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**LEXICAL INFERENCING BEHAVIOR OF LIBYAN EFL MEDICAL
STUDENTS WHILE READING: THE ROLE OF READING PROFICIENCY AND
THE ARABIC LANGUAGE**

by

Nazmia Faraj Bengieleil

**A thesis submitted to the School of Graduate Studies and Research
in partial fulfillment of requirements for the degree of
Doctor of Philosophy**

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بسم الله الرحمن الرحيم

"اقرأ باسم ربك الذي خلق (1) خلق الإنسان من علق (2) اقرأ وربك الأكرم

(3) الذي علم بالقلم (4) علم الإنسان ما لم يعلم (5)"

In the name of Allah, Most Gracious, Most Merciful

“(1) Proclaim! (or Read!) In the name of thy Lord and

Cherisher, Who created, (2) Created man, out of a (mere)

clot of congealed blood (3) Proclaim! And thy Lord is Most

Bountiful, (4) He who taught with the Pen, (5) Taught man

that which he knew not. ”

DEDICATION

***I dedicate this thesis to my father Faraj Bengelail
and to my mother Sadiga Algazaery.
They both taught me the love of learning and how to reach for
the stars.***

الإهداء

إلى والدي العزيز ... إلى الذي علمني معنى الحرف و قدسية الكلمة فجعل
المعرفة طائرا يأتي من الأعماق مجنحا بالفجر والأشواق ليفتح لي الطريق
.... إلى أبي.

وإلى والدتي العزيزة التي علمتني معنى الصبر على مشاق المعرفة فجعلت
من المفاهيم قيما تجري في العروق إلى أمي.

إليكما أهدي هذه الخطوة في طريق العلم والمعرفة التي وفقني الله تعالى فيها
استجابة لدعواتكما طوال سنين الدراسة والغربة ومشاق الحل والترحال.

ABSTRACT

This study investigated the lexical inferencing made by Libyan EFL medical students at a Libyan university when they encountered unfamiliar words in English texts. The researcher examined the effect of learners' level of reading competence on their lexical inferencing with respect to the knowledge sources and types of contextual cues they used in the process, their rate of success in inferring the correct meanings of the target words, and their rate of vocabulary learning and retention of previously unknown words. The study also examined the effect of learners' knowledge of the Arabic language on their inferencing.

Based on the results of a reading comprehension proficiency test (CanTEST), 20 students, 10 from each of two distinct levels of reading ability (i.e., intermediate and advanced) were randomly selected for the study. Two pretests were used: Nation's (1990) Vocabulary Levels Test to assess the students' size of vocabulary; and, the Vocabulary Knowledge Scale (VKS) (Paribakht & Wesche, 1993, 1997; Wesche & Paribakht, 1996), to measure their level of knowledge of the target words. Think-aloud procedures were used during the individual interview sessions. At the end of the interviews, retrospective protocols were collected from the participants about their experiences. These sessions were tape-recorded. The learners were given the VKS again at this point to measure word learning. Two weeks after the individual interview sessions, a post-test (VKS) was administered again to assess learners' rate of retention of the previously unfamiliar target words.

Results revealed that both proficiency groups used similar types of knowledge

sources and contextual cues when inferencing, but in different proportions. Sentence level meaning and discourse level meaning were the types most frequently used by both groups. A taxonomy of knowledge sources and contextual cues used by the learners in inferencing was developed. Results indicate successful learning of some of the previously unfamiliar target words and retention of some new lexical knowledge. L1 influence is apparent at multiple levels of the language system (e.g., interpretation of semantic cues, lexical knowledge and collocations), sometimes misleading the reader and other times facilitating successful inferencing. Pedagogical implications of the findings of the study and suggestions for further research are presented.

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CHAPTER ONE:

Introduction

*"There is not much value in being able to produce grammatical sentences
if one has not got the vocabulary that is needed to convey what one wishes to say...*

*While without grammar very little can be conveyed, without vocabulary
nothing can be conveyed".*

(Wilkins, 1972, pp. 110-111)

Overview

The ability to read English as a second/foreign language (ESL/EFL) is fundamental to the academic success of university students. In an EFL context, most often the need to read English texts appears to outweigh the opportunities to hear and speak the language. Written language in such contexts, therefore, constitutes a major source of potential input for second language (L2) vocabulary acquisition. However, learners are always confronted with unknown words while reading, and poor knowledge of vocabulary constitutes a major obstacle in their reading comprehension. Furthermore, L2 learners themselves report that their limited vocabulary is the main problem they face when reading L2 authentic texts (Gorman, 1979; Yorio, 1971). Research has shown a strong correlation between vocabulary knowledge and L2 reading comprehension (Koda, 1989; Laufer, 1982; Laufer & Sim, 1985). Kim's (1995) study showed that learners' lack of vocabulary knowledge, their unfamiliarity with words or their inability to adapt whatever knowledge they had to the specific text context was an apparent problem affecting L2 reader's recall protocols.

Research also indicates that when learners are confronted with an unknown word in a text, they usually have at their disposal several strategic options: to ignore the word and continue reading, to consult a dictionary or a person, or to infer the meaning (Fraser, 1993, 1996, 1999). The latter, referred to as lexical inferencing, is the primary lexical processing strategy L2 learners rely on when encountering unknown words while reading (de Bot et al., 1997; Fraser, 1993, 1997; Haastруп, 1991; Mondria & Wit-de Boer, 1991; Oxford & Scarcella, 1994). Moreover, researchers have suggested that new words can be best learned when presented in texts and when their meaning must be inferred by the learners themselves (e.g., Bialystok, 1983; Hulstijn, 1992; Nation, 1990; Nation & Coady, 1988; Schouten-van Parreren, 1985).

Many thoughts enter readers' minds when confronted with an unknown word. These normally interact with textual cues in reader's construction of meaning. However, the successful intake of new lexical knowledge, while reading, generally requires repeated input processing during multiple experiences with the word (Hulstijn, 1992; Parry, 1993; 1997). Through repeated encounters with the new word, the learner will have an opportunity to develop a mental representation of the word form, and to elaborate features of its meaning and other types of lexical knowledge (de Bot et al., 1997; Huckin & Coady, 1997; Wode, 1997). Because inferencing involves more in-depth processing and mental effort (than, for example, memorizing), it is more likely to lead to vocabulary acquisition.¹

The main purpose of this study is to explore the lexical inferencing process of Libyan

¹ Vocabulary acquisition means that vocabulary is learned incidentally. Acquisition and learning will be used interchangeably throughout this thesis.

university students when they encounter unknown words while reading English texts, and considering two factors: learners' knowledge of their first language (L1), Arabic; and, their level of reading competence in English. The study examines the influence of these two variables on the learners' inferencing behavior with respect to the knowledge sources and types of contextual clues they use in the process, and their level of success, as well as learning and retention of the target words.

The effect of learners' L1 on their L2 lexical inferencing has received very little attention in research on L2 vocabulary acquisition. One goal of this study is to explore the influence of the L1 (Arabic, a Semitic language), which is typologically different from English, an Indo-European language, on the participants' inferencing processes. Arabic speakers must learn an entirely new alphabet for English including a capital letter system, and also master its rather inconsistent spelling patterns. In addition, Arabic, which is similar in grammatical structure to Aramaic, Hebrew and Ethiopian, has a very different grammatical system from English. For example, Arabic has two word orders: subject, verb, object (SVO), and verb, subject, object (VSO), whereas English has only one word order, SVO. In standard Arabic, when SVO word order is in use, there must be complete subject-verb agreement, whereas in VSO order, the agreement is not complete. Furthermore, Arabic has a slightly different punctuation system than English. These differences, and possibly others, may influence the types and proportions of knowledge sources Arabic speakers draw on in the process of lexical inferencing in English. For example, while French speakers may be able to use their knowledge of cognates in the process, Arabic speakers will not have such an advantage. Yu (1996) argues that most existing research looks at the facilitative role of

similarities between typologically related languages (e.g., English and French). Yu's investigation extends this line of research toward a better understanding of the underlying L1-L2 lexical similarities between typologically unrelated languages (i.e., Chinese and English), on the basis that these can also be of benefit for L2 vocabulary acquisition, even when there is no formal phonological or orthographic similarity between the learner's L1 and L2.

The effect of L2 learners' reading ability on their lexical inferencing is also far from clear. Research shows that differences with respect to for example, frequency and success of inferencing and types of clues used in inferencing exist between low proficiency and high proficiency learners when they infer the meaning of unknown words (Bensoussan & Laufer, 1984; dos Santos & Sanpedro Ramos, 1993; Fraser, 1997; Haastrup, 1989, 1991; Haynes, 1993; Morrison, 1994) (See Chapter 2 for a review). However, more research is needed on this issue and its effect on types and proportions of knowledge sources used in the process, vocabulary learning and retention.

This study examines the effect of Arabic speakers' English reading ability on their lexical inferencing in terms of learners':

- a. use of knowledge sources and contextual cues in the process;
- b. rate of success in inferring the correct meanings of the unfamiliar words; and,
- c. rate of lexical learning and retention as a result of inferencing.

A better understanding of how EFL learners infer the meaning of unfamiliar words while reading English texts may help researchers to understand some of EFL learners' reading comprehension problems as well as their processes of vocabulary acquisition through reading. It may also offer implications for both reading and vocabulary research and instruction. As Haastруп (1991) argues, knowledge about the way in which learners use and integrate (or fail to integrate) the outside input (i.e., the text) with their inside input (i.e., knowledge that learner brings to the text) is essential for the understanding of acquisition processes. When learners' attention is focused on specific unfamiliar target words in context (e.g., a written text), the process may be understood in terms of "input processing" (Gass, 1988, 1997; Hatch & Brown, 1995; Krashen, 1985; Wesche, 1994).

Structure of the Thesis

In Chapter Two, a comprehensive review of the literature on relevant issues is provided, followed by the two main research questions.

In Chapter Three, a description of introspective methods is presented as well as a discussion of the different types, advantages and limitations of the methods. This is followed

by presentation of the types used in this study and a description of the participants, selection of participants, data collection instruments, and data collection procedures including a detailed description of the think-aloud training session and the individual research interview. The chapter concludes with a summary of the research design.

In Chapter Four, descriptions of how the participants of this study approached the inferencing task is provided. A detailed description of the taxonomy of knowledge sources and contextual cues used in lexical inferencing is presented, accompanied by illustrative examples. This is followed by an examination of the effect of the learners' knowledge of Arabic on their lexical inferencing while reading in English.

In Chapter Five, the findings of the quantitative analysis of the study are presented. These are divided into three parts according to the subcategories of the second research question. Finally, a summary of the main findings of the study is presented.

In Chapter Six, the findings of the study are discussed, in particular with respect to the two main research questions. The central conclusion that emerged from conducting this study is then presented. This is followed by a discussion of the study's implications for research, methodology and pedagogy.

CHAPTER TWO:

Review of the Literature

“A language pedagogy that utilizes inferencing removes language study from the domain of mere skills to a domain that is more closely akin to the regions of complex intellectual processes. Language study becomes a matter for a kind of problem-solving and the entire breadth of the student’s experience and knowledge may be brought to bear on the processing of language”

(Carton, 1971, p.58)

Overview

In recent years, researchers have been increasingly interested in the area of L2 vocabulary acquisition and pedagogy (e.g., Bensoussan & Laufer, 1984; Fraser, 1997, 1999; Haastруп, 1987, 1991; Huckin & Coady, 1997; McCarthy, 1997; Morrison, 1996; Paribakht & Wesche, 1997, 1999; Read, 2000; Schmitt, 2000; Schmitt & McCarthy, 1997). This interest has focused on several related issues ranging from systematic vocabulary learning to how acquisition of word knowledge occurs in a more incidental way through reading and listening activities, as well as learners’ lexical processing strategies, including lexical inferencing. Researchers have in particular focused on lexical inferencing processes of L2 readers. More specifically, they have investigated what knowledge sources learners use to make inferences, factors that affect inferencing, the effect of inferencing on reading and vocabulary learning, and the effect of L2 proficiency on success in inferencing.

Read (2000) states that lexical inferencing (word guessing) by learners is not purely a pedagogical concern but is also of great interest in second language vocabulary acquisition

research. Because much vocabulary development takes place when learners attempt to comprehend words they hear or read in context, it is important to understand how such learning occurs. Researchers have addressed the process of L2 vocabulary learning from context both empirically and theoretically (Wesche & Paribakht, 1999). “Most scholars seem to agree that, except for the first few thousand most common words, vocabulary learning predominantly occurs through extensive reading, with the learner guessing at the meaning of unknown words” (Huckin & Coady, 1999). However, extensive reading for meaning does not automatically lead to the acquisition of new words. Acquiring L2 vocabulary knowledge from context depends on the learners’ level of linguistic (L1 and L2) knowledge and on their extralinguistic knowledge. It also depends on several other factors (e.g., level of language proficiency, learner’s level of attention to specific words, kind of reading text, kinds of exposure to a word, frequency of occurrence of a word, learner’s L1, etc.) that might facilitate or hinder vocabulary acquisition.

According to Read (2000), results from some experiments (e.g., Day, Omura & Hiramatsu, 1991; Dupuy & Krashen, 1993; Pitts, White & Krashen, 1989; Saragi, Nation & Meister, 1978) show that there is evidence of incidental learning of previously unknown words while reading when learners are set a reading comprehension task without being told to pay attention to vocabulary. However, it is believed that this is a limited finding because of various weaknesses in the way the studies were designed and carried out. In addition, Read states that this finding:

...gives us no insight into the way that the learners process the words in the text psycholinguistically as they read. It does not tell us whether any of the words have

been retained by the learners in their mental lexicon and will be remembered when they are encountered again on some future occasion. (p. 46)

In this chapter, there will be a review of the major lines of enquiry by researchers on second language vocabulary acquisition with a special focus on lexical inferencing, the main area of research in this study. There is also an exploration of issues such as reading and its relationship to L2 vocabulary acquisition, incidental vocabulary acquisition through reading, lexical processing strategies, success in lexical inferencing, lexical inferencing and vocabulary learning. The roles of reading proficiency level and the learner's L1 in lexical inferencing are also discussed.

What is Involved in Knowing a Word?

For any discussion on vocabulary acquisition, it is essential to take up the issue of what it means to know a word. What then, does vocabulary knowledge involve?

There appears to be a consensus among researchers that knowing a word involves more than just being able to remember its meaning or the ability to provide an equivalent in the L1. Numerous researchers (L1 and L2) have shown how complex vocabulary knowledge can be and they have revealed the different types of knowledge that comprise relatively complete understanding of a word (e.g., Coady, 1993; Graves, 1987; Harley, 1996; Henriksen, 1999; McKeown & Curtis, 1987; Nagy & Anderson, 1984; Nation, 1990; Paribakht & Wesche, 1993; Read, 1989; Richards, 1976; Wesche & Paribakht, 1996).

There have been many attempts in the L2 literature to describe what lexical competence is. One early approach was to attempt to identify/describe all that learners should know about a word if they are to fully acquire it. Richards (1976) formulated eight

assumptions about lexical competence. The first was that the vocabulary knowledge of native speakers continues to expand in adult life. The other assumptions, which cover different aspects of what is meant by knowing a word, are:

- Knowing a word means knowing the degree of probability of encountering that word in speech or print. For many words we also know the sort of words most likely to be found associated with the word.
- Knowing a word implies knowing the limitations on the use of the word according to variations of function and situation.
- Knowing a word means knowing the syntactic behavior associated with the word.
- Knowing a word entails knowledge of the underlying form of the word and the derivations that can be made from it.
- Knowing a word entails knowledge of the network of associations between that word and other words in the language.
- Knowing a word means knowing the semantic value of the word.
- Knowing a word means knowing many of the different meanings associated with the word. (p. 83)

This set of assumptions highlights the complex nature of vocabulary learning, which involves more than just memorising the meaning of a word, and can also be useful for teaching purposes. However, it should be noted that this list is descriptive and not explanatory. It provides an inventory of ideal native-like knowledge, but it does not tell us how this knowledge is acquired (Schmitt & McCarthy, 1997).

Nation (1990) took Richard's (1976) approach a step further by incorporating his

assumptions and several other components into an analytical table to specify the scope of the learner's task (Read, 2000). (See Nation, 1990, for a detailed description of the process.)

Nation proposes a list of the different kinds of knowledge about a word that one should master in order to know a word:

- the meanings of the word;
- the written form of the word;
- the spoken form of the word;
- the grammatical behavior of the word;
- the collocations of the word;
- the register of the word;
- the associations of the word; and,
- the frequency of the word.

Nation's list has the elements of the receptive/productive distinction which is not explicitly included in Richards' assumptions. The ability to use words involves a higher level of knowledge than what it takes to understand them (see Schmitt & McCarthy, 1997 for details). These different types of word knowledge are not usually acquired at the same time, but each of the word-knowledge types is likely to be acquired in a gradual manner (Schmitt, 2000). Therefore, a word can be known in varying degrees, and some researchers describe this kind of word knowledge as a continuum, from no prior knowledge to complete knowledge (Haastrup, 1991).

An alternative approach to describing lexical knowledge is a developmental one (Read, 2000). For example, Paribakht and Wesche (1993) and Wesche and Paribakht (1996)

advocate the use of a “vocabulary knowledge scale” to characterize a learner’s relative levels of vocabulary knowledge of given words, ranging from complete unfamiliarity, through recognition of the word and some idea of its meaning, to the ability to use the word with grammatical and semantic accuracy in a sentence.

Henriksen (1999) proposes that a learner’s lexical competence should be viewed along three separate but related dimensions: a “partial-precise knowledge” dimension; a “depth of knowledge” dimension; and, a “receptive-productive” dimension (p.304).

Another description of lexical knowledge is proposed by Qian (1998), who categorizes word knowledge into three types. The first is mainly component focused (e.g., Richards, 1976). The second is based on the level of familiarity with a given word (e.g., Paribakht & Wesche, 1993; Wesche & Paribakht, 1996) and the third is a combination of the two previous ones (Nation, 1990; Read, 1989). Based on a review of the literature, Qian proposes that a framework for describing depth of knowledge of a word for reading comprehension should contain at least six components, which are structurally and functionally interconnected. These are:

- Pronunciation and spelling, or knowing how different forms of the word are pronounced and spelled;
- Morphological properties, or knowing the word’s stem, its capability of inflection, derivation, and other word formation devices, and its possible parts of speech;
- Syntactic properties, or knowing the word’s possible positions and its syntagmatic relations, including collocational relations, with other words in a

sentence;

- **Meaning, which not only involves identification of the denotative meaning of a word in context, but also, where applicable, knowledge of connotations, as well as polysemy, antonymy and other paradigmatic relations the word may have;**
- **Register, or discourse features, which includes possible adherence to stylistic, social or regional variety, and the field, mode and manner of discourse concerning the application of the word; and,**
- **Frequency of the word in the language, or whether this word is a commonly used word or a rarely used word appearing in specialized texts**
(p.24).

These components appear to be very similar and closely related to Nation's (1990) list. They mainly focus on knowledge of the spoken and written form of the word (e.g., sound and morphological properties), receptive as well as productive abilities, knowledge of the semantic features of words and the ability to use them in different settings and modes.

In this section, the complex nature of vocabulary learning is highlighted by drawing attention to different ways of classifying word knowledge. As Read (2000) argues, "at the simplest level vocabulary consists of words, but even the concept of a word is challenging to define and classify" (p. 35). Building on the notion of what it means to know a word (see Schmitt, 2000), the next section discusses word learning from reading and the incidental acquisition of words (see Huckin & Coady, 1999). As Paribakht & Wesche, (1999) note:

If the process by which lexical knowledge is gained through reading were better

understood, learners as well as instructional programs might be able to harness it to counter the pessimistic results often claimed for reading as a means of vocabulary acquisition. (p. 201)

Reading and L2 Vocabulary Acquisition

It has been suggested that explicit learning (through the focused study of words) and incidental learning (while focused on something else) are two approaches to vocabulary acquisition (Schmitt, 2000). In order to elaborate on these two approaches, the relationship between reading and vocabulary acquisition will be explored, followed by some of the main issues on the incidental acquisition of vocabulary through reading.

Just as L1 studies in reading have been shown to lead to L1 vocabulary growth (Nagy, Anderson & Herman, 1987; Nagy & Herman, 1985; Sternberg, 1987), L2 studies on this issue also indicate that increasing the amount of reading, where L2 learners are motivated and their main focus is on meaning, also leads to noticeable gains in vocabulary acquisition and other aspects of linguistic proficiency (Elley & Mangubhai, 1993; Kiyochi, 1988, cited in Krashen, 1989; Nagy, 1997; Paribakht & Wesche, 1997; Pitts, White & Krashen, 1989; Schouten-van Parreren, 1985). The results of a study by Laufer (1992) support the claim that vocabulary measures are good predictors of reading comprehension level in a foreign language. Therefore, many professionals in the ESL/EFL field now recognize that vocabulary learning in the context of reading is an important component of second language acquisition (Coady, 1993).

Krashen (1989) claims that language learners are able to acquire vocabulary and spelling efficiently by receiving novel but comprehensible input while reading. Krashen, like

Nagy and Herman (1987), argues that students should be encouraged to read extensively in their own area of interest and should be given large quantities of light, low-risk material that they are not tested on. In short, Krashen believes that in addition to being more efficient than other vocabulary learning methods, extensive reading is a much more pleasurable process. Another study by Ferris (1988, cited in Pitts et al. 1989) showed that university students of English-as-a-second-language (ESL) can increase their vocabulary by reading. Students were given the novel Animal Farm by George Orwell and were given a multiple-choice test before and after reading the book. The test consisted of 75 words including 50 words used in the novel, words that students at their level typically did not know. It was found that students made significantly better gains on the test than control students who did not read the book. Another similar example is the study by Pitts et al., where they did a replication of Saragi's A Clockwork Orange study, with adult L2 students instead of native speakers. Students were requested to read for meaning the first two chapters of the novel, which contained a number of slang words of Russian origin (nadsat words). Subsequent testing showed modest but significant acquisition of nadsat words. They concluded that, like native speakers, L2 learners can also acquire vocabulary from reading and they can do so with authentic texts. Similarly, other studies, notably by Schouten-van Parreren (1989) and Day et al. (1991), have been conducted on L2 learners and found that vocabulary can be acquired through reading.

In another study, Dupuy and Krashen (1993) had students of French-as-a-second-language (FSL) watch five scenes of a play on film and then read the next five scenes in French. They were then given a surprise vocabulary test on words that were in the text. The subjects performed better than the control group who did not see the film or read the text. The

results of other studies confirm L1 findings that reading for meaning can result in a small but reliable increase in word knowledge (Nagy & Herman, 1987; Nagy, Herman & Anderson, 1985). It was argued that although the increase is small, it is enough to account for the massive amount of vocabulary acquisition seen in children, if enough reading is done. On the other hand, Coady (1997) lists what he calls some important issues that these studies do not address such as the fact that most of the subjects in these studies appear to be at an intermediate level. This raises the question of whether such gains in vocabulary would occur with students at either the very beginning or advanced levels. He poses these questions: “Do actual beginners know enough vocabulary to read well enough to learn words in this manner?” (p. 227); and, “Do such relatively higher gains occur when control groups are given alternative cognitive enriching opportunities, for example, strategy instruction and mnemonic techniques?” Then he goes on to ask whether such gains persist through time, and whether they do so with a significant advantage over strategy-oriented approaches to vocabulary learning, such as memorizing words and using the keyword technique. Coady also points to some negative evidence in the research and says, “We are left with very mixed results from the research in support of Krashen’s claims about L2 vocabulary acquisition through extensive reading alone”(p. 227). Coady suggests that L2 learners will gain more in terms of vocabulary learning if instruction is added to extensive reading, especially with beginners who face what he calls “a truly paradoxical situation” (p. 229). He also suggests these learners will not be able to acquire vocabulary incidentally through extensive reading unless they know at least the basic 3,000 word families to start with. How can someone learn vocabulary from written text if he or she cannot read in the L2 in the first place? Therefore, Coady (1997)

proposes that, at the beginning, learners should be given instruction and practice in the 3,000 most common words in the language to the point of automaticity. Then they should be allowed to engage in reading material that they find enjoyable.

An interesting diary study by Grabe and Stoller (1997) gives an example of a special kind of evidence of vocabulary acquisition through reading. This study describes an attempt to learn Portuguese by extensive reading of newspapers for at least 2 hours daily. Their study suggests that learning to read in a L2 mainly involves learning words. The theory underlying the study was that “many exposures of differing intensities would gradually lead to a large recognition vocabulary” (p. 102). They concluded that reading and vocabulary abilities developed as a result of extensive reading practice. However, it should be noted that the subject was considered a highly motivated adult learner who knew how to use his learning strategies effectively and successfully.

Most researchers seem to agree that, except for the first few thousand most commonly used words, vocabulary learning occurs through extensive reading, with the learner guessing at meanings of unknown words. Krashen (1989) claims that “While you are acquiring, you don’t know you are acquiring; your conscious focus is on the message, not the form. Thus, the acquisition process is identical to what has been termed ‘incidental’ learning” (p. 440). But what does incidental vocabulary acquisition mean?

Incidental vocabulary acquisition through reading

Incidental vocabulary acquisition means that a learner will acquire vocabulary as a by-product of other activities, such as reading or listening where the focus is primarily on comprehending the message rather than on learning vocabulary. In other words, incidental

learning occurs through exposure when one's attention is focused on language use in context.

Huckin and Coady (1999) argue that incidental vocabulary learning has specific advantages over direct instruction, including:

- It is contextualized, giving the learner a richer sense of a word's use and meaning than can be provided by traditional paired-associate exercises;
- It is pedagogically efficient in that it enables two activities, vocabulary acquisition and reading, to occur at the same time; and,
- It is more individualized and learner-based because the vocabulary being acquired is dependent on the learner's own selection of reading materials.

However, although the topic of incidental vocabulary acquisition has recently received considerable attention from L2 researchers (e.g., Hulstijn, 1992, in press; Paribakht & Wesche, 1999), it appears that the incidental vocabulary learning process is still not fully understood (Fraser, 1999; Huckin & Coady, 1999). Moreover, although it is acknowledged that some incidental L2 vocabulary learning occurs during reading for comprehension, Fraser states that "there is less consensus as to whether reading is a rich event for vocabulary learning" (p. 225). She notes that while several studies have found evidence of vocabulary growth (e.g., Huckin & Bloch, 1993; Hulstijn, 1992; Krashen, 1989; Paribakht & Wesche, 1993, 1997), "views differ as to whether the demonstrated retention rates represent low (Hulstijn, 1992) or high (Krashen, 1989) learning outcomes" (p. 226).

Research has also shown that L2 learners, especially those who achieve advanced reading proficiency in a L2, will acquire most of their vocabulary knowledge incidentally through extensive reading of interesting texts rather than from instruction (Coady, 1997; Gass,

1997; Huckin & Coady, 1999). Moreover, research has found that learning through incidental exposure is most effective when students know how to exploit the information available, for example, by knowing how to use contextual cues, by being aware of word families and ways of analyzing word parts and even by proper use of the dictionary (Fraser, 1999). However, Huckin and Coady (1999) believe that “extensive reading for meaning does not lead automatically to the acquisition of vocabulary. Much depends on the context surrounding each word, the nature of the learner’s attention, the task demands, and other factors” (p. 183).

It appears that readers often fail to spontaneously learn the meanings of previously unfamiliar words encountered in a text for several reasons (Hulstijn, Hollander & Greidanus, 1996), such as failing to notice the presence of an unfamiliar word, or believing that they know it when in fact, they do not; single encounters with new words which do not guarantee their acquisition; and, insufficient contextual information so that readers fail to connect the form of the unfamiliar word to the meaning implied by the context. Furthermore, the successful intake of new lexical knowledge, while reading, generally requires repeated input processing during multiple experiences with the word (Hulstijn, 1992; Parry, 1993, 1997). Therefore, it is important to increase the amount of exposure to words because “incidental vocabulary acquisition depends on multiple exposures to a word in different contexts” (Huckin & Coady, 1999, p. 185).

Nagy, Herman and Anderson (1985) also concluded from their studies of children reading in their L1 that learning words from written texts is incremental and depends on repeated exposure. Kachru (1962, cited in Nation, 1990) found that words had to occur at least seven times in the course books of Indian learners to be widely known, whereas words that

occurred once or twice were not known to most of the learners. Through repeated encounters with the new word, the learner will have an opportunity to develop a mental representation of the word form, and to elaborate features of its meaning and other types of lexical knowledge (de Bot et al., 1997; Huckin & Coady, 1997; Paribakht & Wesche, 1997; Wode, 1997).

