AMERICAN UNIVERSITY OF BEIRUT

THE RELATIONSHIP BETWEEN META-LINGUISTIC
AWARENESS AND READING COMPREHENSION AMONG
FIFTH AND SIXTH GRADERS

by
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AN ABSTRACT OF THE THESIS OF

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Title: <u>The Relationship between Meta-linguistic Awareness and Reading</u>
    <u>Comprehension among Fifth and Sixth Graders.</u>

While it is accepted that meta-linguistic awareness plays a major role in decoding (National Institute of Child Health and Human Development, 2000), not much is known about the role that meta-linguistic awareness plays in reading comprehension. In this study, ambiguous sentences (deep structural ambiguities, surface structure ambiguities and lexical ambiguities) are used to examine the relationship between meta-linguistic awareness and reading comprehension.

Fifty six fifth and sixth graders were tested on 40 ambiguous sentences and 22 structural riddles. Their performance was correlated with scores on the reading comprehension test, which is a component of their language arts program, in order to determine the relationship between meta-linguistic awareness and reading comprehension. Furthermore, a stepwise multiple regression analysis was conducted in order to determine the role of meta-linguistic awareness in reading comprehension. Participants' scores on deep structural ambiguities, surface structure ambiguities and lexical ambiguities were used as predictor variables and the score on reading comprehension were used as a dependent variable.

The results indicated that a positive relationship between both variables exists. In fact the riddle task was significantly correlated with reading comprehension, as assessed by the Houghton Mifflin Reading Comprehension Test, in both grades 5 and 6. Although the sentence ambiguity task was significantly correlated with reading comprehension in grade 5, no correlation between the two variables was found in grade 6. Although the results in grade 6 do not reveal a positive correlation between the sentence ambiguity task and the reading comprehension task, the findings depict a significant correlation between the riddle task and the reading comprehension task.

A stepwise multiple regression analysis determined that riddle solving and ambiguous sentence detection accounted for 41% of the variance in reading comprehension achievement. However, further examination of the results revealed that riddle ambiguity solving was the only predictor of reading comprehension achievements in this sample. Sentence ambiguity was excluded from the model.

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To
My Beloved Family

CHAPTER I

INTRODUCTION

Meta-cognition is often referred to as the process of "thinking about thinking" (Roe, Smith & Burns, 2005, p.3). As such, meta-cognition refers to higher order thinking, which entails active control over the cognitive processes that make up a learning experience (Livingston, 1997). For example, procedures such as planning how to approach a given task, evaluating a learning process, monitoring a given task, and questioning the learning experiences are all considered to be meta-cognitive in nature (Roe, Smith & Burns, 2005).

Research in the field of meta-linguistic awareness has indicated that meta-cognition tends to play a major role in the learning process (Herriman, 2005). It has been documented that meta-cognition facilitates successful learning, and is even associated with intelligence (Sternberg, 1984; Herriman, 2005; Roe, Smith & Burns, 2005). These finding have spurred a debate amongst educators and researchers about whether or not meta cognition can be taught to students, and if so, how (Wang, Yeong & Choi, 2009; Zipke, 2007, 2008; Zipke, Ehri & Cairns, 2008, 2009). One of the major elements driving this debate is whether or not meta-cognition can *actually be taught to children*, or is naturally acquired with time (Roe, Smith & Burns, 2005; Zipke, 2008).

Meta-linguistic awareness falls under the umbrella of meta-cognition. Meta-linguistic awareness is known to be the active and conscious act of considering how linguistic structures and forms are related to and produce the underlying meaning of utterances (Wang, Yeong & Choi, 2009; Zipke, 2007, 2008; Zipke, Ehri & Cairns, 2008, 2009). This understanding of awareness was first used by Cazden (1974) to

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highlight and describe the transmission of linguistic knowledge and skills across language. Today, meta-linguistic awareness is used to define the interaction which takes place between language and written text, mostly in bilingual learners' literary development (Bialystok, 2007). This interaction allows one to analyze and view language as a process and a system. In other words, meta-linguistic awareness in bilingual learners allows them to objectively function outside one language's system, rules, functions and structures. Code-switching and translation are good examples of bilinguals' meta-linguistic abilities.

