعَ الخَيْرُ فِي كُلِّ مَكَانٍ	
18	سجن	سجن المُجْرِمُ	
19	قَصَدَ	قَصَدَ الأَمِيرَ فِي أَمْرٍ مُهِمٍّ	
20	غُرِس	غُرِس الخَيْرُ فِي قُلُوبِ النَّاس	
21	قتل	قتل عَدُوَّهُ بِالسَّيْفِ	
22	طَبخ	طَبخ الأَكْلَ بِطَرِيقَةٍ مُحْتَرَفَةٍ	
23	عُرِفَ	عُرِفَ الحَقُّ مِنَ البَاطِل	
24	قتل	قتل عَدُوَّهُ بِالسَّيْفِ	
25	وَجَدَ	وَجَدَ الأَمْرَ سَهْلاً	
26	نُسِخ	نُسِخ الكِتَابُ مَرَّتَين	
27	هجر	هجر صَدِيقَهُ ثَلاثَةَ أَيّام	
28	مَنح	مَنح الطَّالِبَ جَائِزَةَ التَّفَوُّق	
29	مُنِعَ	مُنِعَ الظُّلْمُ عَنِ الضُّعَفَاء	
30	هجر	هجر صَدِيقَهُ ثَلاثَةَ أَيّام	

	Fifth set for beginners	
Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	أَخَذَ	أَخَذَ المُجْرِمَ إلى السِّجْنِ
2	جُعِل	جُعِل الأَمْرُ سَهْلاً
3	جمع	جمع المُتَخَاصِمِينَ فِي مَكَانٍ وَاحِدٍ
4	بَحث	بَحث المَوْضُوعَ بِشَكْلٍ دَقِيقٍ
5	بُعِثَ	بُعِثَ الرَّجُلُ بِرِسَالةٍ
6	جمع	جمع المُتَخَاصِمُونَ فِي مَكَانٍ وَاحِدٍ
7	حَرَقَ	حَرَقَ إِصْبَعَهُ بِالنَّارِ
8	ذُكِر	ذُكِر اللهُ كَثِيرًا
9	رفض	رفض قَرَارَ المُدِيرِ
10	دَفع	دَفع زَمِيلَهُ إلى الهَاوِيَةِ
11	دُفِنَ	دُفِنَ المَيْتُ بَعْدَ غَسْلِهِ
12	رفض	رفض قَرَارُ المُدِيرِ
13	رَفَعَ	رَفَعَ الأَمْرَ إلى الوَزِيرِ
14	سُجن	سُجن المُجْرِمُ
15	صنع	صنع المَعْرُوفَ دُونَ اِنْتِظَارٍ لِلجَزَاءِ
16	زَرع	زَرع الخَيْرَ فِي كُلِّ مَكَانٍ
17	سُبِقَ	سُبِقَ جَارُهُ إلى الخَيْرِ
18	صنع	صنع المَعْرُوفُ دُونَ اِنْتِظَارٍ لِلجَزَاءِ
19	طَبَخَ	طَبَخَ الأَكْلَ بِطَرِيقَةٍ مُحْتَرِفَةٍ
20	قُتل	قُتل عَدُوُّهُ بِالسَّيْفِ
21	قصد	قصد الأَمِيرَ فِي أَمْرٍ مُهِمٍّ
22	عَرف	عَرف الحَقَّ مِنَ البَاطِلِ
23	غُرِسَ	غُرِسَ الخَيْرُ فِي قُلُوبِ النَّاسِ
24	قصد	قصد الأَمِيرُ فِي أَمْرٍ مُهِمٍّ
25	مَنَحَ	مَنَحَ الطَّالِبَ جَائِزَةَ التَّفَوُّقِ
26	هُجر	هُجر صَدِيقُهُ ثَلَاثَةَ أَيَّامٍ
27	وجد	وجد الأَمْرَ سَهْلاً
28	مَنع	مَنع الظُّلْمَ عَنِ الضُّعَفَاءِ
29	نُسِخَ	نُسِخَ الكِتَابُ مَرَّتَيْنِ
30	وجد	وجد الأَمْرُ سَهْلاً