Lexical acquisition through reading, as revealed in much psycholinguistic research, appears also to depend on the amount and types of cognitive processing that go into it (Huckin & Coady, 1999). Researchers argue that the more mental effort involved in processing a new word, the better the chances of learning that word (Craig & Tulving, 1975; Ellis, 1994; Hulstijn, 1992). For example, Hulstijn observed that L2 learners are able to acquire vocabulary incidentally and are more likely to remember the form and meaning of an unknown word in the text when they have guessed its meaning by themselves. However, his research has shown that the retention of word meanings in a true incidental learning task is very low when the target word occurs only once in a text which is being read for its content.

In summary, some studies have demonstrated evidence of vocabulary acquisition through reading and have illustrated how reading is a valuable source of vocabulary development. These studies have suggested that L2 learners acquire most of their vocabulary through extensive reading of enjoyable texts. However, the process of vocabulary learning from reading is slow and incremental because learners often ignore many unknown words (Fraser, 1999; Paribakht & Wesche, 1999), and attempts to guess their meanings from context are often misguided and seemingly haphazard, with differential outcomes for different learners, word types and contexts (Bensoussan & Laufer, 1984; Haynes, 1993; 1998; Parry, 1993). Furthermore, it appears that readers often fail to learn the meanings of previously

unfamiliar words found in a text for several reasons. Therefore, researchers have sought different ways to help learners become more efficient vocabulary learners, for example, by exploring the lexical processing strategies they employ in their reading and by finding out which are productive for vocabulary learning.

Lexical Processing Strategies Used by Learners While Reading

Vocabulary is a major source of difficulty for learners in an L2 academic context because they are regularly faced with new words while reading L2 texts. As noted earlier, researchers have found that learners have a few basic lexical processing strategies at their disposal when confronted with an unknown word: ignore and continue reading; consult a dictionary or a friend; or, to infer the meaning of the word using linguistic and contextual cues (Fraser, 1993, 1997, 1999). Some research (e.g., Bensoussan & Laufer, 1984; Paribakht & Wesche, 1997, 1999) suggested that L2 learners, when left on their own, generally ignored unknown words. For example, Bensoussan and Laufer found that the most common reaction to an unknown word was to ignore it, that is, no attempt was made to guess the word. Others found that learners inferred only specific words as needed, and consulted on a selective basis (Fraser, 1999).

Paribakht and Wesche (1999) used introspection to study how L2 university students deal with unfamiliar words while reading. Think-aloud and retrospective verbal protocols were analyzed and the learners' lexical processing strategies were identified. Learners in their study used different strategies when dealing with unfamiliar words. They occasionally used word retrieval, repeating a target word out loud or rereading it several times, in an attempt to retrieve it from phonological or graphic cues. They also tried appeals for assistance, which

involves asking the interviewer for help or verifying the meaning of the word from the dictionary. However, lexical inferencing was, by far, the most important strategy used by these learners (80% of strategy use), for which they used various cues and knowledge sources in inferring word meanings. A taxonomy of the knowledge sources and cues used in determining word meanings was developed from the data.

In a similar study, with L2 university students in an English-for-specific-purposes program, Fraser (1999) reported learners' use of three lexical processing strategies (ignore, consult and infer) when reading. Fraser's study also revealed that the learners' preferred and primary strategy was inferencing (58%), followed by the consult and then the ignore strategies. Fraser found that learners, when dealing with unfamiliar words, used lexical processing strategies that were productive for word learning (i.e., consulting and inferencing) more frequently than unproductive ones (i.e., ignoring). They were generally successful in determining word meaning that was adequate for text comprehension when using both inferencing and consulting. The lexical processing strategies often occurred alone but at other times occurred in combination. As noted by Wesche & Paribakht (1999):

Both studies establish the vital role of lexical inferencing in reading comprehension and vocabulary learning from context and, using both introspective and performance data, illuminate the patterned—yet unpredictable—word-learning outcomes of reading in academic texts in a L2. (p. 178)

Because lexical inferencing is the main focus of this study, it may be useful to define it at this point.

Lexical inferencing.

Several researchers have defined lexical inferencing (e.g., Bialystok, 1978, 1983; Carton, 1971; Haastrup, 1987, 1991). “In inferencing, attributes and contexts that are familiar are utilised in recognizing what is not familiar” (Carton, 1971, p. 45). Lexical inferencing, according to a more precise definition by Haastrup (1991), “involves making informed guesses as to the meaning of a word in light of all available linguistic cues in combination with the learner’s general knowledge of the world, her awareness of the co-text and her relevant linguistic knowledge” (p. 40).

The nature of Haastrup’s (1991) definition of inferencing is interactive, recognizing both bottom-up (linguistic knowledge) and top-down (knowledge of the world) processes. She considers lexical inferencing to be a central process in language use and language learning. Haastrup also finds that inferencing at text level and at word level are closely connected and related, and therefore, both can be considered part of the comprehension process. In addition, it is an important cognitive process which, when combined with some others, may facilitate the comprehension and intake of new lexical knowledge during reading. Other researchers acknowledge that lexical inferencing, involving the identification of contextually appropriate meaning and other features of unfamiliar words, is the main lexical processing strategy used by readers in initial comprehension of unknown words in context and is a key vocabulary learning skill (de Bot et al., 1997; Fraser, 1999; Paribakht & Wesche, 1997, 1999). Furthermore, lexical inferencing involves deeper processing than other strategies, is likely to contribute to better comprehension of the text as a whole, and may result in some learning of the words. Nonetheless, some research indicates that when readers attempt to infer a word’s

meaning from context, it often leads to unsuccessful guesses; hence, they may learn words incorrectly (Bensoussan & Laufer, 1984; Dubin & Olshtain, 1993; Laufer & Sim, 1985; Li, 1988). In spite of its importance, research on lexical inferencing as a process is very scarce (Haastrup, 1991).

Morrison (1996) argues that the recognition of lexical inferencing is largely a result of the influence of top-down reading models. Such models claim that when learners encounter an unknown word while reading, they try to link whatever prior knowledge they have (e.g., linguistic knowledge, knowledge of the topic, world knowledge) to the target word in order to get to the intended meaning. However, interactive models of reading (e.g., Rumelhart, 1977; Stanovich, 1980) may more precisely describe the process involved in lexical inferencing because it involves simultaneous, parallel and multi-level processing. In these models of the comprehension process, visual information is first scanned from the printed words, and important features of this information are then sent to a message centre, or pattern synthesizer, where various sources of the reader's prior knowledge, linguistic and otherwise, come together to interpret the information received. "The reading process is the product of the simultaneous and joint application of all the knowledge sources" (Rumelhart, 1977, p. 588).

This section has highlighted some of the recent studies that examined the lexical processing strategies of L2 readers and their effect on vocabulary learning. These studies have shown that lexical inferencing is the main strategy used by most L2 learners for processing reading texts and that it is a useful skill to have. They have also found that learners rely on other strategies such as appeals for assistance and the ignore strategy. Moreover, some studies have identified different types of knowledge sources and contextual cues that L2 learners use

when inferring the meanings of previously unknown vocabulary. These will now be discussed in detail.

Knowledge Sources Used in Lexical Inferencing

Sternberg and Powell (1983) claim that “The contextual cues describe the types of information that might be used to infer the meaning of a word from a given verbal context” (p. 883). It is generally agreed that context should provide a useful basis for inferencing (Bialystok, 1983) and that enough contextual cues may aid vocabulary acquisition (Drum & Konopak, 1987; Graves, 1987; Huckin, Haynes & Coady, 1993; Sternberg, 1987).

The different types of contextual clues used for inferencing from written context are either linguistic cues (ranging from syntactic, semantic and morphological ones) or non-linguistic cues, such as background/world information. Sternberg (1987) argues that a given kind of cue will not necessarily be equally helpful in finding out the meanings of all kinds of words. He claims that “If a given cue occurs in close proximity to the unknown word, then it is likely that the cue will be recognized as relevant to inferring the unknown word’s meaning” (p. 93). Some cues will work better for some words and other cues for other words. He also notes that the helpfulness of a cue will depend on whether it precedes or follows the unfamiliar word, and its distance from it. For example, word class and morphological information may provide cues (e.g., whether the unknown word in the sentence is a noun, verb, adjective, or adverb, and whether the word can be broken down to the elements that the reader knows). Furthermore, semantic information such as the presence of a synonym may help in the lexical processing of an unknown word. An obvious source of clues that readers can use is knowledge of their L1 vocabulary, especially if the two languages are related (e.g.,

knowledge of cognates).

Some contextual cues that can help in the guessing of unknown words include synonym or restatement cues, comparison or contrast cues, example cues, experience or situation cues, and direct explanation or summary cues (Gairns & Redman, 1986). However, just as these clues can often be helpful in guessing, they can at other times be misleading (Laufer, 1997). However, the results of some L2 research suggest the need for caution. For example, in a study of lexical guessing in context, Bensoussan and Laufer (1984) found that for the 70 target words selected from an unedited text of about 600 words, 41% had no contextual cues to be exploited, and even when present, such cues were not always helpful in terms of guessing. However, even if enough clues are present, a single context most often is not sufficient for a reader to guess the full meaning of a word (Schmitt, 2000).

Research in L2 inferencing (e.g, Bensoussan & Laufer, 1984; Haynes, 1984; Huckin & Bloch, 1993) have found that inferences based on word form associations rather than the use of cues from the text context often lead to unsuccessful word-meaning determination. Huckin and Bloch explored the problem solving strategies of three Chinese intermediate proficiency graduate students encountering unfamiliar words in their course readings. They found that these students relied mainly on contextual cues (especially local cues) in inferring word-meanings and were normally successful when they did so. The cues involved were of three general types:

- local linguistic constituents (e.g., syntactic or semantic collocations);
- global text representations (including text schemas and “permanent memory,” that is, the translation up to that point); and,
- world knowledge.

They also found that although the participants would often use two or more of these cues in combination, the most popular type of cue was some local constituent (e.g., a collocating cue word that tipped off the meaning of the target word). Most of these occurred in the same sentence as the target word. The subject's unsuccessful guessing often was when they thought they knew a word but did not and therefore, did not really make a guess. This mainly resulted from misidentification of word-forms.

Research has shown that L1 and L2 learners draw on a variety of knowledge sources when attempting to identify the meanings of unfamiliar words in written contexts. The use of multiple sources of clues to infer word meaning has been reported in several studies (e.g., Haastруп, 1991; Paribakht & Wesche 1997), leading to the development of different classification schemes.

Classification of Contextual Clues used in Lexical Inferencing

There has been a series of studies that set out to identify and classify the contextual clues learners use in processing unfamiliar words while reading (e.g., Ames, 1966; Carton, 1971; Fraser, 1997; Haastруп, 1991; Morrison, 1996; Paribakht & Wesche, 1999; Sternberg & Powell, 1983). These are described and discussed below.

Ames

Ames (1966) designed an introspective study in order to obtain a better understanding of the process of the use of verbal context as an aid in determining word meaning. Twelve advanced graduate students of education (native speakers of English) read selections from "The Saturday Evening Post" and the "Reader's Digest" and were asked to report what clues they actually used to make inferences about unfamiliar words. A classification scheme of

contextual aids containing 14 distinct categories was devised by the investigator in the study, as shown in Figure 1.

The Ames' (1966) classification contains a category of clues that relate to the structure of the text, which may be syntactic (II) or discorsal (III). At the syntactic level, the readers searched for grammatical cues in the clause and the sentence containing the target word. At the discourse level, the readers considered expressions of language functions, such as comparison and contrast, definition, cause-effect, question-answer and main idea-details. The author recognized considerable overlapping in the categories as they then existed and suggested that some categories may be much more useful than others, however, these categories were not specified.

- I. Clues Derived from Language Experience or Familiar Expressions
- II. Clues Utilizing Modifying Phrases or Clauses
- III. Clues Utilizing Definition or Description
- IV. Clues Provided Through Words Connected or in Series
- V. Comparison or Contrast Clues
- VI. Synonym Clues
- VII. Clues Provided by Tone, Setting and Mood of a Selection
- VIII. Referral Clues
- IX. Association Clues
- X. Clues Derived from the Main Idea and Supporting Details Pattern of Paragraph Organization
- XI. Clues Provided Through the Question-and-Answer Pattern of Paragraph Organization
- XII. Preposition Clues
- XIII. Clues Utilizing Non-Restrictive Clauses or Appositive Phrases
- XIV. Clues Derived From Cause and Effect Pattern of Paragraph and Sentence Organization.

(Ames, 1966, p. 66).

Figure 1. Classification scheme of contextual aids

Carton

In the early seventies a taxonomy of cues was established by Carton (1971) to help explore the functions of cues in inferencing in foreign language learning. He suggested three basic sources used when confronted with an unfamiliar word in a written text. These are: intralingual, interlingual and extra-lingual cues.

Intralingual cues are supplied by the target language. The learner who use them must, of course, have some knowledge of the target language. "Essentially, intralingual cues occur in the morphological and syntactic regularity of the language" (Carton 1971, p.52).

Interlingual cues include all the possible derivations that may be made on the basis of

loans between languages, the occurrence of cognates, and the occurrence of regularities of phonological transformations from one language to another.

Researchers found that the closer the target language is to the native language, the easier it is for learners to benefit from some of the similarities (e.g., the use of cognates) while guessing the meaning of unknown words in the target language (although this may often lead to misguesses) (Laufer, 1997). For example, where words from the two languages are similar in form but have different meanings, known as “false friends” (Laufer, 1997), interlingual cues could be more misleading than helpful due to the interference they cause when learners attempt to infer the meaning of unknown words (e.g., the word “rest” in English meaning to rest after work and the French “reste” meaning left over).

Extra-lingual or contextual cues derive their usefulness essentially from the fact that an important function of language is to represent objects and events in the ‘real world’ (Carton, 1971, p.54).

Learners normally bring to the inferencing task past experience as well as world knowledge. As argued by de Beaugrande (1980, cited in Haastруп, 1991), “the question of how people know what is going on in a text is a special case of the question of how people know what is going on in the world at all” (p.47).

Sternberg and Powell

Another L1 framework is that developed by Sternberg and Powell (1983) and Sternberg (1987). They provide a useful classification of the different kinds of contextual cues found in reading texts. Their proposed theory of learning-from-context distinguishes between the external and internal context of the unknown word. The major parts of their classification

are presented in Figure 2. The external context is categorized according to the kinds of semantic information available in the text surrounding the target word. They identified a total of eight cue types of this kind, whereas, the internal context is the morphological structure of the word: prefix, stem and suffix.

EXTERNAL CONTEXT	
Contextual cues Temporal cues	Cues regarding the duration or frequency of X (the unknown word) or when X can occur.
Spatial cues	Cues regarding the location of X, or possible location in which X can sometimes be found
Value cues	Cues regarding the worth or desirability of X, or the kinds of affects X arouses.
Stative description Cues	Cues regarding properties of X (such as size, shape, color, odor, feel)
Functional descriptive Cues	Cues regarding possible purposes of X, actions X can perform, or potential uses of X.
Causal enablement cues	Cues regarding possible causes of, or enabling conditions of, X.
Class membership cues	Cues regarding one or more classes to which X belongs, or other members of one or more classes of which X is a member.
Equivalence cues	Cues regarding the meaning of X, What does it compare or contrast to?
INTERNAL CONTEXT	
Contextual cues	
Prefix cues	
Stem cues	
Suffix cues	
Interactive cues (where two or three word parts convey information in combination)	
(Sternberg & Powell, 1983)	

Figure 2. Components of a theory of learning words from context

One important feature indicated by Sternberg and Powell (1983) is that for each kind of context, there is a set of mediating variables which determine how effectively the reader is able to make use of the cues that are available. For example, in the case of external context, an unknown word is more likely to be inferred if it occurs several times in a variety of contexts within the text, if it is an important word to understand and if the context provides useful cues. Regarding the mediating variables for internal context, they note that if there are a number of words in the text that can be analyzed internally into understandable morphemes, this would encourage the reader to apply this strategy where possible to unknown words. In addition to availability of contextual support, there are also factors that can influence the way those cues are used. Sternberg and Powell list

a number of “mediating variables,” such as extra word and text properties that may determine how effectively the information that lies in the context can be utilized. For example, lexical density, or the ratio of unknown to known words in a text, is one such variable. With respect to L2 learners, West (1941, cited in Laufer, 1992) suggests a ratio of no more than one unknown word to fifty known words (2%). Laufer (1989), argues that reading comprehension at an academic level requires 95% lexical coverage. Other variables include the general frequency of the unknown word, its frequency in the text (the more frequently an unknown word is used in the text the more attention it will get from the reader, thus forcing the reader to search for the meaning), the importance of the unknown word to understanding the context, the closeness of the contextual information to the unknown word, and the usefulness of prior knowledge (Brown, 1993). However, Brown found the general frequency to be more important than the frequency in a text and that it may make a difference as to whether a word is acquired or not.

Although Sternberg and Powell's (1983) classification is comprehensive, Ames's (1966) classification scheme contains a category of clues that relates to the structure of the text.

Haastrup

Haastrup (1991) studied the lexical inferencing procedures of Danish secondary school students learning English. Using pair-think-aloud processes to infer lexical meanings, and based on Carton's (1971) three level framework, she analyzed the clues her participants used from three main sources, and developed the taxonomy presented in Figure 3.

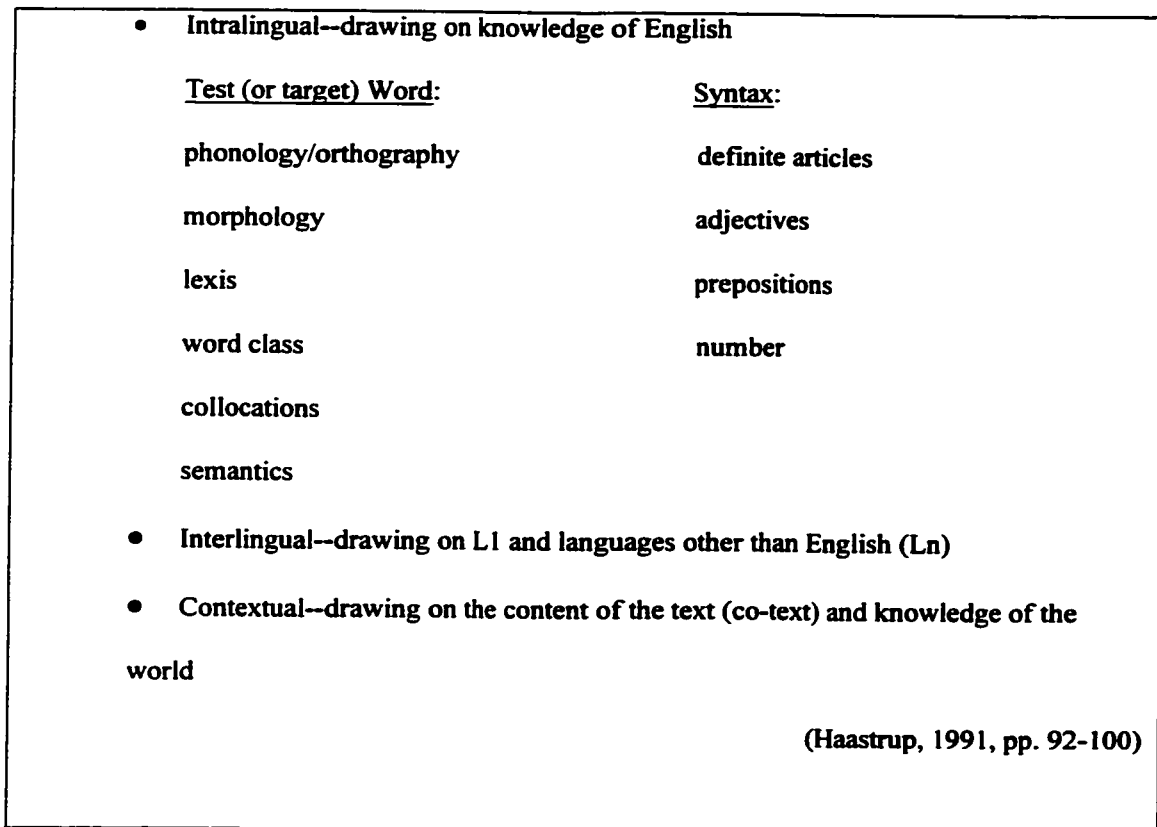


Figure 3. Framework for sources used to infer lexical meanings

Among the many findings from her study, Haastrup (1991) found that contextual knowledge (e.g., knowledge of co-text, the text where the test (target) word appears and knowledge of the world) was the most heavily used source. Intralingual knowledge ranked second, and interlingual knowledge was relatively infrequently used. At the subcategory level, the most heavily used knowledge sources were co-text, test word came as the second heavily used source and knowledge of the world was the third heavily used source. The least used of the sources identified were languages other than English (Ln) and syntax of the sentence containing the test word.

In a similar study, Morrison (1994, cited in Morrison, 1996) investigated the use of guessing strategies in reading comprehension by 20 FSL students. Morrison's results corroborated Haastrup's (1991) in terms of the frequencies of use of the main knowledge sources. It should be noted that Morrison's study was a partial replication of Haastrup's (1991) study, using pair-think-aloud processes to infer lexical meanings. She also noted that knowledge of the world and knowledge about the test word were the most frequently used sources.

Paribakht and Wesche

More recently, Paribakht and Wesche (1999) examined introspective verbal protocols of 10 intermediate ESL learners from a variety of L1 backgrounds. Knowledge sources and cues used by the learners in determining word meanings from written context were identified and a taxonomy of these cues was developed. They found that their learners used eight knowledge sources, as shown in Figure 4, and these were categorised as linguistic and extralinguistic.

Results from Paribakht and Wesche's (1999) study reveal that knowledge of sentence level grammar was the primary type used by their subjects as a group and by most individually. Other important sources were word morphology, punctuation and world knowledge. They also found that students often used multiple sources of information while guessing the meaning of a word (e.g., world knowledge and discourse knowledge). Their results also indicate that certain knowledge sources were used frequently by most learners whereas some were used only rarely and by a few learners. "There were notable individual differences in the knowledge sources used. These differences appeared to be related to individuals' previous L2 learning experience, their L1, and their familiarity with the text" (Paribakht & Wesche, 1999, p. 214).

Extralinguistic source	Linguistic sources	
	Major	Minor
World knowledge	Sentence level grammar	Discourse and text
	Word morphology	Homonyms
	Punctuation	Word associations
		Cognates
(Paribakht & Wesche, 1999)		

Figure 4. Knowledge sources and cues used to determine word meanings

Haastrup's (1991) taxonomy is comprehensive but rather complicated because of its three-level structure. Although Paribakht and Wesche's (1999) taxonomy is organized differently, their knowledge sources generally correspond to categories in Haastrup's taxonomy. The most noticeable difference between the two frameworks is that co-text knowledge, an important category in Haastrup's taxonomy, is not incorporated as a distinct

category in Paribakht and Wesche's taxonomy, nor is intra/inter a primary distinction.

In summary, there are specific types of knowledge sources and contextual cues that are used in inferencing, and cues can be helpful or not in guessing. Using the classification schemes with their different characteristics, and introduced in an historical order, studies have provided new insights into the process underlying L2 vocabulary acquisition, specifically with respect to knowledge sources and contextual cues that learners use in inferencing. Moreover, for effective guessing of words to take place, several studies have shown that the flexible application of a variety of strategies ranging from local ones (such as, graphemic identification) to global ones (such as the use of broader contextual meaning) is required (Huckin & Coady, 1999, p. 186). However, these studies suggest that more information is needed with regard to what clues are helpful in guessing and which are not. Therefore, researchers have attempted to investigate how and why learners succeed or fail to do so when inferencing. Some studies have highlighted main factors that may affect lexical inferencing success and the influence of these on word learning and retention, and a discussion of these follows.

Success in Lexical Inferencing

Research has highlighted a number of factors that may affect lexical inferencing success (Schmitt, 2000). It was emphasized earlier that the use of lexical processing strategies (Fraser, 1999), the importance of clear contextual cues (Dubin & Olshtain, 1993), and learners' use of knowledge sources are some of the factors that have been shown to influence inferencing success. However, the first language (e.g., the formal similarity of the new word to known words in L1) and learners' L2 proficiency have also been demonstrated to influence

success in L2 lexical inferencing (Haastrup, 1991; Haynes, 1993).

Several researchers (e.g., Bensoussan & Laufer, 1984; Haynes, 1993; Laufer & Sim, 1985) found that L2 learners very frequently make wrong guesses while reading. Wrong guesses generally resulted from: giving the wrong meaning to a word that had several meanings; translating the individual morphemes of a word (e.g., outline was misinterpreted as out of the line); mistranslating idioms (e.g., hit and miss, sit on the fence, a shot in the dark were translated literally, word by word); and, confusing the target word for one that looked or sounded similar (e.g., cute/acute, conceal/cancel, available/valuable) (Laufer, 1997).

Research has also identified other factors that may have an influence on lexical inferencing procedures. Paribakht and Wesche (1997; 1999) found that a number of factors, including task, in addition to text and word characteristics, seem to mediate learners' attempts at inferencing and the knowledge sources they use. Overall, it was found that the most influential factor in learners' attempts at inferencing and the knowledge sources they used was the comprehension task, in this case, either to answer comprehension questions or the summary task, where they had to orally summarize the paragraphs they read. The learners dealt with more words when doing the summary task (i.e., more words became salient) than in the comprehension question task, for which they concentrated on what they thought were key words.

Other researchers have shown the effect of learner/reader factors, and language factors (Carton, 1971; Haastrup, 1991) in inferencing success. Learner factors that may have an influence on lexical inferencing include L2 proficiency, which does not exclude the influence of other factors, such as reading proficiency in the L1, as well as intelligence and problem

solving skills (Haastrup, 1991).

Success and effectiveness of L2 inferencing also depends on how and when it is applied (Fraser, 1997). Fraser's subjects were generally successful in determining word meaning that was adequate for text comprehension when using both inferencing and consulting. The strategic use of inferencing in reading implies selectively inferring only some unknown words, ignoring those whose absence will not hinder comprehension (Parry, 1993) or words that can be looked up easily in a dictionary (Haynes, 1984). Moreover, individual differences, including factors such as age, gender, personality characteristics, cognitive style, motivation and attitude, are likely to have an effect on whether a L2 learner can infer successfully or not (Haastrup, 1991). Whether the learner attempts to determine a word's meaning will be strongly influenced by learner perception of text difficulty or of the possibility of inferring the meaning of a given word based on textual cues and previous knowledge.

One can also argue that the inability to correctly guess the meaning of an unknown word from a text does not help in the development of new lexical knowledge when reading. Laufer (1997) attributes this to four possible factors: availability of cues; familiarity with cues; presence of misleading cues; and, compatibility of schemata. The first factor, availability of cues, acknowledges that cues are not always present in the text. Second, familiarity with the cue words, refers to when clues are available but the reader will not necessarily be able to use them. Only if the cue-containing words are understood will readers be able to employ them. The presence of misleading cues, the third factor, means that not everything that looks right in context is necessarily right. Yet the learner who has been taught

not to worry about the precise meaning of words may remain satisfied with whatever makes sense in context, whether it is right or wrong. The last factor, compatibility between the reader's schemata and the text content refers to an effect of background knowledge that is so strong in some cases that it overrides lexical and other clues. It should be noted, however, that limitations to students' vocabulary knowledge may increase the difficulty of guessing the correct meanings of unknown words in context (Haynes, 1993) and consequently hinder the ability to learn new lexical items.

Lexical Inferencing and Vocabulary Learning

Research has shown that lexical inferencing plays a crucial role in L1 vocabulary learning. However, it appears that there is a lack of consensus in terms of how useful inferencing is for L2 vocabulary acquisition. Some researchers have found that it can significantly aid learning of new vocabulary (Haastrup, 1989, 1991; Schouten-van Parreren, 1989). Others have revealed that inferencing is not always an efficient, nor easy strategy for L2 students to use, and that readers often infer the wrong meaning of a word, and hence may learn words incorrectly (Bensoussan & Laufer, 1984; Dubin & Olshtain, 1993; Haynes, 1993; Hulstijn, 1992). Even if a learner successfully infers new meanings while reading, it does not mean that he or she will necessarily acquire knowledge of the words. Most often a reader can guess the meaning of an unknown word for immediate comprehension purposes without retaining any long term memory of that meaning or its form once the reading task is over. As Paribakht and Wesche (1999) put it, "if successful, inferencing can serve briefly for purposes of immediate comprehension in a listening, interaction, or reading context, and under favorable conditions may lead to retention of the word form as well as semantic and other

lexical information” (p. 199).

Other researchers (Nation, 1990; Nation & Coady, 1988) have suggested that new words are best learned when presented in texts and when their meanings must be inferred from the context. It has also been suggested that the thinking process of inferring word meanings can lead not only to the comprehension of new words in context, but also to their integration into the learners’ vocabulary (Honeyfield, 1977; Li, 1988). Hulstijn (1992) notes that:

this point of view is based on two assumptions: when subjects have to infer or induce the solution of a problem, they will invest more mental effort than when they are given the solution to the problem, and information that has been attained with more mental effort can later be retrieved and recalled than information that has been attained with less effort. (p. 113)

Hulstijn states that on the basis of these assumptions, one could construct a “mental effort” hypothesis, which predicts that the retention of an inferred word meaning will be higher than the retention of a given word meaning.