Ever since the mid 1980's and 1990's, meta-linguistic awareness was extensively used as a construct in research. This research indicated that meta-linguistic awareness in bilingual learners is an important component in the learning process because of the positive relationship it has on language and literacy growth (Bialystok, 2007; August & Shanahan, 2006). Later in the 1990's research began to focus on phonological aspects of language and knowledge of the alphabetic principle and phonics as the main abilities in literacy learning. The research continued to find that meta-linguistic awareness also enhanced the literacy learning of bilingual learning (Koda, 2008).

Research also began to highlight that meta-linguistic development involves an intersection of linguistic and non-linguistic cognitive systems (Cairns, Waltzman & Schlisselberg, 2004). This interest in meta-linguistic awareness and meta-linguistic development led researchers to believe that these skills are associated with, and predictive of, successful reading acquisition. However, the question remains as to which component of meta-linguistic awareness plays such a defining role in literacy acquisition and development. Pragmatic awareness (understanding of the appropriate use of language), syntactic awareness (sensitivity to the structure of a sentence) and

phonological awareness (the perception of the sound structure of words) are all part of emerging literacy and are all considered to play an equal role in language and literacy development (Cairns, Waltzman & Schlisselberg, 2004).

This led researchers to question the role ambiguity detection (the ability to detect and report that a sentence and/or word can have more than one meaning) plays in literacy acquisition generally and reading comprehension specifically. In exploring this relationship, researchers learned that they could not dispute the role phonological awareness has in early reading abilities, since reading begins with an understanding of phoneme-grapheme correspondence. This phonological ability aids in decoding, which is a well-known facet of early reading (Cairns, Waltzman & Schlisselberg, 2004). Reading comprehension, on the other hand, has not been as well investigated and documented as decoding (Cairns, Waltzman & Schilsselberg, 2004). In the recent past, however, research focused specifically on the role sentence ambiguity detection plays in reading comprehension has increased, as researchers attempt to address the above-mentioned literature gap on the subject.

Sentence ambiguity is considered an integral part of reading comprehension because deciphering the ambiguities present in any given sentence involves the act of detecting and evaluating ambiguities within words and sentences in order to comprehend them, which is hypothesized to lead to reading comprehension (Cairns, Waltzman & Schilsselberg, 2004). From the present body of research, it is known that sentence ambiguity has two main components; lexical and structural ambiguities. On one hand, lexically ambiguous sentences are sentences that include one ambiguous word which has the ability to change the whole meaning of the sentence. For example, in the sentence 'That ball was one of the nicest I had ever seen,' the word 'ball' could have two different meanings. It could either mean a party or an object with a round

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body. As a result, this word gives the sentence two plausible meanings. It is up to the reader to examine the context in which the ambiguous word is in so that the appropriate meaning can be derived.

A structurally ambiguous sentence, on the other hand, does not include one single word which is ambiguous; rather the syntactic structure of the sentence is what makes it ambiguous. For example, 'The mother tickled the little girl with the toy,' could either mean that the mother tickled the girl who was holding a toy or the mother tickled the girl though the use of the toy.

Despite further research into the area, researchers and educators are still unsure of the role meta-linguistic awareness plays in reading comprehension (Cairns, 1999; Mitchell, 1994; Simpson, 1994; Swinney, 1979). The literature indicates that when a sentence is being processed, the read information is transformed into phonetic information and stored in working memory (Cairns, 1999; Mitchell, 1994; Simpson, 1994; Swinney, 1979). Individual lexical items are then retrieved from the reader's internal lexicon, making the lexica information available to be used in order to bring meaning to the processed sentence. Simultaneously, the reader creates a structural organization for the words. Once both the structural and lexical meanings are in place, the basic meaning of the sentence can be retrieved because this basic meaning is a function of the meanings of its words and their structural organization (Cairns, 1999; Mitchell, 1994; Simpson, 1994; Swinney, 1979).