Appendix D: Differently vowelized verbs and sentences of intermediate readers

Number	Selected Verbs	
	Isolated	Within Context ﴾Within Sentence﴿
1	حَفَرَ	حَفَرَ البِئْرَ
2	خُلِق	خُلِق الإِنْسَانُ مِنْ عَدَمٍ
3	أمر	أمر الرَّجُلَ بالانْصِرَافِ
4	حَكم	حَكم البَلَدَ بالعَدْل
5	حُرِمَ	حُرِمَ اليَتِيمُ مَالَهُ
6	أمر	أمر الرَّجُلُ بالانْصِرَافِ
7	ذَرَفَ	ذَرَفَ الدَّمْعَ عَلَى فِرَاقِهَا
8	سُرق	سُرق مَالُ جَارِهِ
9	ذبح	ذبح الكَبْشَ
10	رَبط	رَبط الأَمْرَ بِأَمْرٍ آخَرَ
11	رُزِقَ	رُزِقَ النَّاسُ كُلُّهُمْ
12	ذبح	ذبح الكَبْشُ
13	سَلَكَ	سَلَكَ الطَّرِيقَ
14	ضُرب	ضُرب البَابُ بِقُوَّةٍ
15	سكب	سكب المَاءَ عَلَى ثَوْبِهِ
16	شَغل	شَغل المَنْصِبَ
17	شُكِرَ	شُكِرَ زَمِيلُهُ عَلَى المُسَاعَدَةِ
18	سكب	سكب المَاءُ عَلَى ثَوْبِهِ
19	ظَلَمَ	ظَلَمَ صَدِيقَهُ كَثِيرًا
20	غُفر	غُفر ذَنْبُهُ تَمَامًا
21	طرد	طرد المُوَظَّفَ مِنْ عَمَلِهِ
22	عَطف	عَطف اللَّفْظَ عَلَى سَابِقِه
23	عُقِدَ	عُقِدَ العَزْمُ عَلَى الذَّهَابِ
24	طرد	طرد المُوَظَّفُ مِنْ عَمَلِهِ
25	قَصَرَ	قَصَرَ الأَمْرَ عَلَى الخَاصَّةِ
26	مُسح	مُسح كُلُّ مَا كَتَبَ
27	غمر	غمر المَكَانَ حُبًّا
28	قَذف	قَذف الوَلَدَ بالحِجَارَةِ
29	لُعِنَ	لُعِنَ الظَّالِمُ بِسَبَب ظُلْمَه
30	غمر	غمر المَكَانُ حُبًّا

	Second set for intermediates	
Number	**Selected Verbs**	
	Isolated	Within Context (Within Sentence)
1	حَكَمَ	حَكَمَ البَلَدَ بِالعَدْلِ
2	أُمِر	أُمِر الرَّجُلُ بِالإنْصِرَافِ
3	حفر	حفر البِئرَ
4	حَرم	حَرم اليَتِيمَ مَالَهُ
5	خُلِقَ	خُلِقَ الإنْسَانُ مِنْ عَدَمٍ
6	حفر	حفر البِئرُ
7	رَبَطَ	رَبَطَ الأَمْرَ بِأَمْرٍ آخَرَ
8	ذُبِح	ذُبِح الكَبْشُ
9	ذرف	ذرف الدَّمْعَ عَلَى فِرَاقِهَا
10	رَزق	رَزق النَّاسَ كُلَّهُمْ
11	سُرِقَ	سُرِقَ مَالُ جَارِهِ
12	ذرف	ذرف الدَّمْعُ عَلَى فِرَاقِهَا
13	شَغَلَ	شَغَلَ المَنْصِبَ
14	سُكِب	سُكِب المَاءُ عَلَى ثَوْبِهِ
15	سلك	سلك الطَّرِيقَ
16	شَكر	شَكر زَمِيلَهُ عَلَى المُسَاعَدَةِ
17	ضُرِبَ	ضُرِبَ البَابُ بِقُوَّةٍ
18	سلك	سلك الطَّرِيقُ
19	عَطَفَ	عَطَفَ اللَّفْظَ عَلَى سَابِقِه
20	طُرد	طُرد المُوَظَّفُ مِنْ عَمَلِهِ
21	ظلم	ظلم صَدِيقَهُ كَثِيرًا
22	عَقد	عَقد العَزْمَ عَلَى الذَّهَابِ
23	غُفِرَ	غُفِرَ ذَنْبُهُ تَمَامًا
24	ظلم	ظلم صَدِيقُهُ كَثِيرًا
25	قَذَفَ	قَذَفَ الوَلَدَ بِالحِجَارَةِ
26	غُمِر	غُمِر المَكَانُ حُبًّا
27	قصر	قصر الأَمْرَ عَلَى الخَاصَّةِ
28	لَعن	لَعن الظَّالِمَ بِسَبَبِ ظُلْمَهِ
29	مُسِحَ	مُسِحَ كُلُّ مَا كَتَبَ
30	قصر	قصر الأَمْرُ عَلَى الخَاصَّةِ