According to Schmitt and Schmitt (1995), “the depth of processing hypothesis states that mental activities which require more elaborate thought, manipulation, or processing of a new word will help in the learning of that word” (p. 135). However, the integration of the word into a broader lexical network is needed in order for that word to be remembered: “For long-term recall, the successful learner not only can analyze and rehearse the new word and its meanings, but also can elaborate the word-meaning complex and establish it within a suitable network of meaning” (Lawson & Hogben, 1996, p. 104). Therefore, guessing a word from

context does not necessarily mean that it will be remembered or learned. Moreover, as Nation and Coady (1988) point out:

The very redundancy or richness of information in a given context which enables a reader to guess an unknown word successfully could also predict that that same reader is less likely to learn the word because he or she was able to comprehend the text without knowing the word. (p. 101)

If a word is easy to guess, then it will be dealt with quickly, with a minimum amount of mental processing to carry on reading. This type of shallow processing may not guarantee that the word is retained.

A study by Mondria and Wit-de Boer (1991) investigated the issue of lexical inferencing and vocabulary learning directly. They wanted to test Schouten-van Parreren's theory that guessing unknown words presented in context (especially a "pregnant" one, offering a range of clues) is an effective means of vocabulary learning. The theory was that the cognitive activity generated by guessing would create useful associations for the word and, in addition, the learner would gain positive feedback from verifying that the guess was correct. For their research with Dutch learners of French, Mondria and Wit-de Boer used eight target words and wrote series of sentences in which the pregnancy of the context was systematically varied. An example of a pregnant sentence (with the English translation) was:

Le jardinier remplit un arrosoir pour donner de l'eau aux plantes.

(The gardener filled a watering can to water the plants.)

By contrast, a non-pregnant sentence for the same word was:

Je cherche un arrosoir pour finir mon travail.

(I am looking for a watering can so I can finish my work.)

They found that subjects who were presented with the words in a pregnant context were significantly better at guessing what they meant than those who did not get the contextual cues. However, when the learners were tested for their retention of the target words' meanings a few days later, the pattern was reversed: the learners who had the non-pregnant sentence remembered the words they had guessed better. The researchers suggest that having contextual cues available made it easy for the learners to understand the word and did not encourage them to put any effort into making a mental association between the word form and its meaning which could be applied in other contexts. However, if there are not enough clues available in a text, and the guessing requires more processing, is pursued and is successful, then the word is more likely to be remembered. Thus guessability and retainability may have an inverse relationship (Mondria & Wit-de Boer, 1991). Their results support the view of Haastrup (1991), that the rich context that may enhance inferring word meaning may not be conducive for vocabulary learning. However, the artificial nature of the sentences and the small number of target words in this experiment made the generalizability of the findings limited. This suggests that the issue of inferencing while reading, and its effect on L2 vocabulary learning, is another area that requires further investigation (Read, 2000).

Role of Reading Proficiency in Lexical Inferencing

Researchers have been interested in the role that different levels of learners' L2 reading proficiency plays in their lexical inferencing from written input (e.g., Bensoussan & Laufer, 1984; Bialystok, 1983; dos Santos & Sanpedro Ramos, 1993; Fraser, 1997, 1999; Haastrup, 1989, 1990, 1991; Haynes, 1993; Laufer, 1992; Morrison, 1994).

Both Haastrup (1991) and Haynes (1993) argue that unless learners have reached a certain proficiency level they will not be able to achieve much success in lexical inferencing. If the L2 reader has limited vocabulary knowledge in the target language, a large number of unknown words may be encountered and, consequently, the reader may be unable to use contextual cues available in the text because such cues are themselves unknown. Haastrup (1990, 1991) also notes that beyond a threshold level, major differences in target language proficiency have an important role to play in inferencing and that proficiency level in the target language is often critical for making successful lexical inferences. However, very few studies have focused on the role of L2 reading proficiency on lexical inferencing.

One of the studies that investigated this issue directly is Haastrup's (1989, 1991), which involved the inferencing procedures of higher and lower L2 proficiency learners. She examined the lexical inferencing procedures of Danish speakers of English at two proficiency levels and the knowledge sources they used when carrying out inferencing tasks. The use of information from different linguistic levels (e.g., the level of context, semantics, morphology and orthography) in the inferencing task was also investigated.

Haastrup's (1991) analysis of the characteristic differences between high proficiency and low proficiency learners revealed that L2 proficiency is a decisive factor in lexical inferencing procedures. She found that there is a threshold level for meaningful guessing, that a learner's proficiency level in the target language is often critical for making successful lexical inferences, and that high proficiency L2 learners usually make more successful guesses than low proficiency learners do. Her research distinguished between holistic inferencing or "prediction on the basis of context, which typically involves the drawing on knowledge of the

world in the form of schematic or conceptual knowledge” (1991, p. 124), and analytic processing that is based on some analysis of the linguistic features of the target word. Results from the study in general indicated that both groups were able to make almost equal use of contextual (i.e., co-text and world knowledge) and L1 sources. However, for both groups, contextual cues were the most dominating source. Haastrup also found that her higher proficiency group surpassed the lower group with respect to the use of intralingual and Ln (Ln refers to other languages) sources. She states that this finding suggests a route of development that starts with contextual and L1 cues, and moves toward L2 and Ln cues. However, high proficiency learners showed more flexibility in using varied inferencing processes (e.g., the use of holistic and analytic inferencing, often interactively) to better exploit the cues available in different word contexts. For example, higher proficiency readers were more able to use certain linguistic cues such as suffixes and prefixes while their lower counterparts were limited to using word stems.

In an earlier study, Haynes (1993) observed how ESL readers from different L1 backgrounds (e.g., Spanish, Arabic, and Japanese), and with high and low proficiency in English, guessed at unfamiliar words after they had read and recounted two short passages. Her goal was to find out whether the students could guess successfully, in which situations they were most likely to succeed, what information they used in making their guesses and whether students from different language backgrounds guessed differently. She found that lack of vocabulary knowledge was a major factor that hindered learners from performing lexical guessing tasks satisfactorily, and that attending to word form was a popular strategy among her learners, but mismatches often occurred, especially with learners at lower

proficiency levels. Haynes argues that much more experimentation and observation is needed to understand guessing processes, particularly as they differ among students of different language backgrounds. She subsequently suggested some of the factors affecting the guessing process:

- ESL readers are good guessers when the context contains immediate cues.
- Insufficient context, or global cues, or a student's lack of vocabulary knowledge, may increase the difficulty of guessing.
- Graphemic cues (in cognates, analyzed words, and mismatches) are highly salient and may override syntactic cues.
- ESL readers are often uncertain as to whether a word is familiar or not and thus must attend to word structure before deciding to skip or guess.

Morrison (1994, cited in Morrison, 1996) investigated the use of guessing strategies in reading comprehension by 20 students, for whom French is a second language. She found that high proficiency learners were more successful (60% correct) than the low proficiency learners (25% correct) at correctly guessing the meaning of unfamiliar words. She argued that this sometimes could be due to limited lexical knowledge which, according to Laufer (1990) and Nation (1993) is a definite problem in the comprehension of a written text. Her study confirmed many of the results and conclusions presented by Haynes (1993). Attending to word shape (i.e., what the word looks like) was a favorite strategy among the ESL learners, but mismatches often happened, especially at the lower proficiency levels. In her study, lower proficiency learners often tended to guess based on written or spoken form similarities to other L1 or L2 words they were familiar with.

In her study of lexical processing strategies used by university students in L2 reading, Fraser (1997, 1999) found that both lower and higher proficiency groups used inferencing as their primary lexical processing strategy, but that the higher proficiency students inferred more frequently. She suggests higher proficiency readers have a knowledge base or processing capability that distinguishes them from lower proficiency readers. However, Fraser (1999) found that differences in L2 reading proficiency level did not affect the retention of the meaning of new words encountered while reading.

Role of the Native Language in Lexical Inferencing

Researchers have confirmed that various aspects of linguistic and metalinguistic knowledge, as well as learners' processing procedures, are transferred from L1 in both oral and written forms of L2 production and comprehension (Gass, 1987; Kellerman & Sharwood Smith, 1986; Koda, 1997; Paribakht & Wesche, 1999). Due to differences in writing systems among languages, word processing strategies used by L2 readers may vary according to the orthography of learners' native languages.

Characteristics of language

Languages are classified into three groups according to their orthographic systems--logographic, syllabic and alphabetic (Schmitt, 2000). A logograph is a meaning-based script in which characters or strokes represent meanings or morphemes. For example, Chinese and Japanese Kanji characters are logographic scripts and do not have systematic relationships between sound and symbol (see Chikamatsu, 1996 and Koda, 1997). In (logographic) such systems (e.g., the Chinese writing system), the grapheme (smallest unit in a writing system) represents a concept. In syllabic systems, the grapheme represents syllables as in the Japanese

Kana. In the alphabetic systems each grapheme represents a phoneme (the smallest unit of sound that can distinguish two words, e.g., pan and ban) as in English, French and other Indo-European languages, as well as Arabic, a Semitic language. Furthermore, the alphabetic languages differ in the consistency of their relative sound-symbol correspondence. Very few studies have been conducted on the effect of learners' native language (NL) knowledge (linguistic, semantic and phonological) as well as its orthography on L2 vocabulary acquisition.

Although there have been many studies on the English writing system, insufficient attention has been given to the question of how readers whose native language uses a non-Roman script deal with decoding writing (Randall & Meara, 1988). Previous research findings suggest that L2 learners' multiple sets of linguistic knowledge and processing skills interact during L2 comprehension (Koda, 1993), and prior orthographic experience has a strong effect on the development of L2 lexical processing skills and strategies (e.g., Brown & Haynes, 1985; Green & Meara, 1987; Koda, 1988, 1990). For example, Chinese and Arabic speakers would find it relatively more difficult than French or Spanish speakers to infer the meaning of unknown words when reading English texts simply because Arabic and Chinese have a different orthography. Moreover, knowledge of L1 vocabulary and of other languages that learners may have acquired are a possible source of clues that L2 readers can use when guessing the meaning of unknown words (Laufer, 1997), especially if the two languages are related or one has extensively borrowed lexical items (e.g., English and French) from the other (Schmitt, 2000). The closer the target language is to the native language, the easier it is for the learners to benefit from some of the similarities (e.g., the use of cognates) while

guessing the meaning of unknown words. However, false friends may be a source of wrong guesses, although Tréville (1996) states that:

The proportion of false friends among English-French cognates is no greater than ten percent, while approximately ninety percent constitute “good friends”: that is, words sharing the same, or a similar form and having at least one of their senses in common.
(p. 174)

Similar to Laufer (1997), however, Fraser (1999) states that the potential for L1 cognate associations can be especially misleading. This was highlighted in her study by the dramatically fluctuating success rates of the learners when inferencing using L1-based word identification processes. Nonetheless, when languages have less common ground, word forms will generally be quite different; more information about word meaning and use has to be acquired from scratch.

Randall and Meara (1988) studied native Arabic speakers’ orthographic search functions involving Arabic or Roman letters. They found that Arabic speakers react to Roman letters in the same way as they react to Arabic letters, however, no description is provided (See Appendix A for the Arabic alphabet). Although they argue it is different from the way native English speakers react to Roman letters, the authors do not show exactly how or why such differences exist.

Studies have shown that mental translation is a common cognitive strategy for high school and adult L2 language learners (e.g., Chamot & Kupper, 1989; Kern, 1994). When ESL/EFL learners attempt to process L2 written input they tend to rely on mental translation, the “mental reprocessing of L2 words, phrases, or sentences in L1 forms while reading L2

texts” (Kern, 1994, p. 442). In fact, the L1 is never switched off when processing the L2 (Cook, 1992). Furthermore, Cohen (1995) and Upton (1998) suggest that many L2 readers use the L1 for more than mental translation. It appears that they use the L1 to think about and process information that is being read in the L2. In other words “they appear to tap their L1 to help them wrestle with and reflect on meaning as they process a L2 text” (Cohen, personal communication, March 2000).

According to Cook (1992), the L2 must not be treated in isolation from the L1. He argues that “The L1 is present in the L2 learners’ minds, whether the teacher wants it to be there or not. The L2 knowledge that is being created in them is connected in all sorts of ways with their L1 knowledge” (Cook, p. 584). Studies in this area have not yet examined the role of the Arabic language on L2 learners’ lexical inferencing in English. Therefore, it remains unknown what role the native language plays in Arabic speakers’ L2 lexical inferencing while reading.

Furthermore, research has indicated that L2 readers normally transfer their L1 reading processing skills when processing L2 text (e.g., Koda, 1997). In addition, researchers contend that L1 writing systems have a long-lasting effect on the way L2 written materials are processed. For example, Green and Meara (1987) found that three different groups of ESL learners (Arabic, Chinese and Spanish) utilized different visual processing strategies when pursuing the search task in their L1s and that, when performing the task in their L2, all subjects used visual search strategies similar to those used in their respective L1s.

Other studies provide further support for processing transfer. Koda (1988, 1990) compared phonological decoding strategies of ESL learners with contrasting L1 orthographic,

phonographic (Arabic, Spanish) and logographic (Japanese) backgrounds. She found that when phonological information is masked in the visual configuration, the performance of alphabetic (Arabic) L1 readers is seriously impaired. However, phonological inaccessibility has no effect on logographic L1 readers, suggesting that their processing is heavily dependent on L1-based processing. Her findings thus support those of Green and Meara (1987).

Characteristics of Arabic

In this study, Arabic is the learners' native language. Given that this study will examine the effect of the participants' knowledge of Arabic on their L2 lexical inferencing, a brief description is provided to illustrate some of the differences and similarities between Arabic and English, the target language.

Arabic, a Semitic language, is typologically different from English, an Indo-European language. They also have different writing systems. Arabic speakers must learn an entirely new alphabet for English, including a capital letter system, and also master its rather unconventional spelling patterns. In addition, Arabic is similar in grammatical structure to Aramaic, Hebrew and Ethiopian and has a very different grammatical system from English (e.g., in terms of word order and punctuation conventions). It is expected that such differences will influence the types and proportions of knowledge sources Arabic speakers may draw on in the process of lexical inferencing. For example, while French speakers may be able to use their knowledge of cognates, Arabic speakers will not have such an advantage. Arabic words do not resemble English words orthographically. Furthermore, research on contrastive rhetoric establishes that the discourse patterns of texts in languages, such as Japanese and Arabic, differ from common patterns in English (Hinds, 1983) and this may also have an effect on the

way Arabic-speaking ESL learners deal with unfamiliar words in a text.

Summary

In recent years, researchers have paid a great deal of attention to vocabulary learning and have in particular focused on lexical inferencing processes of L2 readers. More specifically, they have investigated what knowledge sources learners use to make inferences, factors that affect inferencing, the effect of inferencing on reading and vocabulary learning, and the effect of L2 proficiency on success in inferencing. Research that examines how L2 learners approach unknown words in a text is necessary for mainly two reasons. Because the struggle to uncover the meanings of unknown words while reading is a central part of reading comprehension, it will help to better understand some of the problems L2 learners face in reading; and, it may provide insight into the vocabulary acquisition process.

The effect of reading proficiency on lexical inferencing in terms of knowledge sources and different contextual cues used in the process also requires further investigation. Moreover, relatively little is known in terms of success in comprehending new words in context as well as the acquisition and retention of previously unknown vocabulary through inferencing. In addition, research on lexical inferencing has primarily focused on the use of linguistic resources by L2 learners. As yet, relatively little work has been done on the role of the learner's L1 on L2 lexical inferencing, particularly in cases where learners' L1 (e.g., Arabic) is typologically different from the target language. Therefore, based on the literature review the following research questions guided this study:

Research Questions

1. How do Libyan medical students infer the meaning of unknown words while reading English texts? More specifically,
 - a) what kind of knowledge sources and context clues do they access to guess the meaning of unfamiliar words?
 - b) what, if any, effect does their knowledge of the Arabic language have on their lexical inferencing while reading in English?

2. What is the role of learners' reading proficiency level on their lexical inferencing in terms of:
 - a) their knowledge sources and context clues they use in the process;
 - b) their rate of success in inferring the correct meaning of unfamiliar words; and,
 - c) their rate of learning and retention of previously unknown words.

CHAPTER THREE:

Methodology

“Here is Edward Bear coming downstairs now, bump, bump, bump on the back of his head. . . . It is, as far as he knows, the only way of coming downstairs, but sometimes he feels that there really is another way, if only he could stop bumping for a moment and think about it.”

(A. A. Milne, Winnie the Pooh, 1929, p. 1)

Overview

This study employed introspective methods of data collection. In order to establish a rationale for using introspective methods, this chapter explains the research methodology adopted in investigating the process of how Libyan medical students inferred unknown word meanings while reading. It begins with a description of introspective methods, distinguishing the different types, and outlining the advantages and limitations of such methods. The types of methods used in this study are then introduced, and these are followed by a description of the selection of the participants, data collection instruments and data collection procedures. A summary of the research design is included. A detailed description of the think-aloud training session and the individual research interviews are presented, and the chapter concludes with a description of data analysis procedures.

Introspection as a Research Method

“Introspective methods” covers terms such as thinking-aloud and retrospection Faerch

and Kasper (1987). They describe introspective methods as collecting “informants’ own statements about the ways they organize and process information, as an alternative or supplement to inferring their thoughts from behavioral events” (p. 9). They also refer to the resulting data as “verbal reports/think-aloud data/protocols.”

Verbal reports are classified into two forms, concurrent and retrospective, and are based on two dimensions: time of verbalization (i.e., during or after a task) and the relation between heeded and verbalized information (Ericsson & Simon, 1984, p. 12). Concurrent verbal reporting, or thinking-aloud, requires research subjects to report orally to the researcher about the processes they are engaged in while performing a cognitive or linguistic task (Cohen, 1996; Cohen & Hosenfeld, 1981; Mann, 1982; O’Malley & Chamot, 1990). Thus the informant provides think-aloud protocols while information is still in short-term memory. In other words, subjects tell the researcher what they are thinking and doing (i.e., everything that comes to mind) while performing a specific task. Thinking aloud, as Vandergrift (1995) observes, is a form of introspection which “encourages students to reveal specific steps in their thought processes”(p. 90).

In retrospective reporting, verbalization usually occurs just after a task is completed (immediate retrospection), and subjects are asked to make more explicit what they had hinted at earlier. This serves the purpose of elaborating on what was said or done while performing the task. In other cases, retrospective reports are given hours, days or even weeks after a given task (delayed retrospection), or they may sometimes be unrelated to any specific task (e.g., based on learner’s past learning experience in general). The three major techniques for eliciting retrospective verbal reports that have been successfully used in L2 research are

interviews, questionnaires and diaries (Matsumoto, 1994).

Cohen (1984, 1987, 1996) distinguishes three categories of verbal report data: self-report, self-observation, and self-revelation. In his classification, self-report data can be gathered from questionnaires that ask learners to report on the way they learn and use language. Self-observation implies reference to actual instances of language learning or use (e.g., entries in journals or diaries that retrospectively describe language learning or language use events). Cohen (1984) also notes that self-revelation or think-aloud data are available at the time the language learning or use events are taking place, and data imply that the learner is describing, for example, the struggle to infer the meaning of an unknown word, and not attempting to analyze this struggle. Cohen views thoughts that are analyzed immediately after the event as introspective self-observation; for example, “Now, does the ‘it’ here refer to the ‘dog’ or to the ‘bag’? Let me see...” Thus, think-aloud data are considered self-revelatory and thus unanalyzed, whereas, retrospective protocols produced just after the target task might be more self-observational and thus somewhat analytic (Anderson & Vandergrift, 1996).

Advantages of Introspective Methods

Some researchers claim that verbal reports can provide insights into students’ cognitive processes (Ericsson & Simon, 1987) and argue that they remain a very useful way of obtaining data (Haastrup, 1987). According to Faerch and Kasper (1987), “there is now sufficient experience to offer suggestions for how and why to adopt these methods and just as importantly, when and how not to!” (p. 1). Perhaps that is why Ericsson and Simon (1995) state: “It is now time for verbal reports to reassume their position as a rich source of data, combinable with other data, that can be of greatest value in providing an integrated and full

account of cognitive processes and structures” (p. 373).

The use of verbal report protocols has played an important role in a number of L2 acquisition studies as well as research studies on language learning strategies. They have been used as a way of tapping learners’ cognitive processes involved in L2 use or L2 learning (Ericsson & Simon, 1987; Matsumoto, 1994; Paribakht & Wesche, 1999), in the analysis of language processing and translation, in determining learners’ lexical inferencing procedures, and in the investigation of foreign language reading performance. They have also been used in the study of testing procedures and in teacher training. In relation to L2 learning, the use of verbal report procedures has not been very extensive. However, immediate retrospective verbal report has, for example, aided in describing strategies used in learning vocabulary by association (e.g., through mnemonic keywords) (Cohen, 1990; Cohen & Aphek, 1981). Such descriptions can provide information about vocabulary learning processes, regardless of whether or not the learner provides a correct retrieval of the vocabulary item (Cohen & Scott, 1996). With respect to language use, the think-aloud method has broadened the scope of what is described in text processing by providing insights into the use of knowledge in text comprehension and into other comprehension processes (Waern, 1988). Furthermore, many insights have been gained about L2 learning strategies from learner data provided before, during and after performing language learning tasks or language use tasks (Cohen & Scott, 1996). Such protocols have allowed researchers to focus more on the ongoing process of language learning rather than on the language product (Anderson & Vandergrift, 1996).

Limitations of Introspective Methods

Unfortunately, no method is without its pitfalls. The use of verbal report protocols has

been criticized by some researchers, for example, because of their intrusive effect. In reading research, immediate retrospection may distort the process of reading if the readers read more closely than normal, read sentence by sentence, or concentrate on an additional cognitive or meta-cognitive task (Mann, 1982). Some note that much of cognitive processing is inaccessible because it is unconscious and that when using verbal report methods, students have more limited opportunities for engaging in planning for learning and reflecting on their degree of success after task completion (O'Malley & Chamot, 1993). When using verbal reports, results may vary depending on the characteristics of the participants involved, such as their verbal skills (i.e., verbal facility). Learners vary in their ability to introspect and report their thoughts as well as in their willingness to do so (Paribakht & Wesche, 1999). Some participants may be more able than others to supply the appropriate amount of verbal report data at the appropriate level of specificity. This can especially cause problems if, for example, people are asked to report on information in their L2 (Cohen, 1996; Matsumoto, 1994). Even when reporting in the L1, subjects may experience difficulty in verbalizing their thoughts due to personality factors and because they are not accustomed to expressing certain thoughts or ideas as these occur to them. (Difficulty expressing thoughts verbally may also be due to cultural factors.) Moreover, when respondents do a task in the target language and report on it in their L1, there might be a danger of information being lost due to limits of memory capacity or to other factors, such as inexact translation of thoughts.

In spite of these limitations, the use of introspective methods of data collection can provide a rich source of data that is otherwise inaccessible to observation, and it appears to be gaining popularity among researchers. Ericsson and Simon (1980) state that:

Verbal reports, elicited with care and interpreted with full understanding of the circumstances under which they are obtained, are a valuable and thoroughly reliable source of information about cognitive process. They describe human behavior that is as readily interpreted as any other human behavior. (p. 247)

Furthermore, “there is no other way to access learners’ thoughts and perceptions” (Paribakht & Wesche, 1999, p. 216).

To minimize any concerns about the use of think-aloud verbal reports and other related formats, one can take precautionary measures. Researchers claim that students need to learn through training how to “think aloud” so that they can provide useful data (O’Malley & Chamot, 1990). Anderson and Vandergrift (1996), for example, provide helpful suggestions on how to help learners produce useful and accurate reports. They recommend that researchers provide the learners with practice sessions to familiarize them with think-aloud procedures in order to obtain richer data.

To conclude, and for the reasons given above, think-aloud protocols together with retrospective data collection techniques appeared to be the most appropriate data collection method to use for the purposes of this study. As Pressley and Afflerbach (1995) put it, verbal reports are “a maturing methodology with much interesting work already accomplished and considerable work to be done” (p.1).

In this study, think-aloud data, considered the primary data, focused on how participants inferred on their own without detailed instructions or questioning. This procedure was supplemented by a retrospective interview immediately following completion of a given task. The main aim of the retrospective interview was to obtain additional information on the

participants' thinking processes during the thinking aloud which could be later used to confirm the interpretations of the verbal reports, thereby improving the reliability of the protocol analysis (Haastrup, 1991).

Participants and Selection

"How do experienced adult readers identify words? The answer to this question may appear so obvious to the intelligent layman that research is beside the point. As one of our physicist colleagues put it, 'Well, you just see the word, and then you know it.' There is nothing wrong with this answer as far as it goes; the catch is that we would like to understand how the 'seeing' and the 'knowing' are accomplished."

(Besner & Johnston, 1989, p. 291)

The participants in this study were Libyan university students between the ages of 22 and 25 years, female and male, from Al-Fateh University, Faculty of Medicine in the capital city area, Tripoli. This Faculty was founded in 1969, and the number of students currently enrolled in this faculty is 2,000. Although the participants' L1 is Arabic, all study materials for these students are in English. It should be noted that these students have had about 3 to 4 years of English language instruction (secondary & pre-medical school) and 4 to 5 years of university instruction where the medium of instruction is mainly English. Most students in this context have very little, if any, knowledge of other foreign languages.

The process of recruiting participants for the study started after permission was obtained from the Dean of the Medical School and the Dean of the Faculty of Languages,

where the researcher is a staff member. The researcher was assured of collaboration with some of the professors at the Faculty of Medicine in recruiting participants and facilitating data collection procedures (e.g., finding locations for the various research sessions). At the beginning of June 1998, students in the 4th, 5th and 6th years were informed about the study. Professors in the Medical School announced the study in their classes and helped distribute to the students the consent form with the attached letter of recruitment detailing the purpose of the study, the requirements of the participants, the methods of maintaining confidentiality, the rights of the participants to withdraw at any time, and the name of the researcher and her institutional affiliation (see Appendices B and C). Arrangements were made for the researcher to visit the students in their lecture rooms at the beginning of a class in order to introduce herself and briefly talk about the study and its potential contribution to the field, and to answer their questions. Those willing to volunteer were asked to take an English reading proficiency test a few days later. In order to remind students about the study, posters in Arabic featuring the date and place of the English test were also placed in the Faculty.

Sixty-two students volunteered to take the test. Test scores ranged from 46 to 78 for the two groups. Ten advanced and 10 intermediate students were randomly selected to take part in the actual study. To select two distinct levels of reading proficiency, participants who scored 46-61 (proficiency band 3–3.5 on the CanTEST scale of 5) were considered intermediate level and those who scored 70 and above (bands 4–5) were considered advanced level (See Appendix D for CanTEST levels of performance). Scores for the advanced group ranged from 70 to 78 (mean of 74.7) and those of the intermediate group from 53 to 62 (mean of 58.2) (see Appendix E). The 42 subjects who were not selected for the study received a

brief summary of the general results of the reading test. The summary included the participants' scores on the test, reasons for trimming the sample and an explanation of the final selection of the 20 participants. At the time of the data collection, the selected participants were located in three different areas of the city according to their program of study (i.e., the Eye Hospital, the Medical School and Tripoli Central Hospital).

Data Collection Instruments

The following instruments were used for selection of the participants and for data collection:

1. The Canadian Test of English for Scholars and Trainees (CanTEST): Reading Test
2. Vocabulary Knowledge Tests
 - a. Vocabulary Levels Test (Nation 1990)
 - b. Vocabulary Knowledge Scale (VKS) (Appendix F)
3. A Background Questionnaire (Appendix G)
4. A Reading Text (Appendix H)
5. Target Words (Appendix I)

The instruments used are further described below, and a rationale for their use is included.

The CanTEST

The reading test of the Canadian Test of English for Scholars and Trainees (CanTEST) was used for assessment of the participants' reading proficiency level. The CanTEST was selected because it is a recognized, standardized test of English language proficiency. It has

been used in Canada and in other countries to assess the academic English language proficiency of a population similar to the one in this study (i.e., adult university ESL/EFL students and graduate students who wish to study in Canada). The CanTEST was developed and validated at the Second Language Institute of the University of Ottawa, and is currently used by a number of institutions worldwide for student admission purposes (Des Brisay & Laurier, 1991). The high correlation between the CanTEST and the TOEFL, an already well established measure of English language proficiency, illustrates the criterion-related validity of the CanTEST (Des Brisay, 1994). The combined reading sections (Skimming and Scanning, Reading Comprehension and Cloze) for version A92 used in this study produced a reliability coefficient of alpha .87 in 121 cases (Des Brisay, 1994). The categories for advanced and intermediate status for this version are:

Proficiency Band	Test Score
3.0	46 - 53
3.5	54 - 61
4.0	62 - 69
4.5	70 - 77
5.0	78 plus

Although the CanTEST measures language learners' reading, writing, listening and speaking skills, only the reading sub-section of the test was used. The reading sub-section of the test has three parts. In the Skimming and Scanning section, students have 15 minutes to complete 20 short answer items for which they must either fill in a blank or complete a chart

by writing a number, a word, a name, or a short phrase. The Reading Comprehension section includes three texts of varying length (up to 650 words) and students have to answer 25 multiple choice questions. In the Cloze section, students must fill in blanks in a written text, selecting one of four words given as possible answers for each blank. To complete the Reading Comprehension and the Cloze sections, students have a total of 60 minutes.