For the information to be accessed in order to understand the meaning of ambiguities found in a given text, many processes must take place. It is these processes that researchers are interested in (Cairns, 1999). For example, when processing lexical ambiguities, phonemic information in working memory must make contact with the phonetic representation stored in the lexicon, and information about the meaning of the

word is retrieved (Crains, Waltzman & Schlisselberg, 2004). Sometimes a reader might encounter homophones (a type of lexical ambiguities), multiple meanings are then retrieved and only one meaning is then selected (based on the provided context).

Structural ambiguities, on the other hand, work differently. Usually, under normal circumstances, only one analysis will be retrieved. The information being read (along with the reader's internalized syntactic system) results with the preferred analysis for the structural ambiguities. This analysis is either temporary (resolved before the end of an ambiguous sentence) or permanent (resolved right away) (Crains, Waltzman & Schlisselberg, 2004).

Based on the definitions above, a number of researchers have investigated the ability to detect ambiguity in sentences (Keil, 1980; Shultz & Pilon, 1973; Wankoff, 1983). Two major points summarize the consistent findings. First, ambiguity detection ability develops during early school age. Second, lexical ambiguity detection develops earlier than the ability to detect structural ambiguities. However, only a few studies have investigated the relationship between ambiguity detection and early reading comprehension, but the ones that do exist reveal a correlation between early reading skills and ambiguity detection ability (Crains, Waltzman & Schlisselberg, 2004). In light of all the above, this present study investigates the relationship between ambiguity detection (structural and lexical) and the reading comprehension of children in grades 5 and 6.

Purpose

The purpose of this study was to examine the relationship between meta-linguistic awareness (deep structural ambiguities, surface structure ambiguities, and lexical ambiguities) and reading comprehension. Although there are various

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components of meta-linguistic awareness, this study focuses on one main component: ambiguity detection. The lack of literature that attends to this subject was key in choosing it as the focal point of this study. Although research into the subject has recently increased, more is needed in order to gain a better understanding of meta-linguistic awareness in children (Zipke, Ehri & Cairns, 2009). Consequently, the following questions were considered in this study:

1. Are deep structural ambiguities, simple structural ambiguities, lexical ambiguities and reading comprehension related?

2. How do deep structural ambiguities, surface structural ambiguities and lexical ambiguities influence reading comprehension of 5th and 6th graders?

Rationale

Although meta-linguist awareness is not new to the field of education, little research has investigated the effect it has on reading comprehension (Zipke, Ehri & Cairns, 2009). In addition to that, no documented research has studied this effect on elementary readers in Middle Eastern contexts generally and in Lebanon specifically.

A review of the literature on the subject reveals that novice readers may seem to benefit from such awareness skills since their reading is generally unfocused (Adams, 1990). According to the research, linguistic structure could help such novice readers focus their attention more while reading (Kuo & Anderson, 2006). This might be so because research has indicated that beginning readers are busy decoding and reading word-for-word that they begin to lack the cognitive resources (working memory) needed in order to focus on comprehension (Kuo & Anderson, 2006). Therefore, teaching them such meta-linguistic awareness skills may provide them with more working memory which will in turn allow them to allot more attention to reading

comprehension (Rubman & Walters, 2000).

Nonetheless, the few studies which have investigated the role of meta-linguistic awareness in reading comprehension targeted adults and college-level students, as opposed to elementary students (Rubman & Walters, 2000). One cited reason behind this is that some educational psychologists and researchers still believe that children are cognitively incapable of acquiring such meta-cognitive knowledge (Roe, Smith & Burns, 2005). Researchers are still questioning whether or not children have the cognitive resources needed in order to understand the meta-cognitive processes that might act as a catalyst in their reading process (Zipke, 2008).

In this exploratory study the researcher's interest lays in whether or not there is a correlation between meta-linguistic knowledge and reading comprehension. The results of this study could lead to a later subsequent study which would investigate the effects of teaching meta-linguistic awareness on reading comprehension in elementary students.