		Third set for intermediates	

Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	حَرَمَ	حَرَمَ الْيَتِيمَ مَالَهُ
2	حُفِر	حُفِر الْبِئْرُ
3	حكم	حكم الْبَلَدَ بِالْعَدْلِ
4	خَلق	خَلق الْإِنْسَانَ مِنْ عَدَمٍ
5	أُمِرَ	أُمِرَ الرَّجُلُ بِالْإِنْصِرَافِ
6	حكم	حكم الْبَلَدُ بِالْعَدْلِ
7	رَزَقَ	رَزَقَ النَّاسَ كُلَّهُمْ
8	ذُرف	ذُرف الدَّمْعُ عَلَى فِرَاقِهَا
9	ربط	ربط الْأَمْرَ بِأَمْرٍ آخَرَ
10	سَرق	سَرق مَالَ جَارِهِ
11	ذُبِحَ	ذُبِحَ الكَبْشُ
12	ربط	ربط الْأَمْرُ بِأَمْرٍ آخَرَ
13	شَكَرَ	شَكَرَ زَمِيلَهُ عَلَى الْمُسَاعَدَةِ
14	سُلك	سُلك الطَّرِيقُ
15	شغل	شغل الْمَنْصِبَ
16	ضَرب	ضَرب الْبَابَ بِقُوَّةٍ
17	سُكِبَ	سُكِبَ الْمَاءُ عَلَى ثَوْبِهِ
18	شغل	شغل الْمَنْصِبُ
19	عَقَدَ	عَقَدَ الْعَزْمَ عَلَى الذَّهَابِ
20	ظُلم	ظُلم صَدِيقُهُ كَثِيرًا
21	عطف	عطف اللَّفْظَ عَلَى سَابِقِه
22	غَفر	غَفر ذَنْبَهُ تَمَامًا
23	طُرِدَ	طُرِدَ الْمُوَظَّفُ مِنْ عَمَلِهِ
24	عطف	عطف اللَّفْظُ عَلَى سَابِقِهِ
25	لَعَنَ	لَعَنَ الظَّالِمَ بِسَبَبِ ظُلْمِهِ
26	قُصر	قُصر الْأَمْرُ عَلَى الْخَاصَّةِ
27	قذف	قذف الْوَلَدَ بِالْحِجَارَةِ
28	مَسح	مَسح كُلَّ مَا كَتَبَ
29	غُمِرَ	غُمِرَ الْمَكَانُ حُبًّا
30	قذف	قذف الْوَلَدُ بِالْحِجَارَةِ

	Fourth set for intermediates	
Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	خَلَقَ	خَلَقَ الإِنْسَانَ مِنْ عَدَمٍ
2	حُكِم	حُكِم البَلَدُ بِالعَدْلِ
3	حرم	حرم اليَتِيمَ مَالَهُ
4	أَمر	أَمر الرَّجُلَ بِالاِنْصِرَافِ
5	حُفِرَ	حُفِرَ البِئْرُ
6	حرم	حرم اليَتِيمُ مَالَهُ
7	سَرَقَ	سَرَقَ مَالَ جَارِهِ
8	رُبط	رُبط الأَمْرُ بِأَمْرٍ آخَرٍ
9	رزق	رزق النَّاسَ كُلَّهُمْ
10	ذَبح	ذَبح الكَبْشَ
11	ذُرِفَ	ذُرِفَ الدَّمْعُ عَلَى فِرَاقِهَا
12	رزق	رزق النَّاسُ كُلَّهُمْ
13	ضَرَبَ	ضَرَبَ البَابَ بِقُوَّةٍ
14	شُغِل	شُغِل المَنْصِبُ
15	شكر	شكر زَمِيلَهُ عَلَى المُسَاعَدَةِ
16	سَكب	سَكب المَاءَ عَلَى ثَوْبِهِ
17	سُلِكَ	سُلِكَ الطَّرِيقُ
18	شكر	شكر زَمِيلُهُ عَلَى المُسَاعَدَةِ
19	غَفَرَ	غَفَرَ ذَنْبَهُ تَمَامًا
20	عُطف	عُطف اللَّفْظُ عَلَى سَابِقِه
21	عقد	عقد العَزْمَ عَلَى الذَّهَابِ
22	طَرد	طَرد المُوَظَّفَ مِنْ عَمَلِهِ
23	ظُلِمَ	ظُلِمَ صَدِيقُهُ كَثِيرًا
24	عقد	عقد العَزْمُ عَلَى الذَّهَابِ
25	مَسَحَ	مَسَحَ كُلَّ مَا كَتَبَ
26	قُذف	قُذف الوَلَدُ بِالحِجَارَةِ
27	لعن	لعن الظَّالِمَ بِسَبَبِ ظُلْمَهِ
28	غَمر	غَمر المَكَانَ حُبًّا
29	قُصِرَ	قُصِرَ الأَمْرُ عَلَى الخَاصَّةِ
30	لعن	لعن الظَّالِمُ بِسَبَبِ ظُلْمَهِ