Vocabulary Knowledge Tests

Two vocabulary tests were administered to measure initial levels, word learning and retention.

Vocabulary Levels Test.

The Vocabulary Levels Test (Nation, 1990) is widely used in academic and other settings by L2 researchers as a measure of English vocabulary size (e.g., Laufer, 1992, 1996; Yu, 1996). It consists of words selected from five different frequency bands or word levels (2000, 3000, 5000, University and 10,000). Each level has six items, and for each item, the test taker is required to match three definitions with three of the six words listed. An example, taken from the instruction part of the test (Nation, 1990), is given below:

1	business	
2	clock	
3	horse	----- part of a house
4	pencil	----- animal with four legs
5	shoe	----- something used for writing
6	wall	

The words at each level of the test were selected “so that they would be representative of all the words at that level” (Nation, 1983, p. 14.). Overall, 36 words are tested, 18 from each frequency band. The maximum score possible is 90. The test has been found to distinguish between different levels of vocabulary knowledge in ESL learners taking English for Academic Purposes (EAP) courses and it has also been used in previous studies of L2 vocabulary acquisition (e.g., Fraser, 1997). Participants have about 20 minutes to complete the test.

The validity of the test was investigated by Read (1988) who analyzed the results of 81 students who took the test during a 3-month intensive course in English for academic purposes. In his analysis, the scores from the beginning of the course yielded a coefficient of 0.90, with the five frequency levels in their original order. For end of course scores he obtained the best scalability, 0.84, by reversing the order of the 5000 and the University levels (Read, 2000). It should be noted that, according to Hatch and Farhady (1982), the coefficient should be well above 0.60 if the scores are to be considered scalable. “Thus the statistics showed a high degree of implicational scaling, but by no means a perfect one” (Read, 2000, p.

123).

Vocabulary Knowledge Scale (VKS).

The Vocabulary Knowledge Scale (VKS) (Paribakht & Wesche, 1993, 1997; Wesche & Paribakht, 1996) is a practical instrument for use in studies of initial recognition and learning of new words and has been used in various research studies (e.g., Baltova, 1998; Fraser, 1996, 1997; Joe, 1995, 1998; Qian, 1998). It is used to determine learners' depth of knowledge of given words ranging from total unfamiliarity to the ability to use the word with semantic and syntactic accuracy in a sentence (see Appendix F).

The VKS elicits both self-perceived and demonstrated vocabulary knowledge of specific words in written form, and has a corresponding five-point set of scoring categories which distinguish different levels of learners' knowledge of a word as follows:

- 1--the word is not familiar,
- 2--the word is familiar but the meaning is not known,
- 3--a correct synonym or translation is given,
- 4--the word is used with semantic appropriateness in a sentence,
- 5--the word is used with grammatical and semantic appropriateness in a sentence.

The range of scores for the VKS has been shown to reliably capture progression in the development of knowledge of particular words (Paribakht & Wesche, 1993, 1996, 1997; Wesche & Paribakht, 1996). A reliability estimate for the VKS was established with a sample of 32 words for 93 students entering classes at six different proficiency levels during the 1992 ESL summer school program at the University of Ottawa (Wesche & Paribakht, 1996). The resulting Pearson correlation was .89 for scores on the 24 content words, and .82 for scores on

the eight discourse connectives, indicating that the instrument can elicit acceptably reliable responses. Moreover, this scale was empirically tested with demonstrated validity (Paribakht & Wesche, 1997). “The VKS has thus proved to be a workable measure and seems to be sensitive to increases in vocabulary knowledge that result from reading activities” (Read, 2000, p. 135).

For the purposes of this study, the VKS was used three times to measure learners’ knowledge of the target words:

- 1) two weeks before the individual interview session, to determine learners’ initial levels of knowledge of the target words;
- 2) at the end of the individual interview session, to measure word learning; and,
- 3) two weeks after the individual research session, to measure retention of new word knowledge.

Background Questionnaire

A questionnaire in English was prepared by the researcher to obtain demographic and background information about the participants (see Appendix G). The questions helped the researcher gain information about the participants before the individual interviews. Also, because some questions were based on the research questions, the answers provided information relevant to the interpretation of the results. Some of the questions, for example, were related to the L1 influence to see if the students had any preconceived ideas about the influence of Arabic on their English reading and lexical inferencing behavior. It included questions on their reading behavior, kinds of reading material they enjoyed, how often they

read in English, what they did when they encountered an unknown word in a text, and how they went about guessing the meanings of unknown words while reading English texts. The questionnaire was completed by all the participants at the beginning of the think-aloud training session.

Reading Text

Different types of texts (health related and non-medical) from various sources (e.g., newspapers, journals and magazines) were examined in order to select a suitable text on a topic of general interest to this population. The text had to be interesting and appealing, authentic, non-technical, culturally and politically suitable, and with an appropriate level of difficulty and length.

An authentic text of approximately 1000 words on environmental refugees was chosen, and used in its photocopy form to elicit the participants' inferencing process in the individual research sessions (see Appendix H). The text was field tested with four Libyan graduate students at the University of Ottawa, who were asked to read the text and circle the words they did not know. To further ensure the suitability of the text, it was presented to four native speakers of English, all graduate students at the Faculty of Education of the University of Ottawa, with the 26 target words deleted. These students were then asked to fill in the spaces with suitable words. The purpose was to make sure native speakers had no difficulty filling in the blanks with suitable words while reading, indicating the presence of sufficient clues for inferencing. Three students (two females studying sports psychology and one male studying creativity) completed the task and returned it. Results showed that one student filled all the blanks with suitable words, some of the words chosen being the same ones deleted. The

second student provided only thirteen words, indicating that the task was not easy for her. The third student found the text difficult. On the back of his copy, he wrote: "I found this quite hard. Was I allowed to put more than one word in the blanks or only one word/per blank? Very difficult passage. . . . Please let me know how I did." Nonetheless, this student provided appropriate words for most of the blank spaces.

Target Words

To further ensure the suitability of the selected text, it was field tested again in Libya with ten volunteer medical students (from a population similar to that of the chosen sample). These students were also asked to read the text and circle any unfamiliar words. The circled words this time provided the basis for the selection of the target words that were used in the study. Twenty-six words of those identified as unfamiliar by all the students (including the Libyan students at the University of Ottawa) were chosen as target words. Later, a list of the target words together with four pseudo-words (added to distract the participants' attention from the target words) was prepared. This list was then presented to the group of volunteer Libyan medical students ($n = 62$) just before they took the CanTEST. The students were asked to provide the meanings of the words on the list either in English or Arabic. The purpose was to ensure that the final selection of the target words was based on those words that were found to be unfamiliar to the majority of the students. Finally, 26 words from those identified as unknown by most of the participants were selected and used as target words (see Appendix I).

Data Collection Procedures

Procedures used to collect data, following the selection of participants, included pretesting, training sessions and individual research sessions.

Research Design

Data was collected over a 6-week period between June and August 1998, prior to the students' final exams, and in several research sessions (see Appendix J). Table 1 gives a summary and time line of the research design of this study.

Table 1

Summary and Time Line of Research Design

Both Groups	Week 1	Week 3	Week 4	Week 6
	Vocabulary Test + VKS 1	Training Session	Individual interview + VKS 2	VKS 3

Note: VKS 1 = Vocabulary Knowledge Scale (Pretest); Vocabulary Test = Vocabulary Levels Test; VKS 2 and VKS 3 = Vocabulary Knowledge Scale (Posttests).

The time line summary enabled the volunteers to be flexible when scheduling for the various research sessions. The participants knew in advance that they would be required to give at least 6 hours of their time in order to complete all the research sessions.

Twenty days before the individual interviews, the 62 volunteers willing to participate in the study took the reading proficiency test (CanTEST). Based on the results of the test, 10 students each from two distinct levels of reading ability (advanced and intermediate) were randomly chosen for the study.

Two weeks before the individual research interviews, the 20 selected volunteers signed the consent forms and then took Nation's (1990) Vocabulary Levels Test for an assessment of the size of their academic English vocabulary, which was about 20 minutes in duration. Thus, there were two groups of 10 students each (males and females).

On the same day, the Vocabulary Knowledge Scale (VKS) was also administered to assess the students' level of knowledge of the target words, lasting about 15-20 minutes. The participants were subsequently contacted by the researcher to arrange a suitable time to meet

for the think-aloud training sessions, as well as for the individual research interviews. Because the participants were located in different parts of the city, arrangements were made so that four groups of five participants were available at different times of the same day for the think-aloud training session.

Think-Aloud Training Session

The think-aloud training session took place in a classroom at the University of Al-Fatah. Just after the pretests, and a week before the individual research interviews, 1-hour group think-aloud training sessions were conducted. The goal was to familiarize the students with think-aloud procedures and to make them comfortable in verbalizing their thoughts (Cohen, 1996; Cohen & Scott, 1996; Ericsson & Simon, 1993; Mann, 1983; Matsumoto, 1994). The participants were divided into four groups of five each for these sessions, and training sessions were arranged at suitable times and places. These were also ideal opportunities for the researcher to get to know the participants better and to establish rapport before the individual research interviews.

In the training session, following Ericsson and Simon (1984, 1993), the researcher demonstrated how to “think aloud,” using several pictures. The participants were given ambiguous pictures to look at. They then took turns and talked about what they thought was happening in the pictures. They also talked about what they found difficult to understand and what they did in order to reach an understanding of the picture. The participants carried out the task in their L1, Arabic. They were then given a short passage in English with some words (which the researcher thought would be unknown to the students) underlined. They were asked to read the text and to try to infer the meanings of the underlined words. They were also

asked to verbalize, again in Arabic, what they were thinking and doing as they tried to perform the task. This procedure mirrored the two-step one used in the individual interview sessions. At the end of the training session, the individual interview sessions were scheduled. The participants were notified 1 day before their individual interview to confirm the appointment. Although all participants completed the training sessions, it should be noted at this point that only 17 of the 20 selected participants completed all of the required research sessions (10 intermediate and 7 advanced). Therefore, the other 3 advanced students were not included in the study.

Individual Research Sessions

During the individual research sessions (think-aloud and retrospective sessions), the lexical inferencing task comprised of 26 target words in an English text was presented as a problem-solving task to the participants. They were asked to think-aloud about word meaning, and specifically to think-aloud about what they were doing while reading and guessing the meanings of the target words. This was followed by a retrospective interview. The entire process was tape-recorded using an audio-cassette recorder.

Each individual research session lasted up to 2 hours, with the length of time dependent on the participants' reading speed. Participants were not given a specific time period to finish the tasks. Immediately preceding the inferencing task, a warm-up practice session was conducted with each participant, which lasted about 15 minutes. Each participant was given a short passage with some words underlined, and was asked to verbalize his or her thoughts while reading and to infer the meanings of the underlined words. An attempt was also made to maintain a relaxed and friendly atmosphere, and to make the participants feel

comfortable in verbalizing their thoughts.

Immediately after the practice session, the participant was first given the target text and was asked to read it for general comprehension (to get a gist of the text). This text was then collected and he or she was given a copy of the same text, this time with the target words underlined. The participant was then asked to read the text and to try to guess the meaning of each underlined word. The participant was also asked to verbalize what she or he was doing and thinking while carrying out the inferencing task. Due to their limited communicative ability in L2, the participants were asked to carry out the task in the language of their choice, (i.e., Arabic, English or both). They were allowed to switch from L1 to L2 whenever they felt the need to do so. However, the participants expressed their thoughts mainly in Arabic. They were constantly encouraged and prompted by the researcher to think aloud. Whenever participants came to a target word which appeared familiar or known, they were asked to provide the meaning.

The researcher tried not to interfere with the participants' reading and inferencing process, but prompted them to think aloud whenever there was a long pause by saying, for example: "What are you thinking now?" or "Tell me what's going through your mind right now" or "What is your best guess?" The participants were not allowed to use a dictionary, nor did the researcher answer any of their questions about the meanings of the target words or any other words in the text during the interview in order to encourage guessing.

The same researcher interviewed all participants. She also observed and took detailed notes about how participants reacted to the text, what they were doing during the think-aloud session, as well as about their facial expressions, eye movements over the text, or finger

placement on certain words. Those target words already known to the participants and the inferred meanings of the others were also recorded. Moreover, the researcher used a copy of the same text with the underlined target words to follow the participant closely during the interview. For example, occasionally a participant would skip a target word while reading the text because he or she was involved in constructing meaning. The researcher would find the right moment to remind the participant to guess the meaning of that word.

Immediately after completing the inferencing task, participants were asked to retrospect on how they had found the text in terms of difficulty and interest, and how they had dealt with the unknown words. In addition, they were asked if they had learned any of the words or learned more about words already familiar, and if so, how (see Appendix K). The retrospective interview was conducted immediately after the inferencing task mainly to avoid putting pressure on the participants in terms of having to rely on long-term memory to remember what was done earlier (Anderson & Vandergrift, 1996). All participants were asked the same questions and in the same order. The entire individual research session, which included the inferencing task and the retrospective interview, was audio-taped. At the end of each interview, the participant was given the Vocabulary Knowledge Scale (VKS 2), in order to measure gains in knowledge of the target words. Also, an appointment was made for the last research session.

The last research session took place 2 weeks after the individual research interview. At this time the VKS was administered for the third time to assess the learners' rate of retention of the target words. This was arranged for pairs and groups of participants. Finally, the researcher gave participants a chance to talk informally about their experiences as volunteers

in the research project, ask any questions they might have about language learning in general, about the target words and about vocabulary learning.

Data Analysis

Immediately after data collection was completed, duplicates of all the audio tapes were made. These were subsequently transcribed, in English and Arabic as used by the participants and the researcher. The conventions used for transcribing data are presented in Table 2. These were created to represent the oral tape recording as it would appear in a narrative dialogue.

Every change in speaker, researcher or participant commenced on a new line.

Table 2

Transcription Conventions

Brackets { }	words/sentences the subject read directly from the text
Parentheses ()	words spoken in English
Square brackets []	the correct/equivalent meaning of the target word spoken in Arabic
Normal font	indicates translated text (Arabic to English)
Bold font	target words
<i>Italics</i>	researcher's comments made to the participant
<i>(Italics in parentheses)</i>	researcher's description of an action
4 spaces	a short pause
8 spaces	a long pause

Both qualitative and quantitative analyses of data were carried out in this study. The qualitative analysis was necessary to examine the lexical inferencing behavior of the participants and the knowledge sources and contextual cues they used in the process. Moreover, it was required to examine the influence of their L1 on participants' lexical

inferencing. In other words, qualitative data analysis procedures were used mainly to answer the first research question. On the other hand, the quantitative analysis was needed to find out whether there were any differences between the two groups with respect to the proportions of knowledge sources and contextual cues used in inferencing. This served to answer the second research question.

Coding and Scoring of the Think-Aloud and Retrospective Protocols

Transcription procedures.

The transcripts included verbatim reading of text segments as well as all the verbalizations of participants and prompts provided by the researcher. The researcher also kept a summary sheet while transcribing each tape. This included information that the researcher thought would be useful for later reference in translating the transcripts and in the interpretation of the results (e.g., comments on how participants dealt with unknown target words and the meaning they gave, and their reactions to some familiar words). Once verbal reports were transcribed, they were verified against the tapes. The Arabic segments in each transcript were translated into English immediately after each transcription was complete. A second copy of each transcript was made for analysis and colour coding of the data.

Qualitative Analyses of the Data

The qualitative analysis involved reading and rereading of the transcripts in order to identify the knowledge sources and contextual cues used by each participant in inferring the meanings of the unknown target words while reading the text. These were color coded according to the knowledge sources used. Marginal remarks were made on the interview transcripts. These mainly included the identified categories, successful or non-successful

inferences, and included short comments. Because this was an exploratory study, an inductive approach for generating codes guided the categorization of the knowledge sources. The researcher did not precode any datum until it was collected. Although she was aware of previously reported taxonomies of knowledge sources and contextual cues used in L2 lexical inferencing (e.g., Haastrup, 1991; Paribakht & Wesche, 1999), these did not guide her analysis. Therefore, “there were no pre-arranged categories into which the data were forced” (Ames, 1966 p. 65). Moreover, any knowledge source used in inferencing based on the verbal reports was considered salient, irrespective of the number of times it was reported. Therefore, as Ames (1966) states:

The fact that one mature reader used a particular type of contextual aid would be considered sufficient evidence that such an aid existed, had possible utility, and should be taken into account in any attempted classification scheme of contextual aids. (p. 60)

Thus data determined all categories.

Once all the knowledge sources and contextual cues were identified, two individual summary sheets were created for each of the 17 participants in this study. One, for the knowledge sources used, included the combination of sources and the order of use for each target word. The other sheet indicated success in inferencing each word. Subsequently, another summary sheet was prepared to indicate the frequency of use of the knowledge sources for all participants in each proficiency group. This also indicated the number of known and unknown target words for each participant. All the information from the summary sheets was later entered into the computer to obtain descriptive statistics and in order to provide the basis for the quantitative analyses.

Inter-Rater Reliability Test for the Taxonomy

In order to establish inter-rater reliability in the identification of participants' knowledge sources and contextual cues used in inferencing, two interview protocols were randomly selected and given to a second rater, a Ph.D. student at the Faculty of Education, to be coded. The rater underwent two sessions of coder training (Hak & Bernts, 1996) and was provided with the protocols accompanied by the taxonomy and its definitions. She was then asked to read the protocols and identify the knowledge sources and contextual cues used by each participant in inferring the target words. These two protocols contained 36 inferred target words, accounting for 12.1 % of the total number of 298 attempts at inferencing by all participants. Of the 36 inferred target words, the two raters agreed on the categorization of knowledge sources for 33 words. Thus, using the number of inferences as the basis for calculation, the inter-rater agreement on the two protocols was 92%.

Quantitative Analyses of the Data

The data for the quantitative analyses consisted of: all test scores, including scores on the CanTEST, Vocabulary Levels Test, Vocabulary Knowledge Scale (VKS1, 2 and 3), the number of known and unknown target words for each participant, and, frequency counts of knowledge sources and contextual cues used in lexical inferencing. T tests and a multiple analysis of variance (MANOVA), with repeated measure statistics, were performed to compare the two groups over the three phases of the study (VKS1, VKS2 and VKS3) for differences in the use of knowledge sources, for success in inferencing and for learning and retention of target words.

Summary

To conclude, a rationale for using introspective methods of data collection was presented, followed by descriptions of the data collection instruments. Data collection procedures were described, including the research design, which illustrated the various phases of the study. Data analyses procedures were outlined. The outcomes of the procedures used to collect and analyze the data follow.

CHAPTER FOUR:

Results (Qualitative Analysis)

"Reading may well be a psycholinguistic game.

But words are the toys you need to play it right."

(Batia Laufer, 1997, p. 32)

The results of this study are organized into two sections. In the first section, Chapter 4, the results from the qualitative analysis of the data is presented, and Chapter 5 presents the quantitative analyses of the data. The qualitative analysis of the data addresses the following first research question: How do Libyan medical participants infer the meaning of unknown words while reading English texts? More specifically:

- a) What kind of knowledge sources and contextual cues do they access to guess the meaning of unfamiliar words?
- b) What, if any, effect does their knowledge of the Arabic language have on their lexical inferencing while reading in English?

This chapter is concerned with how Libyan medical students inferred the meanings of unknown words while reading English texts (i.e., how they approached the task and strategies they used), and with the kind of knowledge sources and contextual cues they accessed in the process. A taxonomy of the knowledge sources and contextual cues used by the participants of the study is presented as well as a detailed description accompanied by illustrative examples. The taxonomy is followed by an examination of the effect of the learner's knowledge of L1, Arabic, on their lexical inferencing while reading in their L2, English.

Research Question 1

How did Libyan Medical Students Infer the Meanings of Unknown Words?

During the individual research sessions, when participants were asked to read the text for general comprehension, they all read it silently. However, when they were given the second copy of the text with the target words underlined and were asked to infer their meanings, most intermediate participants tended to read the text out loud, word by word, concentrating on the sentences containing the target words. Each of these sentences was usually read several times before any response was given. On the other hand, the advanced participants generally skimmed through the text until they reached a target word. If they thought it was familiar they provided a possible meaning. If not, they would usually read aloud the sentence containing the unknown target word, sometimes repeating it more than once in an attempt to retrieve a meaning. All participants tended to first concentrate on the general meaning of the whole sentence containing the unknown target word, and then move to the wider context if needed. Both groups utilized similar cues, including local cues (i.e., those found in the same sentence), as well as global cues (i.e., those found beyond the sentence containing the target word) to infer word meanings. However, their main strategy was to make sure they understood the general meaning of the sentence containing the unknown target word, sometimes focusing on the words immediately surrounding the target word in order to infer its meaning. In other words, although participants' starting point was often the target word, they always moved to a larger context of meaning. As well, the identified meaning was often checked against the surrounding context.

Data also show that some participants from both groups (especially the intermediate

group) were involved in hypothesis formation and testing to reach the meaning of some of the unknown target words. For example, one participant from the intermediate group said:

volcanic eruption means well maybe if I see it again in another place in the text I'd be able to compare and this I'll leave for now, like I can leave it as if I understood the meaning then if I find it again, I'll compare.

All participants appeared to be actively engaged in the reading and guessing process. They took the task seriously and appeared to devote the mental effort required to guess the meanings of the unfamiliar target words to the best of their ability. They were constantly predicting and checking the meaning of the sentences containing the target words. Often they did this by going back to the beginning of a paragraph or sentence and rereading parts or all of it, and occasionally by asking themselves questions about the meaning they had constructed in an attempt to get to the meaning of the unknown target words.

Furthermore, although participants of this study knew that the researcher would not answer any questions about the text or provide any information about the target words during the data collection period, and although they were instructed (and occasionally reminded) to infer the meanings of the underlined target words from the written text, they occasionally chose to use other ways to deal with the unknown target words. For example, they used word retrieval techniques and appeals for assistance strategies (Paribakht & Wesche, 1999). In word retrieval, participants repeat the target word out loud or read it several times in an attempt to retrieve the meaning from phonological or orthographical representation:

Example 1:

*I: What did you say **flee** means?*

P: {had to **flee** the Caribbean} **flee** {devastated by volcanic eruptions}
 {**flee** the Caribbean island} I don't know, I'll read the next sentence.

Example 2:

P: I'll continue reading {It may be that people will want to help those outside
 their borders, especially when faced with uhhm televised and
tangible **tangible** **tangible** need}.

In appeals for assistance, participants directly asked the researcher for help to verify their guess and/or the pronunciation of the target word, or simply asked what the word meant.

Example 3:

I: What is going on in your head?

P: I am thinking about the meaning they are all (disaster) aren't they?

Example 4:

P: {A misinformed media can breed **prejudice** and short-sightedness--something
 we can ill-afford} **prej** **prejudice** is this the right pronunciation or is
 it prejudice?

In addition, although participants knew that they were required to infer the meanings of the target words, they occasionally chose to use the "ignore" strategy. They ignored the target word while reading because they thought it did not affect the overall meaning (comprehension) of the sentence or paragraph, or because they felt they could not come up with an appropriate meaning for the word. However, only a few participants resorted to the ignore strategy. One example was when a participant read the sentence containing the target

word “**desertification**.” He reacted by saying:

Example 5:

P: I’ll ignore this one, I don’t need to know the exact meaning of the word. It’s clear from the sentence that these are all things that force people to leave their land.

As mentioned earlier, in order to encourage inferencing participants had no access to a dictionary during the individual research sessions. Some participants from both groups reported that they would have looked up some of the target words or surrounding words had there been a dictionary available. The data also suggest that some participants felt frustrated because they were not able to guess the meanings of some of the target words. In sum, the participants in this study used different strategies to infer unknown word meanings.

Research Question 1a

What kind of knowledge sources and contextual cues did the learners access to guess the meanings of unfamiliar words?

At this stage of the analysis the only concern was to identify the knowledge sources and contextual cues used in lexical inferencing regardless of whether participants succeeded or not in providing the appropriate meanings. For example, when a participant read: {Yet, when the people of Montserrat had to flee the Caribbean island **devastated** by volcanic eruptions}, he accessed his knowledge of grammar because he added: “I’m thinking about devastated . . . like [done to] or something . . . (it’s a verb) and I’m thinking that it’s a verb and not a noun ok.” At this point the researcher was interested in finding out what information or knowledge sources the participants were relying on in the process of inferencing even

though the correct meaning was not reached. The cues were identified mainly by reading the written transcripts, and occasionally by listening to the tapes and by going back to the notes made by the researcher for each participant during each research session. The issue of success in inferencing will be further developed in Chapter 5.

The qualitative analyses of the data revealed that participants used a variety of knowledge sources and contextual cues in word inferencing and exploited several other knowledge sources, such as their native language and their background knowledge. It was also noted that participants often used single as well as multiple knowledge sources and contextual cues in the process. Some examples from the data were coded and selected for different target words.

The identified knowledge sources resemble those previously reported in the literature, but also bring to light some additional and possibly useful knowledge bases that were used by participants in this study. These knowledge sources were then classified based on their commonalities, and the taxonomy was developed. The proposed classification of knowledge sources and contextual cues used in lexical inferencing does not preclude the possibility of alternative classifications. Figure 5, the taxonomy, illustrates participants' use of both linguistic and non-linguistic sources in lexical inferencing. Linguistic sources comprised both L2- based (intralingual) and L1-based (interlingual) sources. The non-linguistic sources represented the participants' background knowledge (cultural knowledge, assumptions, beliefs, values and factual information), knowledge of the topic and their knowledge of medical terms.

I. Linguistic Sources

A. L2-Based (intralingual cues)

- 1. Target Word Level: knowledge of the target word itself**
 - a. word morphology: knowledge of word derivations (prefixes, suffixes and stems)**
 - b. homonymy: knowledge of phonetic or orthographic similarity between the target word and another familiar word**
 - c. word association: association of the target words with other words in learner's mental lexicon**
- 2. Text Level: knowledge based on information in the text**
 - a. sentence level: knowledge related to the sentence that contains the target word**
 - i. sentence level meaning: the general meaning of the sentence that contains the target word**
 - ii. syntagmatic relations: knowledge of one or two words immediately surrounding the target word, which may have a collocational relation to it**
 - iii. paradigmatic relations: knowledge of words that could be substituted for the target word in the sentence**
 - iv. sentence level grammar: knowledge of L2 speech parts and word order**
 - v. punctuation: knowledge of punctuation rules**
 - b. discourse level: relationships beyond the sentence level**
 - i. discourse level meaning: general understanding of certain sentences in combination, paragraphs and the text as a whole**
 - ii. formal schemata: knowledge of how text is organized (i.e., explicit markers of discourse relationships and text organization)**

B. L1-Based (interlingual cues)

- 1. Lexical Knowledge: knowledge of borrowed words that are cognate with the target word**
- 2. Word Collocation: knowledge of which words are often used together in L1**

II. Non-Linguistic Sources

- A. Knowledge of Topic: general background knowledge of text topic**
- B. Knowledge of Medical Terms: knowledge of medical terms**

Figure 5. Taxonomy of knowledge sources and contextual cues used in lexical inferencing

The taxonomy is illustrated by a description of each category accompanied by representative examples. In some of the examples, multiple knowledge sources are used by the participants.

Linguistic Sources

The taxonomy identifies linguistic sources as L2-based (intralingual) or L1-based (interlingual). For those sources described as L2-based (intralingual) cues, participants relied on their knowledge of the target language in inferring the meaning of an unfamiliar word, which included knowledge of the target word, and text level knowledge (sentence and discourse).

Target word level knowledge

Participants frequently relied on features of the target word to infer its meaning. These included their knowledge of word morphology, homonymy and word association.

Participants made use of *word morphology*, or their knowledge of word derivations (stems, prefixes and suffixes).

Example 6:

P: {Toxic spills, **desertification**, roads, land mines} **desertification**
becoming like a desert **desertification** becoming a desert

I: *How did you know?*

P: The beginning (desert) the first part, desert is (environmental disaster) it's got to be it.

Example 7:

P: {prejudice pre judice}

I: *Tell me what you're thinking*

P: I'm trying to break it apart, I want to know what (judice) is (pre),
maybe to do with law because of (judice).

Participants made use of *homonymy* or phonetic or orthographic similarity between the target word and another familiar word.

Example 8:

P: {In 50 years the number of environmental **refugees** could reach } I think I know the word **refugees**, it could mean [refuse].

Example 9:

P: {yet when the people of Montserrat had to **flee** the Caribbean island **devastated** by volcanic eruptions} regards this sentence {when the people of Montserrat had to **flee**} **flee** doesn't it come from (fly)?

I: *What do you think it means?*

P: I don't know the meaning but I'm trying to see if it connects to (fly) {had to **flee** the Caribbean} **flee** {**devastated** by volcanic eruptions} {**flee** the Caribbean island} I don't know

When *word association* was used to infer the meaning, participants sometimes associated the target word with another familiar word.

Example 10:

P: {but however hard the door is **slammed** or opened} if we opened doors of help like **slammed** is destroy or something not destroy (hard the door) we can say the doors are like shut in front of aid or something.

I: *How did you know it's shut?*

P: Because it says (opened) there must be closure

I: *So you got to the meaning from the word (opened)?*

P: Yes, (opened) and (door) it is usually either opened or closed.

Example 11:

P: {But however hard the door is **slammed** or opened for aid and emergency}

slammed means like [knocked] maybe [knocked] (*He knocks on the table*)

{for aid and emergency} Aha! I don't think knocked or opened for sudden emergency and help I think it's the door being knocked or opened.

Text level knowledge.

The participants often made use of cues beyond the target word. This included two main categories: sentence level and discourse level cues. When sentence level cues were used to infer meaning, participants made frequent use of grammar, semantic as well as syntagmatic and paradigmatic relations and punctuation within the sentence that contained the target word. Examples of *sentence level meaning*, when participants used the general meaning of the sentence containing the target word in inferencing, follow.

Example 12:

P: {Caribbean islands **devastated** by} it may mean like destroyed or something like that.

I: *How did you know?*

P: (just from the meaning, the whole meaning of the sentence) they tell you how people (**flee** from their country) then he tells you (by **volcanic** eruptions so it has to be)

Example 13:

P: {especially when faced with televised and **tangible** needs} **tangible** I'll
 have to figure it out from the meaning of the sentence. (*Reads sentence again
 out loud in an effort to retrieve some kind of meaning*).

Sentence level grammar was the cue utilized when participants made use of their knowledge of sentence level grammar for inferring the meaning of a target word.

Example 14:

P: {especially when faced with televised and **tangible** needs}.

I: *What are you thinking?*

P: Of course **tangible** is an adjective for their needs.

I: *How did you know?*

P: Even (bl), I know the adjective ends with these letters (ble) **t.a.n.g**
tangible

Example 15:

I: *What is going on in your head at this moment?*

P: {had to **flee**} I could say it is a verb like I could say that the people here
 traveled, left or something

When *syntagmatic relations* were used to infer the target word, participants made use of one or two words immediately surrounding the target word which may have a collocational relation to it to guess the meaning of an unknown word.

Example 16:

P: {It may be that people will want to help those outside their borders, especially

when faced with uhhm televised and **tangible** **tangible** **tangible** need}

I: What are you thinking?

P: I'm looking at the sentence from the beginning, it talks about the external help for these people, I think it is the essential things essential needs.

I: How did you get to the meaning? Did you previously know the meaning?

P: No, no because when there is a (disaster) this is what people think about and he mentions (needs) which comes after it so this is it I don't know!

(Multiple knowledge sources are used in this example, including syntagmatic relations.)

Example 17:

P: {Even if the **predictions** for your country don't sound dramatic, the movement of environmental refugees towards your 'safe haven' will be.}

I: What is going through your mind at this moment?

P: (I try to connect it with the word after and the word before because I didn't know it **predictions**)

The participants made use of familiar words that could replace the target word in the sentence when they used *paradigmatic relations*.

Example 18:

P: {it will not be enough to really **tackle** the problem}, the word **tackle** {it will not be enough to really **tackle** the problem} **tackle**

I: *What are you thinking now?*

P: **tackle** I'm thinking that I saw this word before here in the text. Oh no, that's trickle no that's right . . . but **trickle** is different. (*Reads it again*)

{it will not be enough to really **tackle** the problem}, oh God! I don't know . . .

. [it is not enough] could it be present the problem or like maybe not enough to show the problem . . . it's enough to illustrate the problem . . . like via TV maybe to show the problem.

(The participant is trying to think of other words that could replace the target word in the sentence).

Example 19:

P: {To **tackle** the problem} means to solve the problem . . . this will not be enough to **tackle** (this can be replaced with solved).

The participants occasionally made use of their knowledge of punctuation rules in lexical inferencing.

Example 20:

P: At the beginning I stopped at **frightening** and thought about the word, but then I glanced and saw that there was not a full stop so when I finished the sentence I found (people), so it must be describing the (people).

Example 21:

P: It is a little difficult because the word is without meaning in the sentence,
to make it clear it's just like a term after the commas {toxic spills,
roads, **desertification**}

Discourse level.

The participants made use of relationships and meanings beyond sentence level, which were identified as discourse level meaning or formal schemata. *Discourse level* meaning is the general understanding of several related sentences, a paragraph or the text as a whole.

Example 22:

P: I want to see the meaning of the whole paragraph, here (hysterical **media**) does
not give a meaning like surely (media) here has another meaning

Example 23:

P: I'm thinking about **influential** I want to go back to read from the
beginning of the paragraph to understand what he means ok?

The participants sometimes made use of their knowledge of text types (e.g., definition/comparison), or formal schemata, to infer the meaning of an unfamiliar word.

Example 24:

P: {we face two immediate **challenges**} **challenges** means (steps)

I: *How do you know?*

P: I read {First, . . . The second **challenge** . . . } so it is steps. It's clear at first (we must find) we find then **challenges** is clear, this we said is

(steps) I told you how I did not know this word before **challenge** but once I read the paragraph after it I saw 1st and then 2nd so the meaning is clear it is (steps).

Example 25:

P: {In 50 years the numbers of environmental **refugees** could reach 200 million} environmental **refugees** . . . from reading the text I'd say that the meaning of this is clear from the given definition. It is a natural phenomenon that will cause people to move from place to another, similar to (migration). That's what I understood from it.

L1-Based (interlingual)

Although participants used their L2 linguistic knowledge to infer meanings, they occasionally used their L1-based (interlingual cues) knowledge to infer the meanings of the unfamiliar target words. These cues included lexical knowledge and word collocation.

Lexical knowledge.

The participants made use of their knowledge of Libyan Arabic, which contains some borrowed words (i.e., Italian words that are commonly used in spoken Libyan Arabic that are cognates with the target words).

Example 26:

P: **journalists** **journalists** comes from [journal]

I: Do you know this from before?

P: As a word like this, no

I: How did you know the meaning?

P: From the meaning

I: Which meaning?

P: From [journal]

I: What is "journal"? You mean journal as a foreign word?

P: No, we use it, even the meaning we use.

(The word "journal" used in spoken Arabic has been borrowed from Italian)

Example 27:

P: **Volcanic** uhhm means [volcano] *(Uses the Arabic equivalent)*

I: You know it from before?

P: Originally it is the same as [borcan] even in Arabic it's the same

[volcan][borcan].

Word Collocation.

When participants used their knowledge of how words occur together in L1 in an attempt to infer the meaning of an unknown L2 word, they were using word collocation. In the following example, the participant considers the Arabic equivalent of the target word and thinks aloud about its potential collocations.

Example 28:

P: {Donors are going to have to change **sacks** of cement}.

Something of (cement) (cement) means [cement] *(an Arabic word)*

I: What's your best guess?

P: Oh it's something he means like an amount of (cement), is it bags of

cement?

I: What made you think of this?

P: Well, it's something cement, and bags of cement go together.

(The participant states this in Arabic.)

Example 29:

P: **crucial** role I think means effective (role) means [role] only effective
will come before it or important role {**crucial** role to play in informing}

(The participant states this to herself in Arabic)

Non-Linguistic Sources (Background Knowledge)

Participants sometimes made use of their general knowledge of the world, the topic of the text and their field of study in lexical inferencing.

Knowledge of topic.

Participants made use of their general knowledge of the topic.

Example 30:

P: the word **flee**, **devastated** and **volcanic** (people of I didn't know
where is Montserrat so that doesn't help me but) {to **flee** the
Caribbean island}

I: What do you think it means?

P: To leave or

I: How did you get to the meaning?

P: There was a problem in their country the topic, of course, the subject

is the trip and the immigrants

Example 31:

P: Yes, {the people of Montserrat had to **flee** the Caribbean island} an island in the Caribbean Sea, maybe it could be a hurricane.

I: *How did you know?*

P: The Caribbean Sea is always like that *(Participant laughs)*

I: *Ok, how did you know it's a hurricane?*

P: The topic is about (environmental **refugees**) so it is related to the (environment), it's not political or something.

Knowledge of medical terms.

The participants occasionally used their knowledge of familiar medical terms or lexical items acquired in the context of their medical study to infer the meaning of a target word.

Example 32:

P: (**volcanic** eruptions), (eruption) means like [laceration or friction] *(Arabic words are given)* but it does not fit here.

(Participant repeats sentence)

(eruptions) for example, we have come across it like in (skin eruption) but the meaning does not fit here.

Example 33:

P: (I didn't know **volcanic** but eruptions) I know it, we have it in medicine like (skin eruptions), **volcanic** eruptions I'll read more.

Patterns of Combinations of Knowledge Sources

Further analysis of the data revealed different patterns of combinations of knowledge sources used by different participants, both intermediate and advanced, while working on a single target word. For example, when inferring the meaning of the target word "**tangible**," one participant used sentence level grammar and word morphology (example 34) while another used discourse level meaning and world knowledge (Example 35) as follows:

Example 34:

P: {it may be that people will want to help those outside their borders, especially when faced with televised and **tangible** needs}. I'm thinking about the meaning of **tangible** it must be related to this word

I: Which word?

P: (televised)

I: How did you know it was related?

P: Because it talks about the same thing like the same verb. These two words.

I: Which words?

P: {televised and **tangible** especially when faced with televised and **tangible** needs}

(Although it is not stated explicitly, the presence of “and” makes him think tangible has the same or similar meaning as televised).

(Participant reads sentence again)

P: {It may be that people will want to . . . } . . . (tele) in particular means [distant] . . . I mean . . . and (vised) maybe something big . . . surely **tangible** is not going to be far from this meaning.

Example 35:

P: tanjible . . . or tangible, I don’t know exactly

(He means the pronunciation of the word).

I’ll read the whole paragraph. It’s like when countries like Australia, Britain and Canada help those outside their countries . . . like via television . . . **tangible** needs, like developed or complicated needs . . . something like that . . . well, according to the context here it seems it means something like . . . so because these countries are well developed and civilized . . . surely they will have better ways unlike other countries which lack the resources . . . via television like.

Intra-subject differences were also examined in order to find out what combinations of knowledge sources and contextual cues were used by the same participant working with different words. In the next two examples, a female advanced level participant inferred the meaning of two target words, “**volcanic**” and “**influential**,” using different knowledge sources and contextual cues. In Example 36, she immediately accessed her knowledge of homonymy, then her background or topic knowledge.

Example 36:

P: **volcanic** hmm **volcanic volcanic**

I: *What are you thinking?*

P: Sounds like (vocabulary) (*she laughs*) but the meaning doesn't make sense at all! (*Realizes it can't mean vocabulary*)

It is definitely something to do with the environment

I: *How did you know?*

P: Because the topic is about (environment) definitely something to do with the environment

I: *What is your best guess?*

P: Eruptions floods isn't it? And maybe change in (weather) or something like that, (eruptions) maybe change in the weather, the temperature changed over there or something.

I: *Is this your best guess?*

P: Yeah (I think that) but it's eruption I don't know
(*Gives up.*)

In the next example she accessed her knowledge of word morphology and sentence level meaning to infer the meaning of "**influential**".

Example 37:

P: **influential** seems to come from influence right? Maybe it does come from (influence) (sections of the **i-n-f-l-u-e-n-t-i-a-l**)

I: *You know influence?*

P: Yeah, (influence) I know It sounds like it does well now I'm not gonna be able to get it (influence) like as if like a current t's a problem I can't recall the Arabic word for it. (influence) here I'll see it's meaning here in the sentence.

(She thinks she knows the meaning of influence but reads the sentence again)

{the **media** has the ability to reach large and **influential** sections} maybe they mean not in one batch but in batches batches, that's what they mean.

I: What do you mean batches?

P: He says (sections) like one section is not like a few small sections maybe that's what they mean. {The media has the ability to reach large **influential** } *(Reads the sentence again)* They mean like one thing after the other, like continuous.

I: Is that your best guess?

P: I don't know what it is ok, but (it's my best guess) means one (section) (large) but several sections, one after the other, continuously.

Results indicate that both proficiency groups used the same types of knowledge sources and contextual cues in lexical inferencing. These sources illustrate the participants' own linguistic and non-linguistic knowledge sources (e.g., background knowledge) interacting with the cues from the target words and the surrounding text.

In sum, participants in this study used linguistic as well as non-linguistic sources of knowledge when inferring unknown word meanings while reading. They all used the same kinds of contextual cues and knowledge sources in the process, except for one knowledge

source, word association, which was only used by the intermediate participants. The developed taxonomy of knowledge sources and contextual cues used by the participants of the study was presented with detailed descriptions and illustrative examples.

Research Question 1b

What, if any, effect does the learners' knowledge of the Arabic language have on their lexical inferencing while reading in English?

Ringbom (1987) states that:

Learning to understand a word is most obviously facilitated if the new item has full identity, both phonological and semantic, to the L1 item. When both phonological and semantic similarity work together, the effect is like that of a magnet attracting a new word to be stored in the learners' mental lexicon when he meets it for the first time.

(p.53)

Throughout the analysis of the transcripts, there was little evidence of the role of the Arabic language in the participants' inferencing. Because there were not many explicit verbalizations made by the participants, it was difficult to identify and pinpoint the direct influence that Arabic might have had on these learner's inferencing when reading in English. For example, it was difficult to decide whether the use of the coordinating conjunctions "and" and "or" as grammatical clues to infer the meaning of some target words was attributable to L1 or L2 influence, as in: {televised and **tangible** needs}; {**slammed** or opened up for aid}; {**prejudice** and short-sightedness}; and, {between taking an issue seriously and **frightening** people}, given that these two conjunctions are used to join two phrases of the same kind in both

English and Arabic. The conjunction “and” is also used in both languages to join clauses where there is no contrast or choice. These cues were categorized under L2 grammatical knowledge because there was no proof to suggest otherwise.

As evident in Examples 26 and 27, with reference to L1-based knowledge sources, some participants used their knowledge of borrowed Italian words in spoken Arabic that are cognates with English words to infer the meanings of unknown target words. Also, Examples 28 and 29 demonstrated that some participants accessed their knowledge of L1 word collocation in L2 lexical inferencing. As the qualitative analysis of the data indicates, participants in this study used two L1-based knowledge sources in inferencing, but these were used only occasionally and only by a few participants.

Results also revealed that participants were influenced by the way each script character is pronounced in Arabic. Data show how some participants had problems pronouncing some of the target words that they had to infer the meanings of as well as other words immediately surrounding the target words. For example, one intermediate level student had problems with words such as “**crucial**,” “**influential**,” “**piles**,” “**volcanic**,” “**island**,” and “**prediction**.” This participant, in dealing with the target word “**crucial**,” pronounced the second “c” as the first “c,” /kru:kel/ and kept repeating the word in the same way. This mispronunciation may affect the way the word is decoded and comprehended in English, because even if the participant has heard the word before, the way he or she pronounces it may not sound familiar, thus, making it almost impossible to retrieve the word or any aspect of its knowledge.

Apart from L1 linguistic factors that appeared to influence learners’ L2 lexical inferencing, the effect of other factors, such as sociocultural, were implicitly indicated. As

evident in the following examples, learners' cultural values, assumptions and belief systems affecting their world view at times appeared to affect their application of word knowledge to inferring the meaning of some of the unknown target words.

Example 38:

*I: What is your best guess for the word **slammed**?*

P: The same meaning as (opened up).

I: Why? What made you think so?

*P: Because for example, it says {however hard the door is **slammed** or opened up for aid and emergency} it's not going to be the opposite because it has (emergency) I feel that it's something that really needs to be given to these people, the door needs to be open or made accessible it says that these people are closing the doors {the immigration doors of wealthier countries are closing} they try to prevent immigration but even if it did happen on their borders, they must offer their help, it's a humanitarian thing but I think there will come a time and they will have to open them at least for (emergency), like it's a humanitarian thing.*

Another source of L1 influence was noticed when many of the participants relied on translation (i.e., reprocessing of L2 words, phrases, or sentences in L1 forms while reading the sentence containing the target word). Many of the participants translated the whole sentence or the paragraph that contained the target word into Arabic in order to construct meaning and to make sense of what they read, which in turn would either help or hinder them in inferring the correct meaning of the unknown words. It was evident that they used the L1 to think about

and process information that was being read in the L2.

Example 39:

P: {There are already 25 million people who have been driven from their homes by **deteriorating** environment}, (**deteriorating** environment) like I know (deteriorate, a verb), of course in Arabic it means [change to the worse], difference or change but change that is always to the worse.

(In addition to using L2 linguistic knowledge, the participant translates the target word into Arabic)

Summary

In this chapter, the results of the qualitative analysis of the data were presented. The results highlighted how the participants approached the inferencing task and the different kinds of knowledge sources and contextual cues used in L2 lexical inferencing. Moreover, a description of the taxonomy of knowledge sources and contextual cues along with illustrative examples from data was presented. The qualitative analyses of the data revealed that the intermediate and advanced groups both used a variety of the same knowledge sources and contextual cues in word inferencing. It was also noted that participants often used single as well as multiple knowledge sources and contextual cues in the process.

Finally, the results revealed some effect of the learners' knowledge of the Arabic language on their lexical inferencing. It was evident that L1-based knowledge sources were accessed in this study, including knowledge of borrowed Italian words that are cognates with

English words, knowledge of L1 word collocation and knowledge of L1 graphemic/phonemic relationships. Both groups also relied on translation of the sentence/paragraph containing the target word to construct meaning while inferencing. Their reliance on the L1 to think about and process information that was read in the L2 was clear. Non-linguistic factors, such as sociocultural, also played a role in the participants' word inferencing. That is, learners' cultural values, assumptions and beliefs affected the way they perceived meanings of some of the target words.

CHAPTER FIVE:

Results (Quantitative Analysis)

“Whatever exists at all exists in some amount.

To know it thoroughly involves knowing its quantity as well as its quality.”

(E. L. Thorndike, 1918).

The quantitative analysis of data was performed in order to answer the second research question which addressed the effect of the participants’ reading proficiency on their lexical inferencing in terms of the knowledge sources and contextual cues they used in the process, their rate of success in inferring the correct meanings of the unfamiliar words, and their rate of learning and retention of previously unknown words.

Data for the quantitative analyses consisted of various tests and scores collected from each participant, including the CanTEST, Vocabulary Levels Test, Vocabulary Knowledge Scale (VKS 1, pretest; VKS 2, to measure learning; and, VKS 3 to measure retention of the unknown target words), the number of known and unknown target words, and frequency counts of knowledge sources and contextual cues used in lexical inferencing.

The results for each part of the second research question will be presented separately with respect to data used, analyses performed and results obtained. It should be noted that, although it is not mentioned in the research question, a third grouping that combined the intermediate and advanced groups was included in the analyses of the results. The rationale for this grouping stems from the qualitative analysis where it was indicated that the two

groups of participants, although different in terms of L2 reading proficiency, are in fact very similar in many other ways. Therefore, having a combined sample or group made it possible to view the participants as a larger group. In addition, it adds more interesting information about the findings of this study.

Research Question 2a

What is the role of learners' reading proficiency level on their lexical inferencing in terms of the knowledge sources and contextual cues used in the process?

Because each participant in this study dealt with a different number of target words in lexical inferencing (i.e., only those words he or she did not know), the number of previously known and unknown target words was calculated for each learner and each group, and for the combined sample (Table 3). As indicated in Chapter 3, there were 17 participants (10 intermediate and 7 advanced) and 26 target words. Therefore, the total number of target words was 260 for the intermediate group and 182 for the advanced group. However, as shown in Table 3, the intermediate group already had some knowledge of 24% of the target words and the advanced group of 45%. In other words, the intermediate group attempted to infer at least 76% of the target words, compared to the advanced group who attempted to infer 55% of the target words. For the combined sample, 33% of the target words were known and 67% were inferred. The average number of previously known target words per participant was 6.3 for the intermediate group, 11.6 for the advanced group and 8.5 for the combined sample. The average number of unknown target words per participant was 19.7, 14.4, and 17.5 respectively.

Table 3.

Number of Previously Known and Unfamiliar Target Words by the Intermediate and Advanced Groups and the Combined Sample

	Intermediate (<u>n</u> = 10)	Advanced (<u>n</u> = 7)	Combined sample (<u>N</u> = 17)
Total number of words dealt with	260	182	442
Number of known target words	63 (24%)	81 (45%)	144 (33%)
Number of unknown target words	197 (76%)	101 (55%)	298 (67%)
Average number of known target words per participant	6.3	11.6	8.5
Average number of unknown target words per participant	19.7	14.4	17.5

To address the research question, a simple frequency count of each knowledge source used by each participant for each unknown target word was carried out. The raw frequencies for each type of knowledge source were then converted into percentages, representing the frequency of use of each knowledge source and contextual cue by each participant as a ratio of the total number of knowledge sources used by that participant. Percentages were also calculated for each group and the combined sample.

The results from the qualitative analysis of the data revealed that both groups, intermediate and advanced, made use of a wide range of knowledge sources to infer the meanings of unknown target words, and that they accessed similar types of knowledge sources but in different proportions. Furthermore, certain knowledge sources were used more

often than others by all participants.

Although the first part of Research Question 2 addressed the differences between the intermediate and advanced groups, with respect to their use of knowledge sources and contextual cues in lexical inferencing, intra-group tendencies were also examined. The results will, therefore, include an account of both intra- and inter-group differences in patterns of use of knowledge sources and contextual cues in lexical inferencing.

Overall Group Patterns of Knowledge Sources Used in Inferencing: Description

As Table 4 indicates, the intermediate group used sentence level knowledge in inferencing most often (53.1%) followed by target word level knowledge (18%), discourse level knowledge (17.2%), non-linguistic sources (9.5%) and L1-based cues (2.1%). This pattern of use is similar to that of the advanced group (i.e., 55%, 20.9% 13%, 9% and 2.1% respectively). A closer examination of the sub categories of these knowledge sources also revealed similar patterns of use by the two groups. As Table 4 demonstrates, among the L2-based sources, within the Target Word Level category, word morphology was used most often by both groups, and homonymy was also used by both groups. However, word association was used only by the intermediate group. At the Text level, among sentence level sources, both groups used sentence level meaning most often, while among discourse level sources, discourse level meaning was the source most relied on by both groups. Among L1-based sources, both groups used word collocation most often and among non-linguistic sources, topic knowledge was drawn on most often by both groups. On the whole, both groups used L2 sentence level meaning most often followed by discourse level meaning, word morphology, knowledge of topic and word collocation.

Table 4

Proportions of Knowledge Sources and Contextual Cues used by the Two Groups and the Combined Sample in Lexical Inferencing

I. Linguistic Sources		Groups					
A. L2-based sources/intralingual cues		Intermediate (<u>n</u> = 10)		Advanced (<u>n</u> = 7)		Combined sample (<u>N</u> = 17)	
1. Target Word Level		<u>N</u>	%	<u>N</u>	%	<u>n</u>	%
a. Word morphology		30	10%	22	16.5%	52	11.5%
b. Homonymy		22	7%	6	4.4%	28	6.2%
c. Word association		3	1%	0	0%	3	0.7%
Total		55	18%	28	20.9%	83	18.4%
2. Text Level							
a. Sentence Level							
i. Sentence level meaning		110	35%	52	39%	162	36%
ii. Syntagmatic relations		19	6%	9	6%	28	6.2%
iii. Paradigmatic relations		10	3.1%	3	2.5%	13	2.9%
iv. Grammatical level		25	8%	9	6%	34	7.6%
v. Punctuation		3	1%	2	1.5%	5	1.1%
Total		167	53.1%	75	55%	242	53.9%
b. Discourse Level							
i. Discourse level meaning		44	14%	12	9%	56	12.4%
ii. Formal schemata		10	3.2%	5	4%	15	3.3%
Total		54	17.2%	17	13%	71	15.8%
B. L1-based sources /interlingual cues							
1. Lexical Knowledge		3	0.1%	1	0.7%	4	0.8%
2. Word Collocation		6	2%	2	1.4%	8	1.8%
Total		9	2.1%	3	2.1%	12	2.6%
II. Non-Linguistic Sources							
A. Knowledge of Topic		21	6.6%	8	6%	29	6.4%
B. Knowledge of Medical Terms		9	2.9%	4	3%	13	2.9%
Total		30	9.5%	12	9%	42	9.3%
Grand Total		315	100%	135	100%	450	100%

Table 5 highlights and summarizes the results for the L2-based knowledge sources and Table 6 presents a summary for all knowledge sources for the two groups and the combined group.

Table 5

L2-Based Knowledge Sources and Contextual Cues Used by the Two Groups and the Combined Sample in Lexical Inferencing (Raw Numbers and Percentages)

Knowledge Sources	Groups					
	Intermediate		Advanced		Combined	
	(n = 10)		(n = 7)		(N = 17)	
(intralingual cues)	<u>n</u>	%	<u>n</u>	%	<u>N</u>	%
Target Word Level	55	18%	28	20.9%	83	18.4%
Sentence Level	167	53.1%	75	55%	120	53.9%
Discourse Level	54	17.2%	17	13%	71	15.7%
Total	276	88.3%	120	88.9%	396	88%

As Table 6 indicates, both intermediate and advanced groups relied far more often on L2-based (intralingual) than on L1-based (interlingual) linguistic cues (i.e., 88.3% and 88.9% versus 2.1% respectively). Table 6 also shows that both groups relied on total linguistic versus non-linguistic sources over 90% of the time.

Table 6.

Linguistic and Non-Linguistic sources used by the Two Groups and the Combined Sample in Lexical Inferencing (Raw numbers and Percentages)

Knowledge sources	Groups					
	Intermediate		Advanced		Combined sample	
	(n = 10)		(n = 7)		(N = 17)	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
L2- based sources (intralingual cues)	276	88.3%	120	88.9%	396	88%
L1- based sources (interlingual cues)	9	2.1%	3	2.1%	12	2.6%
Total Linguistic Sources	285	90.4%	123	91%	408	90.6%
Non-linguistic Sources	30	9.6%	12	9%	42	9.4%
Grand Total	315	100%	135	100%	450	100%

To sum up, both proficiency groups displayed similar patterns in the use of knowledge sources and contextual cues while inferring the meanings of the unfamiliar target words. That is, they used the same types of knowledge sources (with the exception of word association that was used by the intermediate group only). The proportions of use of all the other sources was similar for both groups.

In order to examine inter-group differences in the proportions of knowledge sources used, mean frequencies of use were calculated for each knowledge source with respect to the

total number of times the knowledge source was used, the total number of target words inferred by each group and the total number of participants in each group. Independent samples t tests were then performed on the mean values of the frequency of use of each knowledge source and contextual cue for the two groups. Within group differences were examined, followed by across group comparisons in the use of the knowledge sources and contextual cues.

As reported earlier, both the intermediate and the advanced groups used some knowledge sources more often than others. To determine whether there were significant differences in the frequencies of use of knowledge sources by each group, paired samples t -test were performed. Results revealed that sentence level meaning and discourse level meaning were used significantly more often than all the other knowledge sources by both groups. However, the mean value of the frequency of use for sentence level meaning was significantly higher than discourse level meaning for the two groups (see Appendix L). Moreover, the mean value of the frequency of use for intralingual cues was significantly higher than the mean value of the frequency of use for interlingual cues, and the mean value of the frequency of use for total linguistic sources was significantly higher than that for non-linguistic sources for the two groups (see Appendix M).

In order to determine whether there were significant differences in the frequencies of knowledge sources used by the combined sample of participants, a paired samples t -test was performed. Again, the mean value of the frequency of use of sentence level meaning was significantly higher than that of discourse level meaning for the combined sample (see Appendix L). The mean value was also significantly higher for intralingual cues when

compared to interlingual cues (see Appendix M). And finally, the mean value of the frequency of use of total linguistic sources was significantly higher than non-linguistic sources for the combined sample (see Appendix M).

In summary, the quantitative patterns of use of knowledge sources and contextual cues in inferencing were similar for the intermediate and the advanced groups, as well as for the combined sample.