Fifth set for intermediates		
Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	أَمَرَ	أَمَرَ الرَّجُلَ بِالْانْصِرَافِ
2	حُرِم	حُرِم الْيَتِيمُ مَالَهُ
3	خلق	خلق الْإِنْسَانَ مِنْ عَدَم
4	حَفَر	حَفَر الْبِئْرَ
5	حُكِمَ	حُكِمَ الْبَلَدُ بِالْعَدْل
6	خلق	خلق الْإِنْسَانُ مِنْ عَدَم
7	ذَبَحَ	ذَبَحَ الْكَبْشَ
8	رُزق	رُزق النَّاسُ كُلُّهُمْ
9	سرق	سرق مَالَ جَارِه
10	ذَرَف	ذَرَف الدَّمْعَ عَلَى فِرَاقِهَا
11	رُبِطَ	رُبِطَ الْأَمْرُ بِأَمْرٍ آخَر
12	سرق	سرق مَالُ جَارِه
13	سَكَبَ	سَكَبَ الْمَاءَ عَلَى ثَوْبِه
14	شُكِر	شُكِر زَمِيلُهُ عَلَى الْمُسَاعَدَة
15	ضرب	ضرب الْبَابَ بِقُوَّةٍ
16	سَلك	سَلك الطَّرِيقَ
17	شُغِلَ	شُغِلَ الْمَنْصِبُ
18	ضرب	ضرب الْبَابُ بِقُوَّةٍ
19	طَرَدَ	طَرَدَ الْمُوَظَّفَ مِنْ عَمَلِه
20	عُقد	عُقد الْعَزْمُ عَلَى الذَّهَاب
21	غفر	غفر ذَنْبَهُ تَمَامًا
22	ظَلم	ظَلم صَدِيقَهُ كَثِيرًا
23	عُطِفَ	عُطِفَ اللَّفْظُ عَلَى سَابِقِه
24	غفر	غفر ذَنْبُهُ تَمَامًا
25	غَمَرَ	غَمَرَ الْمَكَانَ حُبًّا
26	لُعن	لُعن الظَّالِمُ بِسَبَب ظُلْمَه
27	مسح	مسح كُلَّ مَا كَتَبَ
28	قَصر	قَصر الْأَمْرَ عَلَى الْخَاصَّة
29	قُذِفَ	قُذِفَ الْوَلَدُ بِالْحِجَارَة
30	مسح	مسح كُلُّ مَا كَتَبَ