Intergroup Comparisons: Statistical Analyses

Across group comparisons, as shown in Table 7, indicate that the intermediate and advanced groups differed significantly only in the use of sentence level meaning and discourse level meaning. The intermediate group used these two sources significantly more often than the advanced group did. These are also graphically presented in Figure 6.

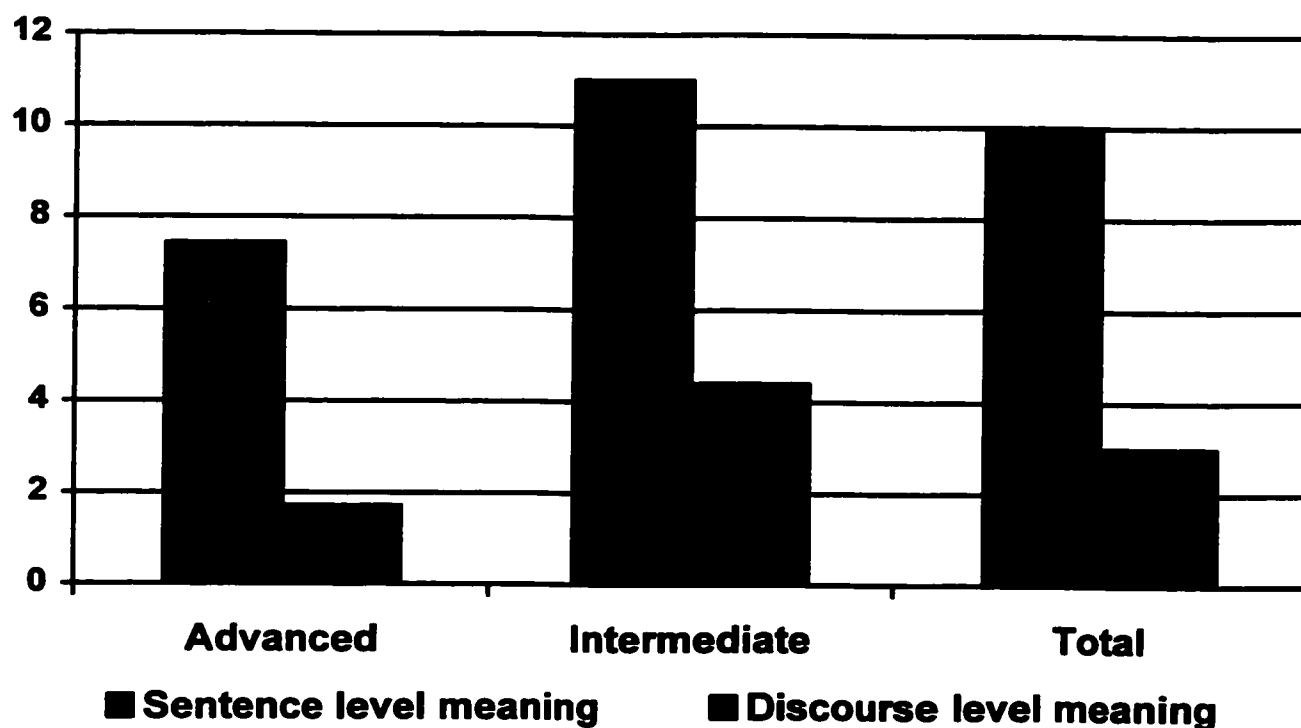


Figure 6. Mean frequency of the use of sentence level meaning and discourse level meaning by the two groups and the total population.

Table 7.

Inter-Group Differences in the Mean Frequency of Use of the Knowledge Sources and Contextual Cues in Lexical Inferencing Using t tests

I. Linguistic Sources		Mean Frequencies & Standard Deviation					
A. L2- based sources/intralingual cues		Intermediate (<u>n</u> = 10)		Advanced (<u>n</u> = 7)		Combined groups (<u>N</u> = 17)	
		<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
1. Target word Level							
a. Word morphology		3.00	1.20	3.14	1.07	3.06	1.20
b. Homonymy		2.20	1.50	.86	1.07	1.65	1.50
c. Word association		.30	.48	.00	.00	.18	.39
2. Text Level							
a. Sentence Level							
i. Sentence level meaning		11.00*	2.36	7.43	2.94	9.53	3.10
ii. Syntagmatic relations		1.90	.99	1.29	1.38	1.65	1.17
iii. Paradigmatic relations		1.00	.94	0.43	.53	0.76	.83
iv. Grammatical level		1.90	2.99	1.29	1.11	2.00	2.42
v. Punctuation		0.30	.48	0.29	4.9	0.29	.47
b. Discourse Level							
i. Discourse level meaning		4.40**	2.46	1.71	.76	3.29	2.34
ii. Formal schemata		1.00	.47	0.71	.76	0.88	.60
B. L1-based sources/interlingual cues							
1. Lexical knowledge		.30	.67	.14	.38	.24	.56
2. Word collocation		.60	.70	.29	.76	.47	.72
II. Non-linguistic Sources							
A. Knowledge of topic		2.10	1.60	1.14	1.21	1.71	1.49
B. Knowledge of medical terms		.90	.88	.57	.79	.76	.83

Note: * $p < .05$, ** $p < 0.01$

Furthermore, the intermediate group used intralingual cues and total linguistic sources significantly more often than the advanced group did. These are also graphically represented in Figures 7 and 8.

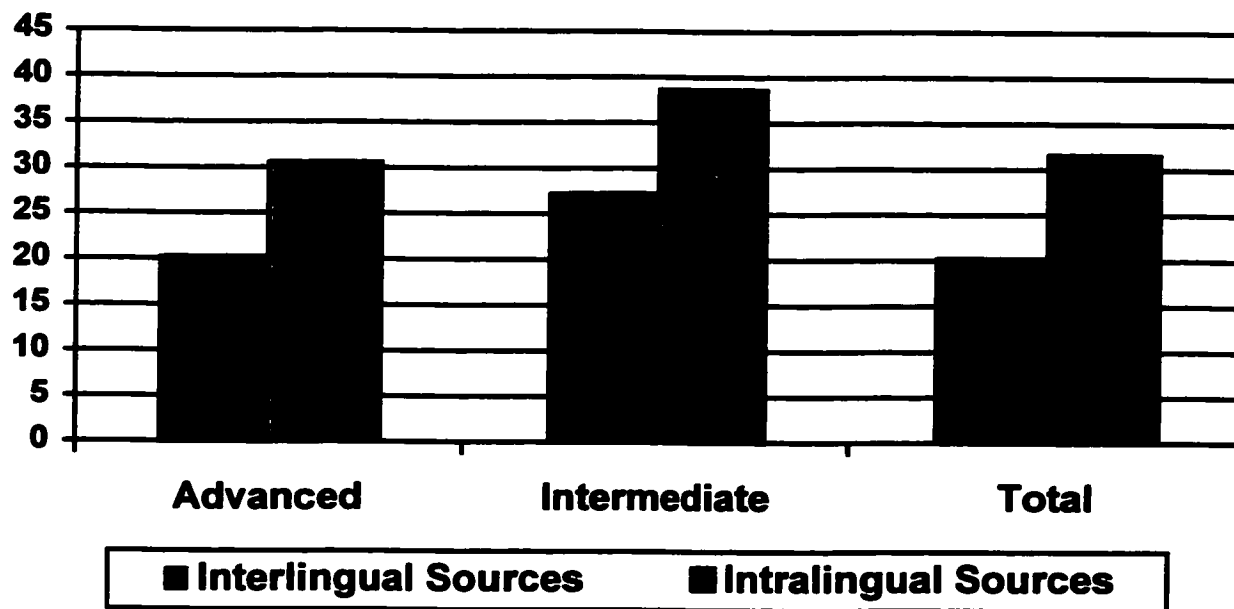


Figure 7. Mean frequency of the use of interlingual and intralingual sources by the two groups and the total population.

However, there were no significant differences between the two groups in the use of interlingual cues and non-linguistic knowledge sources (see Table 8).

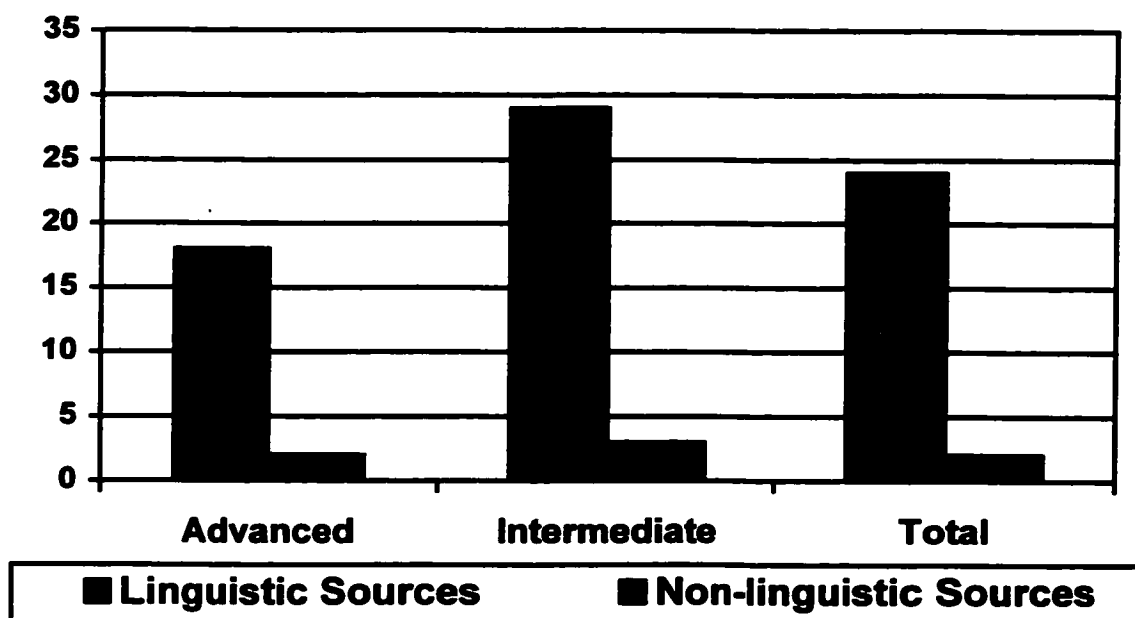


Figure 8. Mean frequency of the use of linguistic and non-linguistic sources by the two groups and the total population.

Table 8

Inter-Group Differences in the Mean Frequency of Use of Interlingual vs.

Intralingual Sources and Linguistic vs. Non-Linguistic Sources Using t tests

Knowledge sources	Mean Frequencies		
	Intermediate (<i>n</i> = 10)	Advanced (<i>n</i> = 7)	Combined sample (<i>N</i> = 17)
Intralingual cues	27.60***	17.14	23.29
Interlingual cues	.90	.43	0.71
Total Linguistic Sources	28.50***	17.57	24.00
Non-Linguistic Sources	3.00	1.71	2.47

*** $p < .000$

In summary, results indicate that L2-based knowledge sources (intralingual cues) were most frequently used and L1-based sources were least frequently used by the two groups and the combined group. Moreover, although the intermediate group used all the knowledge sources proportionally more often than the advanced group, they did so significantly only in the use of sentence level meaning and discourse level meaning.

Single Knowledge Sources and Combinations of Sources in Lexical Inferencing

Further analyses were performed to determine whether there were any differences between the two groups in their use of single, pair or multiple knowledge sources, or combinations of these while inferencing. Using each participant's summary sheet, the number of times one source, two sources and more than two sources were used by each participant when inferring the meaning of each unfamiliar target word was calculated.

Both groups made use of single as well as multiple (two to five) knowledge sources when guessing the meaning of a given target word. There were, however, differences between the two groups in the number of times single versus multiple sources were used. The advanced group used single sources 66% of the time, two sources 29% of the time, and more than two sources 5% of the time. The respective percentages for the intermediate group were 37%, 43% and 20%. These are shown graphically in Figure 9.

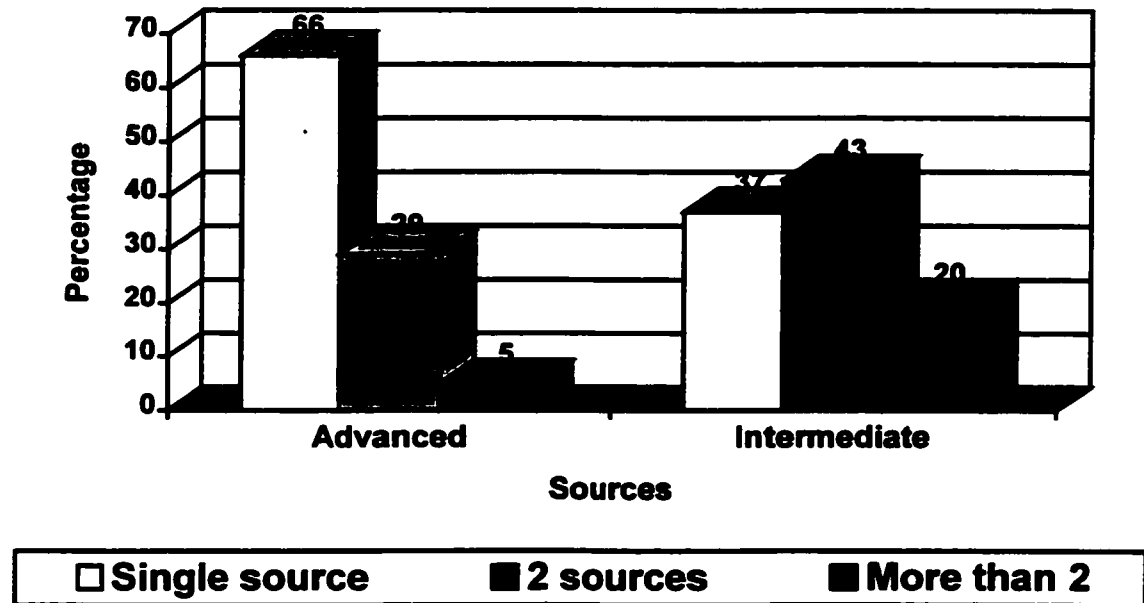


Figure 9. Single and multiple knowledge sources used by both groups.

In addition, variations in the ways the participants combined these knowledge sources were examined. Results revealed that the intermediate group used 50 different combinations of cues while inferring the meanings of unfamiliar target words, whereas the advanced group used only 23 different combinations. It was also noted that almost all combinations of knowledge sources used by the two groups contained sentence level meaning as one of their elements. The following patterns illustrate combinations involving two to five sources.

- word morphology + sentence level meaning
- sentence level meaning + discourse level meaning + knowledge of medical terms
- sentence level meaning + discourse level meaning + topic knowledge + word morphology
- homonyms + sentence level grammar + sentence level meaning + punctuation + topic knowledge

Research Question 2b

What is the effect of learners' reading proficiency level on their lexical inferencing in terms of rate of success of inferring the correct meanings of unknown target words?

The purpose of this analysis was to examine whether there were any differences in the rate of success of the two proficiency groups in inferring the meanings of unfamiliar target words. Were the advanced readers more successful than their intermediate counterparts when inferring the meanings of the unfamiliar target words? To answer this question, participants' inferred meanings of the unfamiliar target words were coded as "complete success," "partial success" or "failure."

- Complete Success (CS): if the correct or appropriate meaning of the target word was provided.
- Partial Success (PS): if an approximate meaning of the target word was given.
- Failure (F): if no correct meaning was given or for some reason the participant gave up guessing altogether.

For each category of success, t tests were then performed on the participants' totals.

The results, along with the descriptive statistics, are presented in Table 9. There were no significant differences in terms of complete or partial success rates in lexical inferencing between the two groups. However, in terms of failing to provide the appropriate meanings of the target words and/or giving up, the results reveal a significant difference between the advanced and intermediate groups. The intermediate group participants failed to provide an appropriate meaning significantly more often than the advanced participants did.

Table 9

Inter-Group Differences in Success of Inferencing Using t tests

Group	Complete Success		Partial Success		Failure		Average # of words inferred
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	
Inter. (<u>n</u> = 10)	7.00	1.33	2.70	1.25	9.0**	2.75	19.9
Adv. (<u>n</u> = 7)	6.86	4.18	2.86	2.85	5.0	2.65	14.4

** $p < .01$

It should also be pointed out that both groups often accessed the same types of knowledge sources and contextual cues to infer the meaning of a given target word, they sometimes achieved different results for it. For example, a participant from the intermediate group relied on her knowledge of L2 sentence level grammar to infer the meaning of the target word “**slammed**” and was successful. However, even though her counterpart from the advanced group used the same knowledge source, she failed to infer the correct meaning of the word. The following examples show how these two different learners dealt with the target word “**slammed**.”

Example 42:

(Intermediate learner)

P: {But however hard the door is **slammed** or opened up for aid } in this case it is like I mean this thing happened before {But however hard the door is **slammed** or opened **slammed** or opened}. I think slammed is the opposite of opened {**slammed** or opened up for}. It's either this or that.

I: *What made you think so?*

P: From the sentence itself {however hard the door is **slammed** or opened opened up}. Like it's either this or that like something opposite the other If it were the same, it would have said (and) (slammed and opened) but it's {**slammed** or opened}. Like it's either right (or) wrong.

Example 43:

(Advanced learner)

P: {however hard however hard the door is **slammed** or opened up for aid};
slammed seems to be like opened

I: What made you think so?

P: Because of (or), so it's like it

I: What does it mean?

P: It means exactly like opened, the same meaning sometimes it can be the opposite but I don't feel it's the opposite

Results also showed that participants from both groups often gave a partial meaning for the target word. For example, when one advanced student was asked how she got to the meaning of the target word "**trickle**" in: {Rather than cross international borders, they **trickle** into cities, or to areas where the environment may seem (but rarely is) better able to support them}, she said: "the meaning is clear from the sentence (**trickle** into the cities) like to go to the cities, it says (into) not (from) like (away from)."

In summary, results revealed no significant differences between the two proficiency groups in terms of complete or partial success rates. However, there was a significant difference between them in failure to provide the correct meaning of the previously unknown

target words. The intermediate group failed significantly more often than the advanced group. Results also indicated that the use of the same knowledge sources and contextual cues to infer the meaning of an unknown word by different readers does not guarantee guessing the correct meaning of that word.

Research Question 2c

What is the effect of learners' reading proficiency level on their lexical inferencing in terms of the rate of learning and retention of previously unknown words?

As mentioned earlier, the Vocabulary Knowledge Scale was used to measure learning (VKS 1, pre-test; VKS 2, post-test) and retention (VKS 3, post-test) of the target words. A multiple analysis of variance (MANOVA) with repeated measure statistics was performed to compare the two groups over the three phases of the study (VKS1, VKS2 and VKS3) (see Table 10). Each phase was considered individually but when the repeated measures design was performed, there was no significant difference between the advanced and the intermediate groups in terms of their rates of learning and retention of the inferred words.

Table 10 presents the mean scores of VKS for the two groups and the combined sample. For each group the absolute numbers increase in each test. The MANOVA, with repeated measure statistics for the combined sample, shows a significant difference between both pre- and post tests ($f = 73.34$, $p < .000$), indicating learning and retention of

Table 10

Means and Standard Deviations of VKS Scores for the Two Groups and the Combined Sample

Group	Learning				Retention	
	VKS 1 (pre-test)		VKS 2 (post-test)		VKS 3 (post-test)	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Intermediate (<u>n</u> = 10)	2.2	.39	3.1	.39	3.1	.54
Advanced (<u>n</u> = 7)	2.9	.40	3.8	.57	4.1	.49
Combined sample (<u>N</u> = 17)	2.4	.51	3.4*	.58	3.5*	.71

* $p < .0001$

the previously unknown target words. Results for the separate groups were not significant, which is probably a reflection of the small sample size. The results are illustrated in Figure 10.

It should be noted that because of the small numbers of participants in each group, the assumption of equal variances was tested using Levene's test. The results indicated that the three dependent variables' variance were homogenous; pre-VKP: ($F_{(1;14)} = .47, p > .50$), post-VKP: ($F_{(1;14)} = 1.32, p > .26$), and post-test: ($F_{(1;14)} = .07, p > .79$). Moreover, the Kolmogorov-Smirnov test of normality, with a significance of the statistic $> .05$, indicated that all three dependent variables followed a normal distribution for each group.

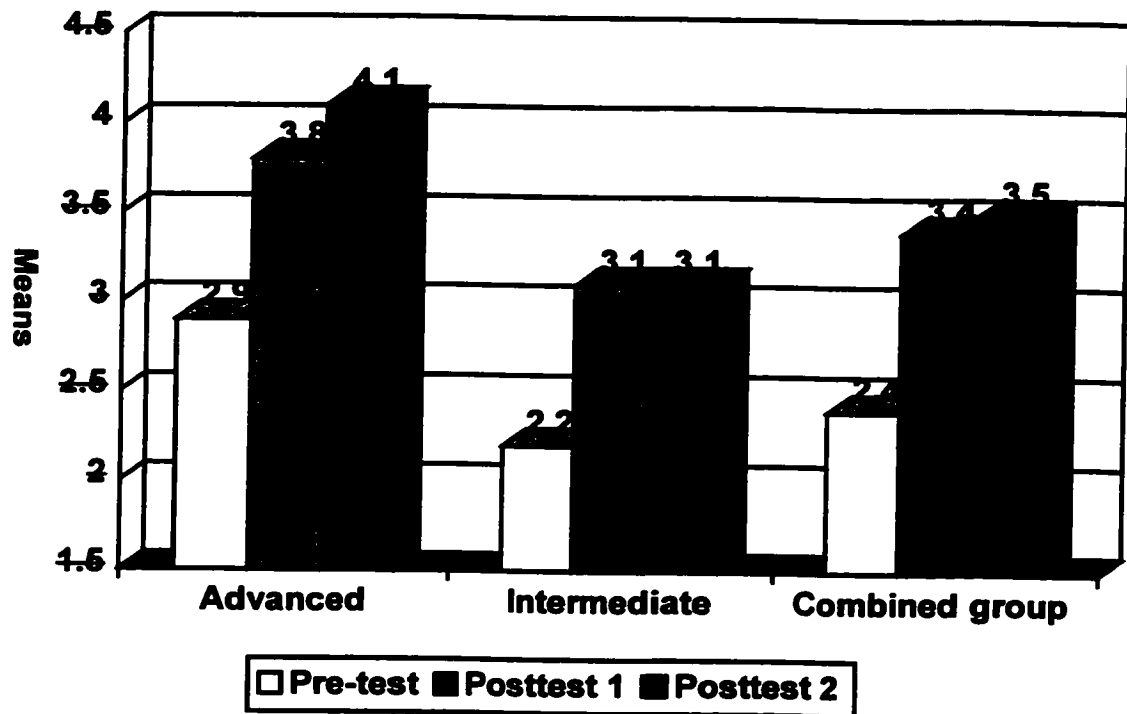


Figure 10. Means of VKS scores by groups.

To sum up, in terms of learning and retention of previously unknown words, results indicate that there was absolute gain over time (mean retention rate of 29% of correctly inferred words) but it was not significant for either group. However, the gain was significant for the combined group.

Summary of the Main Results of the Study

The main results of the qualitative and the quantitative analyses of this study are summarized and presented below:

- The same knowledge sources and contextual cues (with the exception of word association) were used by both the intermediate and the advanced groups in L2 lexical inferencing.
- Sentence level meaning was used most often by both groups, followed by discourse level meaning, word morphology, knowledge of topic and word collocation.
- Sentence level meaning and discourse level meaning were the most frequently used cues by both groups, but the intermediate group used sentence and discourse level meaning significantly more often than the advanced group.
- Both groups used L2-based (intralingual) cues significantly more often than L1-based (interlingual) cues.
- L1-based (interlingual) cues were the least frequently used cues by the two groups.
- Both groups used linguistic cues significantly more often than non-linguistic cues.
- Both groups made use of single knowledge sources as well as multiple sources when inferring the meaning of a given target word; however, the intermediate group used the latter more often than the advanced group.
- The intermediate group showed more variation than the advanced group in

their combinations of knowledge sources and contextual cues used in lexical inferencing.

- There was no significant difference between the two groups in terms of success of inferencing. However, the intermediate group had a significantly higher level of failure in providing appropriate word meanings.
- There were no significant differences between the groups in terms of learning and retention of previously unknown words. However, there was a significant rate of learning and retention over time of the inferred words for the combined group.

The way the two groups accessed the same types of knowledge sources, and in a like manner, suggests a similarity between these two groups. Both groups mostly used sentence level meaning, followed by discourse level meaning, word morphology, knowledge of topic and L1 word collocation. In addition, sentence level meaning and discourse level meaning were the most frequently sources used by both groups. To conclude, it is evident that for this group of learners there is a clear pattern in the use of the knowledge sources and contextual cues in lexical inferencing.

CHAPTER SIX:

Discussion

"Maybe in order to understand mankind, we have to look at the word itself. Basically, it's made of two words: 'mank' and 'ind.' What do these words mean? It's a mystery, and that's why so is mankind."

(M. Kesterton, *The Globe and Mail*, 1999, p. 20)

The main goal of this study was to examine the lexical inferencing strategies used by Libyan medical students when confronted with unfamiliar words while reading an English text. The study also addressed the effect of reading ability and L1 background on these participants' inferencing behavior.

In this chapter, the results pertaining to each of the main questions are discussed with reference to previous L2 research and theory. Information and experience from the qualitative and quantitative analyses, which were presented separately in Chapters 4 and 5, are integrated. Finally, research and pedagogical implications are presented.

How did Libyan Medical Students Infer the Meanings of Unknown Words?

The main issue in this study was how these participants inferred word meanings and not whether they succeeded in doing so. The results of this study revealed that participants used several strategies when they encountered unfamiliar words when reading. It was noted that they occasionally used word retrieval and appeals for assistance strategies. In word retrieval, participants repeated the target word out loud or read it several times in an attempt

to retrieve the meaning from phonological or orthographical representation. In appeals for assistance, participants directly asked the researcher for help to verify their guess and/or the pronunciation of the target word or simply asked what the word meant (see Chapter 4).

Although they were told before the individual interview session that no answers to their questions would be given during the task and no dictionaries were available, the participants tried to use the appeal strategy anyway. Furthermore, they occasionally chose to use the ignore strategy. They ignored the target word while reading because they thought it did not affect the overall meaning of the sentence or the paragraph, or/and because they felt they could not come up with an appropriate meaning for the word. However, this strategy was used very rarely, mainly because the participants were eager to infer as instructed by the researcher, and tried very hard to provide the meanings of the unfamiliar words. These lexical processing strategies (consult, appeals for assistance and ignore) have also been reported in previous studies (Bensoussan & Laufer, 1984; de Bot et al., 1997; Fraser, 1997; Paribakht & Wesche, 1999). For example, Bensoussan and Laufer (1984) found that their subjects used the ignore strategy most frequently when asked to translate the target words; in this case 26% of the words were ignored in their study. In contrast, in Fraser's (1997) study, although participants ignored words regularly (overall about one third of the time), their preferred strategy was to infer. In her study, consulting and ignoring both functioned as back-up strategies to inferencing. More recently Paribakht and Wesche (1999) reported on an introspective study of how L2 learners dealt with unknown words they encountered while reading. They found that learners ignored about half the words they identified as unknown in the comprehension task. However, similar to Fraser's (1997) study, inferencing was the main

strategy used and accounted for almost 80% of strategy use.

However, in the present study, because participants were instructed to infer the meanings of unknown words, they did not use the other lexical processing strategies as often as participants in other studies. It is likely that if these participants had been given an option, had not been asked to specifically infer the meaning of the target words, and had had a dictionary at their disposal, they would have probably made more use of the other lexical processing strategies to get to the meaning of unfamiliar words. But this was not the case. For this reason, these participants' main focus was to infer most of the time, and only occasionally to use the other strategies. The ignore strategy was used very rarely; therefore, the percentage of the words that were ignored was not calculated.

The analysis of the learners' protocols revealed that when inferencing, both groups utilized similar cues, including local cues (i.e., those found in the same sentence) as well as global cues (i.e., those found beyond the sentence containing the target word). Also, all participants appeared to be actively engaged in the task, and devoted a great deal of mental effort to guess the meanings of the unfamiliar target words. They were willing to try hard in order to come up with suitable meanings for the target words. This was probably due to the fact that these participants volunteered for the research study, were highly motivated students, and were effective L1 readers. They also shared the same language and culture as the researcher and likely felt a sense of obligation to do their best. However, some of the participants in this study appeared to have a great deal of difficulty in making efficient use of contextual cues while inferring unknown words while reading. The text was a little difficult for most of them with some unfamiliar words surrounding the target words, and this may have

contributed to their difficulty. As the researcher observed during the research sessions, participants' main concern was to attempt to understand the sentences and paragraphs in order to get to the meaning of the target words. However, this often was not an easy task for them. For example, they did not explicitly try to identify the word class of most of the target words, they never tried to look for any cohesive devices that linked the sentence containing the target words with other sentences in the text. In other words, these learners did not appear to have the knowledge needed about the various kinds of contextual information that is available to L2 readers in guessing the meaning of unknown words. However, most participants used their L1 while reading to wrestle with the text (i.e., translating word or phrase meaning). Upton et al (2000) state that like all reading strategies, the strategy of accessing one's L1 when reading in the L2, when used appropriately and in moderation, is a useful one and therefore, should not be discouraged.