Appendix E: Differently vowelized verbs and sentences of advanced readers

Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	بَسَطَ	بَسَطَ الأَمْرَ أَمَامَهُ
2	خُبِّر	خُبِّر الخَبَرُ بِطَرِيقَةٍ جَيِّدَةٍ
3	بذل	بذل مَجْهُودًا كَبِيرًا
4	جَرَف	جَرَف الحَجَرَ والشَّجَرَ
5	حُمِلَ	حُمِلَ الأَمْرُ عَلَى مَحْمَلِ الجِدِّ
6	بذل	بذل مَجْهُودٌ كَبِيرٌ
7	خَدَمَ	خَدَمَ جَارَهُ خِدْمَةً عَظِيمَةً
8	زُعم	زُعم البَاطِلُ
9	ختم	ختم القُرْآنَ مَرَّتَيْنِ
10	خَلق	خَلق الإِنْسَانَ ضَعِيفًا
11	دُحِضَ	دُحِضَ البَاطِلُ بالحُجَّةِ
12	ختم	ختم القُرْآنُ مَرَّتَيْنِ
13	عَبَدَ	عَبَدَ اللَّهَ وَحْدَهُ
14	غُلب	غُلب الرَّجُلُ فِي الْمُوَاجَهَةِ
15	سكن	سكن البَيْتَ المَهْجُورَ
16	عَرض	عَرض الأَمْرَ عَلَيْهِ
17	غُفِرَ	غُفِرَ ذَنْبُهُ كَامِلًا
18	سكن	سكن البَيْتُ المَهْجُورَ
19	قَسَمَ	قَسَمَ المَالَ نصْفَيْن
20	مُنع	مُنع الدُّخُوْلُ بَتَاتًا
21	فعل	فعل أَمْرًا خَاطِئًا أَثْنَاءَ القِيَادَةِ
22	لَمز	لَمز الضَّيْفَ بِكَلَامٍ غَيْرِ مَقْبُولٍ
23	لُمِسَ	لُمِسَ المُصْحَفُ
24	فعل	فعل أَمْرٌ خَاطِئٌ أَثْنَاءَ القِيَادَةِ
25	نَشَرَ	نَشَرَ الخَبَرَ بَيْنَ النَّاس
26	وُضع	وُضع الكِتَابُ فِي مَكَانِهِ
27	نذر	نذر مَالَهُ كُلَّهُ
28	نظر	نظر الأَمْرَ قَضَائِيًا
29	وُصِفَ	وُصِفَ القَمَرُ وَصْفًا جَمِيلًا
30	نذر	نذر مَالَهُ كُلَّهُ

	Second set for advanced	
Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	جَرَفَ	جَرَفَ الحَجَرَ والشَّجَرَ
2	بُذِل	بُذِل مَجْهُودٌ كَبِيرٌ
3	بسط	بسط الأمْرَ أَمَامَهُ
4	حَمل	حَمل الأمْرَ عَلَى مَحْمَلِ الجِدِّ
5	خُيِّزَ	خُيِّزَ الخُبْزُ بِطَرِيقِةٍ جَيِّدَةٍ
6	بسط	بسط الأمْرُ أَمَامَه
7	خَلَقَ	خَلَقَ الإِنْسَانَ ضَعِيفًا
8	خُتِم	خُتِم القُرآنُ مَرَّتَيْن
9	خدم	خدم جَارَهُ خِدْمَةً عَظِيمَةً
10	دَحض	دَحض البَاطِلَ بِالحُجَّةِ
11	زُعِمَ	زُعِمَ البَاطِلُ
12	خدم	خدم جَارُهُ خِدْمَةً عَظِيمَةً
13	عَرَضَ	عَرَضَ الأمْرَ عَلَيْهِ
14	سُكِن	سُكِن البَيْتُ المَهْجُورُ
15	عبد	عبد اللَّهَ وَحْدَهُ
16	غَفَر	غَفَر ذَنْبَهُ كَامِلًا
17	غُلِبَ	غُلِبَ الرَّجُلُ فِي الْمُوَاجَهَةِ
18	عبد	عبد اللَّهُ وَحْدَهُ
19	لَمَزَ	لَمَزَ الضَّيْفَ بِكَلَامٍ غَيْرِ مَقْبُولٍ
20	فُعل	فُعل أمْرٌ خَاطِئٌ أَثْنَاءَ القِيَادَةِ
21	قسم	قسم المَالَ نِصْفَيْن
22	لَمس	لَمس المُصْحَفَ
23	مُنِعَ	مُنِعَ الدُّخُولُ بَتَاتًا
24	قسم	قسم المَالُ نِصْفَيْن
25	نَظَرَ	نَظَرَ الأمْرُ قَضَائِيًا
26	نُذِر	نُذِر مَالُهُ كُلُّهُ
27	نشر	نشر الخَبَرَ بَيْنَ النَّاسِ
28	وَصف	وَصف القَمَرَ وَصْفًا جَمِيلًا
29	وُضِعَ	وُضِعَ الكِتَابُ فِي مَكَانِهِ
30	نشر	نشر الخَبَرُ بَيْنَ النَّاسِ