In addition, part of the difficulty these participants were facing in the inferencing task could have also been related to their lack of practice in using the strategy of inferencing. As Read (2000) states, "given this evidence that many learners lack the skill to infer the meaning of unknown words correctly, there has been surprisingly little research on whether they can be successfully trained to apply it in their reading" (p. 60). He argues that previous studies, like that of Clarke and Nation (1980), do not report any empirical evaluation of the guessing procedure that they recommend. He also notes that van Parreren and Schouten-van Parreren (1981) refer to a few experiments which convincingly demonstrate that the guessing skill is trainable but they provide no details as to how this should be done. They agree, however, that the skill is not easily acquired.

Studies that have used strategy instruction have shown significant gains in learners' ability to guess word meanings while reading (Barnett, 1988; Fraser, 1997; Kern, 1989). Nonetheless, Clark and Nation (1980) argue that their experience in this area coincides with that of Bright and McGregor (1970), who state that: "Perhaps the most important thing of all is to remember that the ability to infer in this way is a skill that can only be acquired by practice" (p. 31). The difficulties encountered by the Libyan medical students are hardly surprising considering that they had never received any kind of reading strategy training and/or inferencing instruction before not even in the L1.

Types of Knowledge Sources and Contextual Cues Accessed in Inferencing

As the results of the study revealed, the participants did not depend only on their knowledge of the target language, but also exploited several other knowledge sources, such as their native language and their background knowledge, when inferring the meanings of unknown words while reading English. The findings also indicated that all participants used the same kinds of knowledge sources and contextual cues while inferencing. These sources illustrate the participants' own linguistic and non-linguistic knowledge sources (e.g., background knowledge) interacting with the cues from the target words and the surrounding text.

The two proficiency groups used the same types of knowledge sources, with the exception of word association, which was used only by the intermediate group. Furthermore, certain knowledge sources were used more often than other sources by all participants. In other words, they all shared the same pattern of frequency of use. For example, both groups

relied on the use of sentence level knowledge in inferencing most often followed by target word level knowledge, discourse level, non-linguistic sources and L1-based cues (see Table 4). Moreover, a closer examination of the sub categories of these knowledge sources again revealed similar patterns of use.

Sentence level meaning and discourse level meaning were used significantly more often than all the other knowledge sources by all participants irrespective of their reading proficiency level. Also, sentence level meaning was used significantly more often than discourse level meaning by all participants, indicating that their main approach was to use local cues. This was because they tried to understand the general meaning of the sentence containing the unknown target word, sometimes focusing on the meaning of the words immediately surrounding it in an attempt to make semantic connections which would help them infer its meaning. The finding that the participants predominantly made use of local cues to infer the meanings of unknown words is consistent with results of previous research (e.g., Fraser, 1997; Huckin & Bloch, 1993). This may have to do with the way the learners were taught in their English as a Foreign Language (EFL) and Arabic classes at school. The aim of their instruction was to understand the overall meaning and not to be put off or distracted by individual words that they did not know.

Among L1-based knowledge sources, both groups used word collocation more often than lexical knowledge and, in non-linguistic sources, topic knowledge was drawn on most often by both groups. In terms of sub-categories, both groups used sentence level meaning most often followed by discourse level meaning, word morphology, knowledge of topic and word collocation. This is most probably because the participants in this study are homogenous

in many respects (e.g., they have the same first language, culture, training and educational background).

Based on the identified knowledge sources, a taxonomy based on their commonalities was developed. These knowledge sources resemble those previously reported in various studies in the literature (e.g., Ames, 1966; de Bot et al., 1997; Fraser 1997; Haastrup, 1991; Morrison, 1996; Paribakht & Wesche, 1999; Qian, 1998) but also highlight some additional knowledge bases that were used by the participants in this study (see Figure 5). The additional sources that emerged in this study included formal schemata, word collocations and knowledge of medical terms.

At the discourse level, the participants used formal schemata. This is probably due to the formal, structural type of teaching they received in the L2 in secondary school. They also used their knowledge of borrowed words and L1 word collocations. This is probably partly because these learners were influenced by their spoken native language and also because they had the same L1 as the researcher.

Under non-linguistic sources, knowledge of medical terms was used. This is hardly surprising given the fact that all participants in this study were medical students. However, the inferred meaning using their knowledge of medical terms was often not checked against the context, which led to either a wrong guess or a partial/correct meaning of the word. For example, when an intermediate learner tried to guess the meaning of the target word “**deteriorating**” he said, “**deteriorating** means something harm you; like it means the environment, harmful environment.” And when asked how he got to the meaning, his instant response, in English, was, “it’s medical.” In this case, the participant realizes that the word is

used in his medical text books but does not try to think of another meaning that the word may have in that particular context.

As mentioned earlier, the developed taxonomy of knowledge sources presented in this study bears some resemblance to those previously reported in the literature. Interestingly, although the classification scheme devised by Ames (1966) was not used with L2 learners, it has some similarity to the present taxonomy. This resemblance is observed in some of the categories and different levels of the contextual cues. For example, Ames' classification scheme contained structural cues that may be syntactic or discoursal. At the syntactic level, readers search for grammatical cues in the clause and sentence where the word occurs. This inferring process is labeled as sentence level grammar in the present taxonomy. At the discourse level, the reader tries to find expressions of language functions, such as definition, comparison and contrast, and cause-effect, and this process is identified as formal schemata in the current taxonomy.

The taxonomy developed by Haastrup (1991) is divided into three main sources of knowledge that Danish L2 learners used in lexical inferencing: contextual, intralingual and interlingual. This differs from the present taxonomy because it is divided into two main sources: linguistic and non-linguistic. However, intralingual and interlingual sources, which are considered main headings in Haastrup's taxonomy, are presented together under the main heading, "Linguistic Sources," in this study.

The classification of knowledge sources and contextual cues used in lexical inferencing in the present study are more similar to Paribakht and Wesche's (1999) study, and more specifically, in terms of the two main sources: linguistic sources (intralingual and

interlingual) and extralinguistic sources (learners' world knowledge). This may be due to the similarities of the data collection methods used in the two studies. For example, as mentioned earlier Paribakht & Wesche (1999) identified eight knowledge sources as follows:

Major linguistic sources

sentence level grammatical knowledge; word morphology; and, punctuation

Minor linguistic sources

discourse/text; homonymy; word association; and, cognates.

Extralinguistic sources

world knowledge

However, in the present study fourteen knowledge sources were identified at different levels as follows:

Linguistic sources

Intralingual cues (L2-based): word morphology; homonymy; word association; sentence level meaning; syntagmatic relations; paradigmatic relations; sentence level grammar and punctuation; discourse level meaning; and, formal schemata

Interlingual cues (L2-based): lexical knowledge; and, word collocation

Non-Linguistic sources

Knowledge of topic; and, knowledge of medical terms (see Figure 5).

Although organized differently, the knowledge sources in Paribakht and Wesche's taxonomy and the present taxonomy generally correspond to those in Haastrup's (1991) taxonomy. The main difference between them is that co-text knowledge, a main heading in Haastrup's taxonomy, is not included as a distinct category in Paribakht and Wesche's and the

present taxonomy, although some categories, such as sentence level grammar, sentence level meaning, discourse level meaning, syntagmatic and paradigmatic relations, do imply the use of contextual cues. The organizational difference between Paribakht and Wesche's taxonomy and Haastrup's makes the former simpler than the latter and, therefore, easier to use.

However, the current taxonomy is more comprehensive in that it represents knowledge sources and contextual cues at several different levels, ranging from target word level to text level, as well as some knowledge sources not reported in other studies. These variations may be partially due to differences in the sample (e.g., background knowledge, native language and culture).

A final similarity to the above mentioned studies is that single as well as multiple knowledge sources and contextual cues, when inferring the meaning of a given word, were used by both groups in this study.

Effect of Learners' Knowledge of Arabic on their Lexical Inferencing

As the qualitative analysis of the data indicated, two L1-based knowledge sources (i.e., word collocation and lexical knowledge) were used by the participants in this study in inferencing even though these were used only occasionally and by a few. Both Haastrup (1991) and Morrison (1996) reported more use of interlingual knowledge by their participants. This was perhaps due to the fact that the learners' L1 in these studies (Danish and English, respectively) were cognate to some extent with the target language of their studies (English and French). However, this finding contradicts some previous research in this area. For example, Qian's (1998) results revealed no evidence that knowledge of learners' L1, Chinese

and Korean was at work while inferencing.

First, the finding that knowledge of borrowed Italian words in spoken Arabic that are cognates with English words was used to infer the meanings of the unknown target words, is not surprising. There are many borrowed words that are still used in the Libyan spoken language and especially by the older generation, therefore, it was easy for the participants to recognize and relate some of the previously known words to the target words. The reason why there were only a few examples of these is probably due to the fact that there were only two target words in the reading text that could tap this knowledge source (i.e., sacks and journalists). They would have possibly used this knowledge source more often had there been more target words of the type in the text.

Second, some participants accessed their knowledge of L1 word collocation in L2 lexical inferencing, as demonstrated in Examples 28 and 29. The target word “**crucial**” occurred in the following sentence: {The second challenge involves the media which has a **crucial** role to play}. The phrase, “important role to play,” is a typical expression that is often used in standard Arabic. The participants’ reliance on their knowledge of L1 collocations may be because these learners are not exposed to enough everyday English that would allow them to access L2 word collocations very often.

Another noteworthy observation is that some participants, when inferring the target word “**volcanic**” said: “it means [volcano] (pronounced in Arabic, borcan)” and said: “originally it is the same as [borcan], even in Arabic it’s the same [borcan, borcan]. The participants here relied on their knowledge of the Arabic word “borcan.” This suggests that Arabic readers of English can recognize a word that has originated from the Arabic language

(such as, alcohol, schedule, almanac).

Because Arabic and English are typologically different languages and have different writing systems, homonymy was rarely a source of clues for these participants. For example, the only target word in the text, “**tackle**,” which sounds exactly like the Arabic word “she eats” and “you eat,” was never used by any of the participants as a cue. This is most probably because they knew that the two languages are very different and therefore, in this and many more instances, they just relied on other sources of knowledge and contextual cues. The fact that L1 sources were not used frequently in this study may be due to the learners’ perceived L1-L2 distance, which may have determined to a considerable degree the transferability of linguistic elements (Gass, 1983; Kellerman, 1983). As Schmitt and McCarthy (1997) state, “L1 may make a difference by influencing the guessing procedure through L1 syntactic patterns or number of cognates to use” (p. 107).

It is also worthwhile to note that when asked the question: “When reading in English what kind of information do you depend on to guess the meaning of unknown words?” all of the participants reported that their preferred approach was to access clues in the immediate sentence, the meaning of the whole paragraph, or the meaning of the words surrounding the target word. This behavior is very similar to what they actually did in the inferencing task. This is what they would also normally do when reading in their L1. As indicated in the questionnaire, these participants did not seem to be aware of the possible influences that their L1 might have on their reading and guessing.

Research shows that orthographic knowledge plays a crucial part in L2 reading and in lexical processing (Koda, 1997). Because the Arabic language has very close relation between

spelling and sound (i.e., graphemic-phonemic relationship), the Arabic reader may be influenced and insist that each script character be pronounced.

Many of the participants relied on mental translation while performing the task. That is, they were constantly reading, translating and summarizing the paragraphs using their L1. Several studies have shown that mental translation is a common cognitive strategy for high school and adult learners (e.g., Chamot & Kupper, 1989; Kern, 1994). Many of the participants translated the whole sentence or the paragraph that contained the target word into Arabic in order to construct meaning and to make sense of what they read, which in turn either helped or hindered them in inferring the correct meaning of the unknown words. It was evident that they used the L1 to think about and process the information that was being read in L2. In other words, they appeared to tap into their L1 to help them wrestle with and reflect on meaning as they processed the L2 text (Cohen, personal communication, March 2000).

According to the responses provided in the questionnaires, most participants were not really aware of the effect of L1 on their inferencing while reading in English. Their answers were too vague (e.g., for what they thought would be a positive effect some wrote “grammar” and others “word meaning,” and another participant said: “It can help me in grammar”). Others referred to translation and paraphrasing in Arabic (not language specific) as positive ways that might affect their guessing. For example, some wrote, “First, I translate the whole sentence into Arabic and then I’m trying to guess it,” and another wrote, “Paraphrasing a sentence in Arabic may help find a suitable meaning according to the meaning of the sentence.” Four of the participants (two advanced and two intermediate) believed that knowledge of Arabic would not have any effect on their lexical inferencing when reading in

English. These statements suggested that these learners were not consciously aware of the possible role their L1 might have on their lexical inferencing while reading English.

The finding that all participants mainly relied on the use of sentence level meaning and discourse level meaning in inferencing, may indicate that they focused on understanding the immediate context, and then attempted to move on to the wider context to connect the ideas and make more sense of the target word meaning. It may also indicate some L1 processing influence. As Abu-Rabia (1995) states, “In most modern written and printed Arabic texts, no vowels signs are given, and the reader has to deduce them from context or prior knowledge” (p. 353). Arabic is a context-dependent language where a large amount of contextual input is required to process lexical information. That is, to process Arabic words in context, readers are required to rely on the general meaning of the sentence or paragraph. Therefore, it is reasonable to assume that these participants’ reliance on sentence level and discourse level meaning in inferencing may have largely been the influence of their L1 processing habits. This is further confirmed by the fact that this was a clear pattern for both groups.

According to Gass (1987) and Sasaki (1991, cited in Koda, 1994), L2 learners seek solutions to their processing problems in the workings of their native language and, when they cannot solve these because of incongruities between the languages, they rely on fundamental universal principles for resolution (e.g., making greater use of semantic cues). Furthermore, Gairns (1992, cited in Koda, 1994) clearly demonstrated that L1 and L2 linguistic knowledge interact closely in shaping L2 cognitive processing strategies.

Anderson et al.(1977) argue that:

“schemata” which the reader brings to the text are far more important than structures

and patterns which are in some sense in the text. . . . The schemata by which people attempt to assimilate text will surely vary according to age, subculture, experience, education, interests and belief systems. (p. 378)

In this study, as reported in Chapter 4, the role of L1 was also evident with respect to the participants' world-view and their cultural beliefs and values, which in turn may have affected their interpretation of the text. This may be due to the fact that reading comprehension is a function of cultural background knowledge. As Coady (1979) suggests, the cultural difference between the reader and the text may be particularly marked for ESL readers who do not have European backgrounds. According to Parry (1987), "it is likely that in second language reading the appropriate schemata will be lacking, as the language and the text are products of a culture alien to the student" (p. 62). Swaffar (1988) also states that: "While metacognitive logic may be common to us all, different cultures seem to emphasize different aspects of logic in their written and verbal discourse" (p. 128). As Example 35 indicated, a participant had clearly projected her values and world-view onto the meaning and the interpretation of the text.

In summary, although the influence of Arabic on the participants' English lexical processing was apparent on some levels, this influence was limited mainly due to the typological differences between Arabic and English (e.g., lack of cognates) and the different writing systems of the two languages. However, regardless of how little the influence of L1 was in this study, further studies in this area would be worthwhile.

Effect of Learners' Reading Proficiency Level on the Knowledge Sources and Contextual Cues Used in L2 Lexical Inferencing

Another main goal of this study was to examine the effect of the participants' reading proficiency level on their lexical inferencing in terms of the knowledge sources and context clues they use in the process. The findings indicate that although both intermediate and advanced proficiency groups made use of a wide range of the same knowledge sources and contextual clues when inferring the meanings of unknown target words, they used them in different proportions. Results indicated that the intermediate group used intralingual and linguistic sources (intralingual + interlingual) significantly more often than the advanced group. A closer examination revealed that the intermediate group used sentence level meaning and discourse level meaning significantly more often than the advanced group. This is probably because the intermediate group had to try harder and consequently drew on as many linguistic sources as they possibly could. Huckin and Bloch (1993) explored the problem solving strategies of three Chinese intermediate proficiency graduate students encountering unfamiliar words in their course readings. They found that these students relied mainly on contextual cues when inferring word-meanings and were normally successful when they did so.

Furthermore, both groups in the present study used linguistic sources more often (over 90% of the time) than non-linguistic sources. This is perhaps because in dealing with linguistic problems, learners are more likely to primarily draw on available L2 linguistic knowledge sources and resort to other knowledge sources for additional support to

compensate for gaps in their linguistic knowledge sources. However, there were no significant differences between the two groups in the use of interlingual and non-linguistic sources. In fact, interlingual cues were used least frequently by both groups. Learners at the reading proficiency level of these participants are more likely to rely on their L2 knowledge sources for solving their lexical problems than on their L1 knowledge sources, particularly if their L1 is typologically different from the target language. That is, learners' perceptions of distance between the two languages may discourage them from relying on their native language knowledge for guessing the meanings of unfamiliar words. This finding is similar to some previous studies (e.g., Haastrup, 1991; Paribakht & Wesche, 1999) where interlingual cues were found to be the least frequently used sources. In some other studies (for example, Qian 1998), none of the learners (mostly Korean and some Chinese) accessed interlingual cues in the inferencing process at all. Furthermore, considering how similar the two groups were in the present study in terms of their background (cultural and academic), it is not surprising that they used this source in similar amounts.

Some differences between the findings of this study and other studies in the use of knowledge sources were observed. For example, overall in this study, all participants accessed sentence level grammar only 7.6% of the time. However, in Paribakht and Wesche's (1999) study, sentence level grammatical knowledge was the knowledge most often used by their university students (35%). These differences may be related to individuals' previous L2 learning experiences or/and as argued earlier related to L1 processing influence.

In a similar fashion, Bensoussan and Laufer (1984) examined different proficiency level learners and reported that there were no differences in the cues accessed or the processes

engaged in while inferencing based on L2 proficiency. In contrast, Haastrup (1989) who compared inferencing processes between two different levels of language proficiency, found that higher L2 proficiency Danish learners were able to access a wider range of cues in inferencing and to better tailor their choices of cues than lower proficiency learners. Fraser (1997) also compared different levels of language proficiency. She discovered that her participants used sense creation processes that made use of cues from the text context more often than word identification processes that relied on L1 or L2 form-based associations when inferring, regardless of L2 proficiency.

The finding that the two groups of learners of this study had similar patterns of frequency of use of the knowledge sources may be attributed to the fact that the participants in the study were homogenous and shared the same language and sociocultural background and values, came from the same country and went to the same university.

Single and Multiple Knowledge Sources Used in Lexical Inferencing

As stated earlier, and similar in some ways to previous studies (e.g., Haastrup, 1991; Paribakht & Wesche, 1997; 1999; Qian, 1998), participants in the present study made use of single as well as multiple knowledge sources (two or more) when guessing the meaning of a given target word. Results of this study however, show that the advanced group used single sources more often (66%) than the intermediate group (37%). This may be because the advanced group felt more confident and thought that they were able to give an appropriate guess by using a single source. However, the intermediate group used two or multiple sources more often than the advanced group. This may indicate that the intermediate group had less

linguistic confidence and were trying harder to guess the meanings of the target words. They accessed more knowledge sources in a “compensatory manner”. It was also observed that the intermediate group used 50 different combinations of cues while inferring the target word meanings, whereas, the advanced group used only 23 different combinations. However, all combinations used contained sentence level meaning as one of their elements and the most frequently used combinations are the same for both groups. These similarities between the intermediate and advanced groups appear to be unique to this study.

Some of the results of this study differ dramatically from those of Haastrup (1991). First, both proficiency groups in her study used multiple sources more often than a single source. The high proficiency group used two or more knowledge sources in 75% of the attempts and the lower proficiency group in 65% of the attempts. Furthermore, regarding combinations of knowledge sources used, Haastrup found that the higher group used 33 different combinations, whereas the lower group used only 21. Morrison’s (1996) results resemble Haastrup’s findings. However, it should be noted that the former study was a replication of the latter. Morrison found that her high proficiency learners displayed a greater variety in the knowledge source combinations they used. The differences between the results of the present study and these two studies in terms of the use of single and multiple knowledge sources may be because the research design adopted by Haastrup and Morrison (pair-think-aloud) may have inspired participants to provide one cue each in order to establish a balance in the pair-work situation.

Relationship of Learners' Reading Proficiency Level to Success in Inferring the Correct

Meanings of Unknown Words

The results of this study revealed that although the intermediate group inferred more target words than the advanced group, there were no significant differences between the two groups in terms of the frequency of their complete or partial success in lexical inferencing (see Table 3). That is, the differences between the two groups in their level of reading proficiency did not appear to significantly affect their level of success in inferring the correct meanings of the target words. The researcher's observation was that most of these participants were not efficient guessers and it appeared that they could not use context clues effectively. This may be due to several factors, including the fact that these learners were under some pressure to perform well during the task. They were engaged in a heavily cognitively demanding task where they had to read, translate parts of the text to construct meaning and make sense of what they had read in order to reach a suitable meaning for the target word. These problems may also reflect these learners' lack of previous training in inferencing. This result was not very surprising considering the general finding of some of the previous research in this area (e.g., Bensoussan & Laufer, 1984; Haynes, 1984; Laufer & Sim, 1985), which found that learners very frequently made wrong guesses. The finding from this study does not, however, corroborate findings from other studies where the differences were significant between the high and the low proficiency groups in this respect (e.g., Haastrup, 1991; Morrison, 1996, Qian, 1998). This may be due to the following reasons or factors:

1. The language proficiency level of the participants in this study may not be similar to those in the above mentioned studies. It should be noted, however, that the other

studies were concerned with general language proficiency and not reading proficiency.

2. The differences in research design for this study and the others may also have played a role.
3. These studies (except for Qian's) dealt with closely related languages, whereas this study deals with distantly related languages.
4. A lack of significant difference between high and low proficiency groups in success may also be due to the differences in L2 learning environments of the participants of this study and the other studies.

The absence of difference in the two groups in their rate of success in inferencing can also be partially attributed to at least two other factors. Morrison (1996) reported that the majority of attempts that combined different knowledge sources were generally successful. Therefore, because the results of the present study indicated that the intermediate learners used more multiple sources and had more variation than the advanced group in their combinations of knowledge sources, it may be reasonable to assume that this may have contributed to the intermediate group's rate of success in inferencing. Furthermore, the advanced learners may have occasionally been over confident, thinking that they knew the meaning of a target word when they actually did not (e.g., fighting for "**frightening**"); therefore, they often did not try any further. They also sometimes gave wrong guesses because they confused the target word with another word that looked or sounded similar (e.g., intangible for "**tangible**," tangle for "**tangible**," refuse for "**refugee**").

It also became evident in this study that the use of the same knowledge sources or contextual cues by different learners did not necessarily lead to success or failure in lexical

inferencing. As mentioned earlier, there are many interacting factors that may affect the outcomes of inferencing. It is not just what knowledge sources are used, but also when and how they are used that makes a difference between success or failure. For example, when two participants tried to infer the meaning of the word “**slammed**,” they both used sentence level grammar and got two different meanings. The intermediate student inferred it correctly but the advanced student failed to give the correct meaning (see Examples 42 and 43). This suggests that it is not the use of a specific knowledge source or contextual cue per se that determines inferencing outcomes but also how effectively the reader uses that knowledge in combination with other cues in the process. This finding suggests that lexical inferencing is not an easy task to perform even for advanced students. Learners can easily be led astray by inferences that are based on partial knowledge of the target word and by failing to systematically monitor their preliminary guesses against the wider context.

The results of this study also indicated that the intermediate group failed significantly more often than the advanced group in providing the appropriate, correct meaning of the target words and/or giving up guessing all together. This may be attributed to the fact that the intermediate learners were overwhelmed because overall they had to deal with more unfamiliar words than the advanced group. Furthermore, these learners have not reached the same level of reading proficiency or size of lexical knowledge as the advanced group and therefore, did not feel as confident as the advanced group (see also Haastrup, 1991; Haynes, 1984, 1993; Haynes & Baker 1993).

Haastrup (1991) suggests that there is a threshold level of L2 proficiency that is critical for successful inferencing, and this precept is recognizable in the current study. The

intermediate group's vocabulary size, as measured by Nation's (1990) Vocabulary Levels Test, was lower than that of the advanced group (see Appendix D). When a low level of vocabulary knowledge is combined with poor inferencing strategies, learners are more likely to fail in their inferencing attempts compared with those with a larger vocabulary size. In addition, intermediate participants relied significantly more often than the advanced on discourse level meaning, which means that they had to integrate longer sections of the text to guess a word's meaning, and this may have contributed to their poor performance. As Haynes (1993) observes, for lower proficiency students, "guessing is apparently more difficult when comprehension of longer context is required" (p. 54), and that is why they are likely to perform less well, even when the word appears several times in a text. Furthermore, based on the retrospective interviews, most intermediate level learners reported that they found the reading text to be somewhat difficult and that the presence of unfamiliar words surrounding some of the target words made inferencing more difficult for them which may, in turn, have contributed to their higher rate of failure. The following example illustrates an intermediate student's limited understanding of the other words in the immediate context of the target word "**prejudice**" when inferencing.

P: {A misinformed media can breed **prejudice** } this sentence of course contains more than one unknown word

I: What are you thinking?

P: Honestly, I am trying to link it with what comes before it and after it in the sentence it is clear that (misinformed media) is affecting the (global issue)
(The learner repeats the sentence and says)

The problem is when there are a few unknown words in the sentence, the connection between sentences you can't figure out the meaning exactly disagreement? or problem or something wrong?

Nation and Coady (1988, cited in Laufer, 1997) claim that successful guessing in context occurs when about 98% of the lexical items in a text are already known. Laufer (1997), points out that for university students this implies knowing about 5000 word families or about 8,000 lexical items. Presumably, the reader would then be an independent learner capable of learning words through context in the same way as L1 learners. In other words, knowledge of other vocabulary items in the immediate context is an important factor when using contextual cues. Most intermediate participants in this study reported that they would have preferred the opportunity to use the dictionary during the inferencing task whenever needed. The learners could have looked up the meanings of the unknown words immediately surrounding the target words, which might have helped them infer the meanings of some of the target words.

Chern (1993) reports that evidence of pronunciation as a strategy was observed in his study with adult Chinese ESL learners and argues that this, with graphemic analysis, did not contribute to their success in guessing. As shown in other studies (Haynes, 1984; Huckin & Bloch, 1993; Laufer, 1981), pronunciation, morphemic and graphemic strategies are essential processing stages in normal reading, though they do not always lead to correct guesses. In this study, some words were mispronounced by some intermediate learners, and this may also have hindered them in their inferencing process.

The finding that the advanced as well as the intermediate students often gave a partial

meaning for the target word when inferencing was not surprising. As Parry (1993) argues, a single context rarely gives sufficient information for a L2 reader to guess the full meaning of a word and a clear sense of a word's defining features can only be reached through repeated encounters with it in diverse contexts. "Furthermore, an unknown word is more likely to be guessable if it occurs numerous times in a variety of contexts within the text, if it is clearly an important word to understand and if the context provides several useful clues" (Read 2000, p. 54).

In summary, although there were no significant differences between the two groups in terms of success of inferencing, the intermediate group failed more significantly than the advanced group probably because these participants had not reached the same level of reading proficiency as the advanced ones, and had more limited vocabulary knowledge.

Relationship of Learners' Reading Proficiency Level to Learning and Retention of Previously Unknown Words

As reported earlier, for either group alone, the posttest gains did not reach statistical significance. However, there was some evidence of learning and retention over time for the combined sample. These results, indicating minimal word learning and retention, are not surprising. Research shows that even if learners successfully infer the meaning of an unknown word in a reading text, the word may not necessarily be acquired (Schmitt & McCarthy, 1997). Research has also shown that intermediate as well as advanced L2 readers "pick up only a few new, hitherto unfamiliar words by just reading for recreational, educational or professional purposes" (Hulstijn et al., 1996, p. 328). Multiple encounters with a new word in

meaningful contexts are usually needed for acquisition (Hulstijn, in press; Nagy et al. 1985; Paribakht & Wesche, 1999).

Moreover, the reason that even some of the advanced students did not gain significant vocabulary knowledge after the inferencing task may be because they thought they knew some of the target words when they actually did not, and they did not make an attempt to verify their guesses against the context. Also, most of the target words in this study occurred only once in the text. Therefore, the participants did not have enough exposure to the words in order for them to learn them. However, as Hulstijn et al. (1996) state, even “frequency alone does not determine the likelihood of acquisition” (p. 328).

It is noteworthy that although the intermediate students failed to infer the correct meaning of some of the target words significantly more often than the advanced ones, there were no significant differences between them in terms of learning and retention. This may be partially due to the fact that both groups were instructed to infer the meanings of the target words. Therefore, they were all mainly focused on the task of inferring the meanings of the target words for immediate comprehension purposes. Wesche and Paribakht (1998) illustrate this point, saying that:

A given task will work in different ways for different individuals, depending upon their background knowledge, their interests, the particular features of the new word that they notice, and their level of effort and involvement. All these will influence learning outcomes.

The participants had no intention of learning the target words and were not aware that they would be tested on the words at the end of the session and may not, consequently, have paid

specific attention to the target words. They were more concerned with the meanings in context. Researchers argue that for learning and retention to take place, there must be some level of attention to linking meaning and form of the target word (Hulstijn, in press).

Another reason for the participants' minimal learning of the target words may be attributed to the learners' perceived language and cultural distance. Swan (1997) notes: "Where languages have less common ground, word forms will generally be quite different; more information about word meaning and use also has to be acquired from scratch." (p. 163). In addition, the learners in this study did not have a dictionary at their disposal to verify their inferred meaning, nor did they get any feedback from the researcher in this regard. Hulstijn (1993) suggested that L2 readers "with good inferring skills may end the process of inferring the meaning of an unfamiliar word by consulting a dictionary in order to verify their self-generated meaning" (p. 144). Moreover, Haastrup (1991) found that providing some kind of feedback to learners when inferencing might help with the retention of the words. Other studies have found that when learners verified their guesses by looking them up in a dictionary, it would play a positive role in terms of retention of those words. Similarly, Fraser's (1997) study did not show any effect of the learners' reading proficiency on their word retention after reading and inferencing. It should be noted, however, that when her learners consulted or inferred alone, they recalled the word meaning they had determined about 30% of the time but when they inferred and then consulted a dictionary, their recall increased to 50% (Fraser, 1999).

It has been suggested that inferring and then consulting would involve a greater depth of processing (i.e., more rehearsal and elaboration) and might result in enhanced retention

(*Craik & Lockhart, 1972; Ellis, 1994; Hulstijn, 1992; Paribakht & Wesche, 1999*). Such mental processing may have influenced the likelihood of the participants in this study to acquire more knowledge of particular words that they had some previous knowledge of as well as the acquisition of some new words.

The way participants in this study perceived vocabulary learning may have also contributed to these findings. In the retrospective interviews, most participants reported that their involvement in this research study made them more aware of the importance of vocabulary knowledge to reading. When asked about the best way to learn vocabulary, most participants acknowledged that in addition to reading widely, writing the words down repeatedly and using them in sentences of their own was the key to vocabulary learning. Some also said that residing in an English-speaking environment would be the best way to learn and improve their L2 vocabulary.

In spite of the factors mentioned above, there was evidence of some word learning and retention over time for the combined sample in this study. In other words, all participants in this study did acquire a reasonable amount of vocabulary (mean retention rate of 29% of successfully inferred words) in the context of a single reading and verbal report session. Previous research shows that the saliency of new words helps their learning in the course of reading. Therefore, the fact that there was some level of learning of previously unknown words may indicate that the inferencing task brought at least some target words to the participants' attention and therefore, made them more salient. *Fraser (1999)* argues that "attention to an unknown word seems to be a prerequisite for any learning to occur" (p. 226). Also, the fact that the participants found the reading text very interesting and appealing might

have helped them learn some of the words. For example, when asked whether the text was interesting in the retrospective interview, an intermediate student said: “Yes, it’s great that people are paying attention to this problem. It is a humanistic crisis and anybody could be faced with it.” An advanced student also replied by saying: “Yes, it’s ok, I think the topic is important here, and it has new words . . . I like to know new words.”

Summary

The participants of this study, irrespective of their reading proficiency level, used the same types of knowledge sources and contextual cues in inferencing, indicating that they all had the same sources at their disposal and shared the same strategic competence.

Quantitatively, these participants used the same knowledge sources and contextual cues in different proportions. Although these participants relied on a variety of knowledge sources, they were not able to use them effectively. Nonetheless, there were many cases of successful inferences and, overall, there was evidence of learning of some of the target words and a retention rate of 29% for correctly inferred words, which was statistically significant for the combined sample.

The results of this study shed some light on the complex process of L2 inferencing and the factors that may affect its outcomes in terms of learners’ success in guessing the meanings of unfamiliar words, as well as the rates of learning and retention of these words. The results also help to better understand some of the learners’ problems in the process and possible impact on their L2 reading comprehension and L2 vocabulary acquisition. In particular, this study contributes to the fields of L2 pedagogy and L2 acquisition, the unique contribution of this study lies in the careful analysis of the impact of the participants’ L1 (Arabic) on

inferencing in English. In addition, these results, more specifically, the taxonomy of the knowledge sources used in lexical inferencing that was developed from this study may be of interest to researchers investigating different L2 learners' lexical inferencing processes in this area.

Limitations of the Study

The present study has some limitations. The research explored the lexical inferencing process of a small group of Arabic-speaking university-level medical students, whose backgrounds were linguistically, educationally and culturally specific. The findings of the study, therefore, may not be generalizable beyond these particular participants and their context. However, such a study may generate insights that contribute to a better understanding of the lexical inferencing process of similar Arabic speaking students, or other students with non-European language backgrounds (e.g., Chinese, Korean and Japanese), especially those in an EFL context.

Implications for Further Research

Lexical inferencing, as noted in the literature review, is an important lexical processing strategy mainly because of its relation to reading comprehension and subsequent vocabulary acquisition. This study suggests there is need for further studies in reading processes and lexical inferencing of Arabic speaking EFL learners. It might be useful to examine to what extent these learners' problems in reading are attributed to their difficulties with lexical inferencing.

Considering that Arabic is a non Indo-European language and is typologically distant from English, a more thorough investigation of the differences between the two languages, and possible consequent effects of these differences on learners' reading and lexical inferencing processes, may be a fruitful area of research. Such research may help us to further understand the specific reading problems of these learners in academic contexts. Moreover, comparative data from studies of learners from various linguistic backgrounds are required in order to identify specific reading problems, including lexical inferencing that these learners face in dealing with a L2 and their subsequent vocabulary acquisition. Paribakht, Tréville and Wesche are currently investigating this, using data from learners from French and Farsi language backgrounds.

As was the case in this study, it would be useful for researchers conducting similar studies to allow the participants to choose the language they feel most comfortable with (either the L1 or L2 or both) to produce the verbal reports. If feasible, the participants should be allowed to switch between L1 and L2 whenever they feel the need to do so, such as when they cannot think of the word they need to say in one language, when an expression does not exist in the L2, or when there is no equivalent for a word/phrase in L1.

Finally, the importance of conducting immediate retrospective interviews must not be underestimated. This enhances think-aloud data by providing the researcher with supplementary information, which may be very useful in the interpretation of the results of the study. Moreover, it is better than delayed retrospection because it helps learners remember more easily what was done during the task and avoids putting pressure on the learners in terms of having to depend on long-term memory.

Pedagogical Implications

Several practical implications emerge from this study. The taxonomy of knowledge sources and contextual cues that was developed in this study may be used by teachers as a basis for teaching inferencing skills. The taxonomy could be used as a guide or framework, to point out the possible types of knowledge sources and contextual cues that L2 learners might rely on in the inferencing process. That is, it may help teachers make learners more aware of alternative means available to them when inferring the meanings of unfamiliar words while reading. More specifically, results of this study suggest that learners need to be trained to recognize and effectively utilize contextual clues. A lot of practice can also be provided. This could be achieved through instruction and practice. Instruction in the use of contextual cues and knowledge sources, combined with opportunities for practice, may enhance learners' inferencing skills, which may in turn contribute to success in guessing the meaning of unfamiliar words and help them become more confident readers and guessers. That is, although learners may have a natural ability to deal with unknown words while reading and know how words work and relate to each other in written discourse, they may lack the required skills to apply this kind of knowledge whenever needed.

Fraser (1997) investigated the lexical processing strategies used by L2 learners when they face unfamiliar words while reading and the impact of these strategies on vocabulary learning in a strategy training study. The two instructional phases she provided had a complementary and positive impact on lexical processing strategy use; the amount of ignoring decreased and the amount and quality of inferencing increased. She claims that instruction needs to guide students to monitor and elaborate inferences based on word identification

processes through the use of the immediate sentence and the wider context. Instruction should also make students aware of knowledge sources other than contextual cues that they can rely on when guessing.

Therefore, focused instruction in inferencing may enhance the learners' lexical processing and their strategic competence, and the knowledge of how and when to apply this knowledge effectively and efficiently (Van Dijk & Kintsch, 1982, cited in Fraser, 1989). For example, short reading texts with some difficult words underlined could be given to the students and they could then be asked to read the text and infer the meanings of the target words in order to find out how or whether they can use contextual clues in inferencing. The teacher can examine how they deal with the task and help them whenever they encounter any problems.

The researcher observed that Libyan Arabic speaking students lacked training and experience in lexical inferencing. Direct instruction for enhancing L2 inferencing ability during reading may prove to be beneficial for these learners, as well as others, in similar situations. This is true especially because reading comprehension of study related material is the main source of L2 input for these learners. It has also been suggested that inferencing has rich possibilities in comprehension tasks, and that encouraging and training individuals to use cues that assist comprehension is beneficial (Sternberg, 1985; Sternberg, Powell, and Kaye, 1982).

ESL/EFL learners could possibly benefit from instruction that will develop vocabulary learning skills and strategies through reading. Sternberg (1987) claims that "teaching people to learn better from context can be a highly effective way of enhancing vocabulary

development” (p. 89). Learners need to know what clues are out there and where to look for them, as well as to learn how to approach the skill of guessing words from context. Clark and Nation (1980) propose the following method:

- Determining the part of speech of the word.
- Looking at the immediate grammar.
- Studying the wider context.
- Guessing the word then checking the guesses.

A final pedagogical implication of the results of this study for instruction relates to retention. Because inferencing alone is not likely to lead to learning and retention, especially with single encounters of new words, it may be more beneficial to devise multiple activities and tasks with the selected target words in order to increase the possibility of students’ learning and long term retention of critical vocabulary.

Finally, the study of L2 vocabulary acquisition has become a flourishing area in applied linguistics research and teaching practice. As Read, 2000 noted "Some scholars go so far as to suggest that language acquisition is essentially a matter of developing lexical competence in the target language" (p.251). The taxonomy of knowledge sources and contextual cues developed in this study will, it is hoped, not only provide L2 researchers in the field with a useful and practical tool but also encourage and aid language teachers to help their students become more efficient language learners.

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APPENDIX A: Arabic Alphabet

أ	ب	ت	ث	ج
ح	خ	د	ذ	ر
ز	س	ش	ع	غ
ص	ض	ط	ظ	ك
ل	ف	ق	هـ	و
م	ن	ي		

APPENDIX B: Letter of Recruitment

Dear student,

This letter is an invitation to participate in a research study. The research is part of a Ph.D. thesis at the Faculty of Education of the University of Ottawa. The purpose of this doctoral thesis research is to find out how students guess the meanings of unknown words and what kind of influence their knowledge of Arabic has on their guessing. This study is important because it will help us to better understand the process a reader goes through when confronted with unknown words while reading a text in a foreign language and may offer valuable implications for both second language reading and vocabulary instruction.

If you agree to participate as a volunteer in this study, you will be required to do the following :

1. Take an English reading proficiency test to determine what your reading level is (Duration of test: 60 minutes). Two levels : intermediate and advanced are required. If you are selected, then you will be asked to:
2. Take the Vocabulary Levels Test to assess the size of your vocabulary (20 minutes).
3. Participate in a practice session on think-aloud procedures lasting about an hour. You will fill out a questionnaire for background information
4. Attend an individual research session with the researcher. During this session you will be given an English text to read and then to guess the meanings of a number of underlined words. You will also be asked to think-aloud while reading and guessing. You may do this in Arabic, English, or both. This session will take about 2 hours and will be tape recorded.

5. Take a post-test (Vocabulary Knowledge Scale) two weeks after the individual session.

The test results and the interview will have no impact on your studies or academic record and all the information from the questionnaire, the test and the interview will be kept **strictly confidential**. When the test and the interviews are completed, each student's name will be replaced by a code, and my thesis advisor and I will be the only persons to have access to these codes.

I hope that you will agree to participate in this research . Test results and a short summary of the study results will be available on request to all participants. Your participation will be highly appreciated. If you agree to be part of this study, please fill out the attached form and return it to your professor. You will be free to withdraw from the study at any time with no penalty. If you have any questions, please feel free to call me at Tel: 4771310. Thank you for your patience and cooperation.

Sincerely,

Nazmia F. Bengelil

APPENDIX C: Consent Form (Interviewees)

TITLE OF PROJECT: Lexical Inferencing Processes of Libyan EFL Students: Effects of Reading Proficiency and The Native Language

RESEARCHER: Nazmia F. Bengelil, 308- 85 Range Rd. Ottawa, K1N 8J6

SUPERVISOR: Dr. Sima T. Paribakht, Second Language Institute,
University of Ottawa

Whenever a research project is undertaken with human participants, the written consent of the participants must be obtained. This does not imply, of course, that the project in question necessarily involves a risk. In view of the respect owed the participants, the University of Ottawa has made this type of agreement mandatory.

The purpose of this doctoral thesis research is to examine Libyan students' lexical inferencing (guessing the meaning of unknown words) while reading in English and to find out how they guess the meaning of unknown words and what kind of influence their knowledge of Arabic has on their guessing. This study is important because it will help to better understand the processes a reader goes through when confronted with unknown words while reading a text in a foreign language and the role of the Arabic language on these processes. I invite you to participate in this study.

If you agree to participate as a volunteer in this study, you will be required to do the following :

1. Take an English reading proficiency test (60 minutes) to determine your reading level. Two levels, intermediate and advanced are required. If you are selected, then you will be asked to:
2. Take the Vocabulary Levels Test to assess the size of your vocabulary (20 minutes).
3. Participate in a practice session on think-aloud procedures lasting about an hour. You will fill out a questionnaire for background information.
4. Attend an individual research session with the researcher. During this session you will be given an English text to read and then will be asked to guess the meanings of unknown words. You will also be asked to think-aloud while reading and guessing. You may do this in Arabic, English or both. You will be asked to reflect on the inferencing experience, and at the end, you will be required to take the Vocabulary Knowledge Scale (VKS). This session will take about 2 hours and will be tape recorded.

5. Take a post-test (VKS) two weeks after the individual session.

The test results and the interview will have no impact on your studies or academic record and all the information from the questionnaire, the test and the interview will be kept **strictly confidential**. When the test and the interviews are completed, each student's name will be replaced by a code, and my thesis advisor and I will be the only persons to have access to these codes.

CONSENT FORM

I _____, hereby agree to

(Print name)

participate in the above study. My participation is voluntary and I understand that my participation has no effect on my academic work outcome. I understand that all the information gathered for the study will remain confidential and will be used only for research purposes.

I am aware that my oral interview will be tape recorded.

I also understand that I am participating in this project anonymously and that my name will not be associated with this project in any way and that I may withdraw from the study at any time without penalty.

I have been given an opportunity to ask any questions regarding the research and these questions have been answered to my satisfaction.

Participant's Signature.....

Date.....

Researcher's signature.....

Date.....

APPENDIX D: CanTEST Levels of Performance

CanTEST Levels of Performance

International Version

BAND	DESCRIPTION
[5+]	Fluent User. Consistently effective, fully operational command of the language in demanding familiar and unfamiliar contexts for language use, with full comprehension. No language problems that would impede academic success. An exceptional score awarded when a candidate exceeds the minimum for Band 5 in all skills tested.
[5]	Very Good User. Very good command of the language in most demanding contexts of language use, especially in area of expertise, with a high degree of comprehension. Only occasional unsystematic inaccuracies and inappropriacies in communication, with misunderstandings in some unfamiliar situations, which very rarely impede communication. Level of proficiency considered adequate for full time academic study.
[4]	Competent User. Generally effective command of the language in fairly demanding contexts, especially in area of expertise, with a satisfactory level of comprehension. Some inaccuracies, inappropriacies and misunderstandings in less familiar contexts with more complex language. This level of proficiency in a skill area indicates some weaknesses which sometimes impede communication, and could affect performance in an academic program. Additional language training would be helpful to improve overall speed and accuracy.
[3]	Limited User. Fair command of the language only in moderately demanding language contexts or in interactions with a sympathetic speaker, with limited comprehension. Markedly reduced effectiveness in demanding or unfamiliar situations. The number of systematic inaccuracies and misunderstandings significantly impedes communication and comprehension. Definitely requires additional language training before being considered for academic placement.
[2]	Very Basic User. Some ability to function in highly contextualized, familiar situations, but no real command of the language. Frequent systematic errors and misunderstandings seriously impede communication, leading to frequent breakdowns in communication.
[1]	Novice. Extremely limited command of the language, with the user limited to handling basic communicative needs.

NOTE: Half band scores are awarded where candidate's performance exceeds that described in one band but does not fully meet that of the next higher band.

APPENDIX E: Pre-Test Scores

	Eng. Reading	Eng. Vocab. size
Scale	0-100	0-90
Range	53 -78	27-72
Mean	65.00	50.24
S D	8.90	13.17

Participants	Eng.Reading	Eng.Vocab.	Groups
1	53	59	Intermediate
2	61	50	Intermediate
3	61	47	Intermediate
4	77	69	Advanced
5	76	72	Advanced
6	61	30	Intermediate
7	59	39	Intermediate
8	56	42	Intermediate
9	55	37	Intermediate
10	57	48	Intermediate
11	78	54	Advanced
12	70	62	Advanced
13	75	55	Advanced
14	61	40	Intermediate
15	58	27	Intermediate
16	77	60	Advanced
17	70	63	Advanced

Note: Eng. Read=CanTEST, section 3 (Reading Combined) version A 92;
 Eng. Vocabulary= Vocabulary Levels Test (Nation, 1990).

A summary of the mean scores on the tests for both groups

Test	Mean	S D
CanTEST		
Advanced (n=7)	74.71	3.35
Intermediate (n=10)	58.20	2.90
Vocabulary Levels Test		
Advanced (n=7)	62.14	6.67
Intermediate (n=10)	41.90	9.55

APPENDIX F: Vocabulary Knowledge Scale (VKS)

VKS Elicitation Scale Self-Report Categories	
Self-report	Categories
I	I don't remember having seen this word before.
II	I have seen this word before, but I don't know what it means.
III	I have seen this word before, I <u>think</u> it means _____. (synonym or translation).
IV	I <u>know</u> this word. It means _____. (synonym or translation).
V	I can use this word in a sentence _____. (Write a sentence). (if you do this section, please also do Section IV).

VKS Scoring Categories: Meaning of Scores	
Self-report Categories	Possible Meaning of Scores
	1 The word is not familiar at all.
→	2 The word is familiar but its meaning is not known.
→	3 A correct synonym or translation is given.
→	4 The word is used with semantic appropriateness in a sentence
→	5 The word is used with semantic appropriate-ness and grammatical accuracy in a sentence

(From Paribakht & Wesche, 1997)

APPENDIX G: Background Information Questionnaire

Dear student,

Please fill in this questionnaire and return it to the researcher as soon as possible.

Please check (✓) where applicable.

1. Name..... 2. Age..... M. F.
3. Language(s) spoken at home.....
4. Address Telephone.....
5. Faculty..... Year of study.....
6. Besides English what other languages do you know? None.....
7. If you know other languages, how well do you think you know these languages?
 - a) very little
 - b) some.....
 - c) well.....
 - d) very well.....
8. Number of years you have studied English? (at secondary school and university).....
9. Have you been to an English speaking country? If yes, where and for how long?.....
10. What do you normally read in Arabic?
 - a) newspapers & magazines
 - b) books.....
 - c) novels.....
 - d) study related texts.....
 - e) nothing
 - f) other? (Please specify).....
11. Do you read in English? Yes..... No.....
12. If yes, how many hours a week do you spend reading in English? (Do not include study related

material)

- a) one hour.....
- b) two hours.....
- c) three hours.....
- d) more than three hours (Please specify.).....

13. Do you enjoy reading in English? Yes..... No.....

14. If yes, what do you usually read? (You can check as many as applicable.)

- a) newspapers & magazines.....
- b) books.....
- c) novels.....
- d) study related texts.....
- e) other? (Please specify.).....

15. What do you find most difficult when reading English texts?

- a) grammar.....
- b) vocabulary (unknown words).....
- c) content (knowledge of the topic).....
- d) other? (please specify.).....

16. What do you usually do when you meet an unknown word while reading in English?

- a) look it up in a dictionary.....
- b) ignore it.....
- c) ask someone for help.....
- d) try to guess the meaning from context.....
- e) other? (Please specify.).....

17. When reading in English what kind of information do you depend on to guess the meaning of

unknown words?

- a) the clues in the sentence.....
- b) the meaning of the whole paragraph
- c) the meaning of surrounding words.....
- d) my knowledge of the topic.....
- e) other? (Please specify.).....

18. In what way (s) do you think your knowledge of the Arabic language affect your guessing of the meanings of unknown words when reading an English text? (Include both positive and negative effects)

Positive:

Negative:

.....

Thank you ! Researcher: Nazmia Bengelil Tel: 4771310

APPENDIX H: Reading Text

Finding the voices of the dispossessed

HEATHER BUDGE-REID

IN 50 YEARS THE NUMBERS OF ENVIRONMENTAL refugees could reach 200 million. There are already 25 million people who have been driven from their homes by a deteriorating environment. Despite common perceptions they will not all be from the South, nor from Africa nor from another country nor even another community.

As the impact of global warming increases, it is going to affect everyone across the Commonwealth and beyond. Even if the predictions for your country don't sound dramatic, the movement of environmental refugees towards your 'safe haven' will be.

Environmental refugees are probably going to be the all too human face behind the mega issue of climate change. Environmental refugees are usually defined as those that are forced to leave their land because it no longer supports them. However, environmental decline is not recognised as a cause for displacement and currently refugee status does not go to such people. Yet, when the people of Montserrat had to flee the Caribbean island devastated by volcanic eruptions, neighbouring countries tried to accommodate them. People and their governments, wherever they are, continue to want to help.

But it isn't always so dramatic. Environmental refugees are usually driven off their lands little by little and they are often internally displaced within their own country. Toxic spills, desertification, roads, land mines, development projects, strip mining and soil erosion are only a few of the causes that daily push more people off their land.

The immigration doors of wealthier countries are closing, pushed shut by a rising tide of hysterical media headlines. Even if these nations could resist those knocking on their door, rising sea levels and changing environments will have their own impact in Commonwealth countries such as Australia, Britain and Canada. It may be that people will want to help those outside their borders, especially when faced with televised and tangible needs. But however hard the door is slammed – or opened up for aid and emergency help to flow out – it will not be enough to really tackle the problem.

In the South, it is just one more problem and a relatively silent one at that – the voices of those already on



the move are frequently left unheard. From Bangladesh to Kenya, thousands are being forced off their land. Rather than cross international borders, they trickle into the cities, or to areas where the environment may seem (but rarely is) better able to support them. Unlike refugees from war, environmental refugees seldom move in one televisual mass, so external help is little and internal public debate is pushed to one side by those with more powerful voices.

Today, help or action rarely come without questions. In both the North and South, the 'whose responsibility?' and 'who pays?' questions are set to dominate the debate. Governments, scientists and policy-makers are beginning to worry – and so they should. It's not just the numbers of refugees, it's what those numbers indicate about the declining resources available for our survival that is really alarming.

We face two immediate challenges. First, we must find and listen to the voices of the dispossessed. They won't always agree with each other, but we must find a space for them and other excluded communities in the policy debate. To do this we have specifically to use participative methodologies such as collecting oral testimony. Donors are going to have to change as this will mean funding not just for hardware – not sacks of cement or piles of piping – but support for people and their ideas, and funding for making those ideas heard.

The second challenge involves the media which has a crucial role to play

Dhanduka, Gujarat state, India, once an area rich in jungle and mangroves, is now reduced to a desolate wasteland from over-exploitation, compelling some of its inhabitants to look elsewhere for their survival

in informing and stimulating public debate which, in turn, influence public and policy decision-making. It is often the only way that a wider civil society can gain a knowledge of the many options and potential impacts of government policy, of changing environments or of international actions. The media has the ability to reach large or influential sections of the population in the shortest possible time and to provide factual information, analysis and opinion.

The challenge for governments, non-governmental organisations and journalists worldwide will be to find the right balance between self-interest and humanitarianism; between taking an issue seriously and frightening people into aggressively defensive postures. A misinformed media can breed prejudice and short-sightedness – something we can ill-afford on such a global issue.

We have to aim to provide the media and wider civil societies with accessible information and perspectives from all sides of the debate. Only then will people be able to make up their minds on sustainable strategies.

Ms Budge-Reid is Director of Information at the Panos Institute, a London-based organisation which specialises in information and communication for sustainable development.

APPENDIX I: Target Words

List of the target words that were used in the individual interview session.

- 1) trickle
- 2) refugees
- 3) deteriorating
- 4) global
- 5) despite
- 6) tackle
- 7) predictions
- 8) flee
- 9) alarming
- 10) devastated
- 11) volcanic
- 12) desertification
- 13) tangible
- 14) slammed
- 15) debate
- 16) unheard
- 17) sacks
- 18) challenges
- 19) seldom
- 20) alarming
- 21) influential
- 22) frightening
- 23) prejudice
- 24) media
- 25) crucial
- 26) testimony

APPENDIX J:**Summary of Data Collection Sessions**

	Description of Session	Length
	CanTEST (reading comprehension test for all volunteers (N= 62))	60 minutes
	Vocabulary Levels Test Vocabulary Knowledge Scale (VKS) (selected students only N= 20)	20 minutes 20 minutes
	Think-aloud group training session (selected students)	60 minutes
	Individual interview (selected students) warm up practice session inferencing task retrospective interview Vocabulary Knowledge Scale	15 minutes 65 minutes 10 minutes 20 minutes
	Vocabulary Knowledge Scale (selected students)	20 minutes

Sessions 1, 2, and 3 were group sessions

Session 4 individual interview session

Session 5 was done on an individual basis and in groups

Total time required for the five sessions is 300 minutes (4hours 50 min.)

APPENDIX K:

Retrospective Interview Guide

At the end of the individual think-aloud interview, the researcher will ask the participants to retrospect about their experience. This will be guided by the following questions:

1. How did you find the text? Was it easy to read, a little difficult or too difficult?
2. Was the text interesting for you? Why or why not?
3. Which words do you remember working with the most? What did you do in order to understand the meanings of the underlined words?
4. Were there any words that you think you already had some knowledge of ? Which ones?
5. If yes, did you learn more about the words from your guessing? What? How?
6. What do you normally do to learn vocabulary? What is the best way to learn vocabulary?

The answers to these questions will be used in the interpretation of the data.

APPENDIX L:Intra-Group Differences in Mean Frequency of Use of Knowledge Sources and ContextualCues in Lexical Inferencing

Linguistic Sources L2 based sources (intralingual cues)	Mean Frequencies		
	Inter. (n=10)	Adv. (n=7)	Total (N=17)
Target word Level			
Word morphology	3.00	3.14	3.06
Homonymy	2.20	.86	1.65
Word association	.30	.00	.18
Sentence Level			
Sentence level meaning	11.00*	7.43**	9.53***
Syntagmatic relations	1.90	1.29	1.65
Paradigmatic relations	1.00	0.43	0.76
Grammatical level	1.90	1.29	2.00
Punctuation	0.30	0.29	0.29
Discourse Level			
Discourse level meaning	4.40	1.71	3.29
Formal schemata	1.00	0.71	0.88
L1 based sources (interlingual cues)			
Lexical knowledge	.30	.14	.24
Word collocation	.60	.29	.47
Non-linguistic Sources			
Knowledge of topic	2.10	1.14	1.71
Knowledge of medical terms	.90	.57	.76

* $p < .05$ ** $p < 0.01$ *** $p < .000$

APPENDIX M:

Intra-Group Differences in Mean Frequency of Use of Interlingual vs. Intralingual knowledge
sources and Linguistic vs. Non-linguistic Sources

Knowledge Sources	Mean Frequencies		
	Intermediate (n=10)	Advanced (n=7)	Total (N =17)
Intralingual Cues	27.60***	17.14***	23.29***
Interlingual Cues	90	43	0.71
Total Linguistic Sources	28.50***	17.57***	24.00***
Non-Linguistic Sources	3.00	1.71	2.47

*** $p < .000$

APPENDIX N:Intra-Group Differences in Success of Inferencing

Group	Complete Success		Partial Success		Failure	
Intermediate (<u>n</u> =10)	Mean	SD	Mean	SD	Mean	SD
	7.00	1.33	2.70	1.25	9.0**	2.75
Advanced (<u>n</u> =7)	6.86	4.18	2.86	2.85	5.0**	2.65
Total (<u>N</u> =17)	6.94	2.75	2.76	1.99	7.35**	3.3

** $p < .01$