	Third set for advanced	
Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	حَمَلَ	حَمَلَ الأَمْرَ عَلَى مَحْمَلِ الجِدِّ
2	بُسط	بُسط الأَمْرُ أَمَامَهُ
3	جرف	جرف الحَجَرَ والشَّجَرَ
4	خَبز	خَبز الخُبْزَ بِطَرِيقَةٍ جَيِّدَةٍ
5	بُذِلَ	بُذِلَ مَجْهُودٌ كَبِيرٌ
6	جرف	جرف الحَجَرُ والشَّجَرُ
7	دَحَضَ	دَحَضَ البَاطِلَ بالحُجَّةِ
8	خُدم	خُدم جَارُهُ خِدْمَةً عَظِيمَةً
9	خلق	خلق الإِنْسَانَ ضَعِيفًا
10	زَعم	زَعم البَاطِلَ
11	خُتِمَ	خُتِمَ القُرْآنُ مَرَّتَيْن
12	خلق	خلق الإِنْسَانُ ضَعِيفًا
13	غَفَرَ	غَفَرَ ذَنْبَهُ كَامِلًا
14	عُبد	عُبد اللَّهُ وَحْدَهُ
15	عرض	عرض الأَمْرَ عَلَيْهِ
16	غَلب	غَلب الرَّجُلَ فِي الْمُوَاجَهَةِ
17	سُكِنَ	سُكِنَ البَيْتُ المَهْجُورُ
18	عرض	عرض الأَمْرُ عَلَيْهِ
19	لَمَسَ	لَمَسَ المُصْحَفَ
20	قُسم	قُسم المَالُ نِصْفَيْن
21	لمز	لمز الضَّيْفَ بكَلَامٍ غَيْرِ مَقْبُولٍ
22	مَنع	مَنع الدُّخُولَ بَتَاتًا
23	فُعِلَ	فُعِلَ أَمْرٌ خَاطِئٌ أَثْنَاءَ القِيَادَةِ
24	لمز	لمز الضَّيْفُ بكَلَامٍ غَيْرِ مَقْبُولٍ
25	وَصَفَ	وَصَفَ القَمَرَ وَصْفًا جَمِيلًا
26	نُشر	نُشر الخَبَرُ بَيْنَ النَّاسِ
27	نظر	نظر الأَمْرَ قَضَائِيًا
28	وَضع	وَضع الكِتَابَ فِي مَكَانِهِ
29	نُذِرَ	نُذِرَ مَالُهُ كُلُّهُ
30	نظر	نظر الأَمْرُ قَضَائِيًا

	Fourth set for advanced	
Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	خَبَزَ	خَبَزَ الخُبْزَ بِطَرِيقَةٍ جَيِّدَةٍ
2	جُرف	جُرف الحَجَرُ والشَّجَرُ
3	حمل	حمل الأَمْرَ عَلَى مَحْمَلِ الجِدِّ
4	بَذل	بَذل مَجْهُودًا كَبِيرًا
5	بُسطَ	بُسطَ الأَمْرُ أَمَامَهُ
6	حمل	حمل الأَمْرُ عَلَى مَحْمَلِ الجِدِّ
7	زَعَمَ	زَعَمَ البَاطِلَ
8	خُلق	خُلق الإِنْسَانُ ضَعِيفًا
9	دحض	دحض البَاطِلَ بِالحُجَّةِ
10	خَتم	خَتم القُرْآنَ مَرَّتَيْنِ
11	خُدِمَ	خُدِمَ جَارُهُ خِدْمَةً عَظِيمَةً
12	دحض	دحض البَاطِلُ بِالحُجَّةِ
13	غَلَبَ	غَلَبَ الرَّجُلَ فِي المُوَاجَهَةِ
14	عُرض	عُرض الأَمْرُ عَلَيْهِ
15	غفر	غفر ذَنْبُهُ كَامِلًا
16	سَكن	سَكن البَيْتَ المَهْجُورَ
17	عُبدَ	عُبدَ اللَّهُ وَحْدَهُ
18	غفر	غفر ذَنْبُهُ كَامِلًا
19	مَنَعَ	مَنَعَ الدُّخُولَ بَتَاتًا
20	لُمز	لُمز الضَّيْفُ بِكَلَامٍ غَيْرِ مَقْبُولٍ
21	لمس	لمس المُصْحَفَ
22	فَعل	فَعل أَمْرًا خَاطِئًا أَثْنَاءَ القِيَادَةِ
23	قُسِمَ	قُسِمَ المَالُ نِصْفَيْنِ
24	لمس	لمس المُصْحَفُ
25	وَضَعَ	وَضَعَ الكِتَابَ فِي مَكَانِهِ
26	نُظر	نُظر الأَمْرُ قَضَائِيًا
27	وصف	وصف القَمَرَ وَصْفًا جَمِيلًا
28	نَذر	نَذر مَالَهُ كُلَّهُ
29	نُشِرَ	نُشِرَ الخَبَرُ بَيْنَ النَّاسِ
30	وصف	وصف القَمَرُ وَصْفًا جَمِيلًا

	Fifth set for advanced	
Number	Selected Verbs	
	Isolated	Within Context (Within Sentence)
1	بَذَلَ	بَذَلَ مَجْهُودًا كَبِيرًا
2	حُمِل	حُمِل الأَمْرُ عَلَى مَحْمَلِ الجِدِّ
3	خبز	خبز الخُبْزَ بطَريقةٍ جَيِّدَةٍ
4	بَسط	بَسط الأَمْرَ أَمَامَهُ
5	جُرِفَ	جُرِفَ الحَجَرُ والشَّجَرُ
6	خبز	خبز الخُبْزُ بطَريقةٍ جَيِّدَةٍ
7	خَتَمَ	خَتَمَ القُرْآنَ مرَّتَيْن
8	دُحض	دُحض البَاطِلُ بالحُجَّةِ
9	زعم	زعم البَاطِلَ
10	خَدم	خَدم جَارَهُ خِدْمَةً عَظِيمَةً
11	خُلِقَ	خُلِقَ الإِنْسَانُ ضَعِيفًا
12	زعم	زعم البَاطِلُ
13	سَكَنَ	سَكَنَ البَيْتَ المَهْجُورَ
14	غُفِر	غُفِر ذَنْبُهُ كَامِلًا
15	غلب	غلب الرَّجُلَ في المُوَاجَهَةِ
16	عَبد	عَبد اللَّهَ وَحْدَهُ
17	عُرِضَ	عُرِضَ الأَمْرُ عَلَيْهِ
18	غلب	غلب الرَّجُلُ في المُوَاجَهَةِ
19	فَعَلَ	فَعَلَ أَمْرًا خَاطِئًا أَثْنَاءَ القِيَادَةِ
20	لُمِس	لُمِس المُصْحَفُ
21	منع	منع الدُّخُولَ بَتَاتًا
22	قَسم	قَسم المَالَ نِصْفَيْن
23	لُمِزَ	لُمِزَ الضَّيْفُ بكَلَامٍ غَيْرِ مَقْبُولٍ
24	منع	منع الدُّخُولُ بَتَاتًا
25	نَذَرَ	نَذَرَ مَالَهُ كُلَّهُ
26	وُصِف	وُصِف القَمَرُ وَصْفًا جَمِيلًا
27	وضع	وضع الكِتَابَ في مَكَانِهِ
28	نَشر	نَشر الخَبَرَ بَيْنَ النَّاسِ
29	نُظِرَ	نُظِرَ الأَمْرُ قَضَائِيًا
30	وضع	وضع الكِتَابُ في مَكَانِهِ

Appendix F: Interview questions

Q1: When you read Arabic texts other than the ones assigned for your Arabic courses, do you usually read vowelized texts or unvowelized texts? Why?

Q2. Do you prefer to read vowelized or unvowelized Arabic texts? Why?

Q3. Does the use of diacritical marks (vowels) in Arabic texts make reading more accurately and or not? Please explain how and why.

Q4. Does the use of diacritical marks (vowels) in Arabic texts make reading faster or not? Please explain how and why.

Q5. Does the use of diacritical marks (vowels) in Arabic texts make reading more understandable or not? Please explain how and why.

Q6. Do you think all words in the Arabic texts you read should be vowelized? Why or why not?

Q7. Do you think all letters of words in the Arabic texts you read should be vowelized? Why or why not?

Q8. What do you think of the partial use of vowelization?

Q9. Do you know how to use/read verbs in active versus passive voice in Arabic? How do you distinguish active and passive verbs in Arabic? What makes them difference or similar?

Q10. Do you think diacritical marks (vowels) are more helpful with isolated words or with context?