Significance

Research reports that ambiguous words found in any given context may disrupt the reading comprehension process of the reader (Hino, Lupker & Pexman, 2002). Therefore, when working with students in order to improve their reading comprehension, it is important to consider the impact ambiguous words have on reading comprehension. Also, Tunmer and Bowey's (1984) model stated that training in ambiguity detection significantly improved the reading comprehension of novice readers (as cited Yuill, 1998). In an attempt to generalize Tunmer and Bowey's claims, Yuill (1998) also noted that training readers to identify the ambiguities found in both sentences and riddles helped improve reading comprehension scores.

Therefore, increasing educators' awareness about the impact ambiguity detection has on reading comprehension might help improve reading comprehension instruction inside the typical elementary classroom, which should in turn help improve reading comprehension. This study will assist in raising awareness of the subject matter in Lebanon as no documented research in the field of ambiguity detection (deep structural, surface structural, and lexical), been conducted in Lebanon. Hopefully, exposing Lebanese educators to information about the impact ambiguity detection has on reading comprehension they can then start to address this issue in the early elementary grades, which will in turn help improve reading comprehension at the higher grades.

Finally, reading comprehension is connected with most of the other content area subjects (Roe, Smith & Burns, 2005). Finding ways to improve it will also help educators improve the performance of students in other subject areas like Math (word problems), Science and Social Studies. If this study reveals that there happens to be a positive correlation between ambiguity detection (a form of meta-linguistic awareness) and reading comprehension, then that would compel further research into how meta-linguistic awareness can be taught in classrooms.

Methodology

Participants

The researcher did not have a choice in selecting the participants for this study. The school director provided the researcher with access to only the students in grades 5 and 6. The school director did not allow the researcher to include students in other grades. Hence, the provided sample were Lebanese students enrolled in one private school located in the suburbs of Beirut, where English is the language of instruction in

all subject areas except Arabic and French. Sixty two students in grades 5 and 6 participated in the study. The age of the participants ranged between 10 and 12 years. Twenty eight children participated from the 5th grade (12 girls and 16 boys) and 28 from the 6th grade (11 girls and 17 boys). The fifth and sixth grade homeroom teachers' participation was limited to helping the researcher administer the tests in the classroom.

Independent Variables

The independent variables in this study are deep structural ambiguities, surface structure ambiguities and lexical ambiguities.

Dependent Variable

The dependent variable in this study is reading comprehension.

Design

The study follows a correlational design. The variables studied are: meta-linguistic awareness (deep structural ambiguities, surface structural ambiguities and lexical ambiguities) and reading comprehension. The researcher administered three main assessments. The first assessment involved twenty five riddles. The second assessment involved forty ambiguous sentences. The third assessment was reading comprehension. The first two assessments were used to assess ambiguity detection at all three levels (lexical, deep and surface structural). It is important to note that the riddle assessment and the sentence ambiguity assessment were both taken from Zipke's study (2007). The third assessment assessed reading comprehension through reading a text and answering questions.

The sentences in the sentence ambiguity assessment could be categorized under 4 main categories; deep structural ambiguities, surface structural ambiguous, lexical ambiguities, and foil sentences. Foil sentences are sentences that do not include ambiguities at any level.

The scores on the riddle assessment and the ambiguous sentence assessment were correlated with the reading comprehension scores the students received on the reading comprehension assessment, which is based on the current Houghton Mifflin Reading Program used at the participants' school. This assessment is both standardized and reliable. Professionals in the field of reading have created this assessment for students who are learning English as a second language (Cooper & Pikulski, 2008).

Procedure

After approval from the IRB, the researcher obtained written permission from the school in order to carry out the research study. Once permission was granted, the researcher distributed a parent consent form to the parents/guardians of each potential participant. Once the signed forms were obtained from the parents/guardians, the researcher distributed a child assent form to each potential participant. The students read the assent form and signed it if they wished to participate in the study.

Next, the researcher explained the purpose and the procedures of the study to the homeroom teacher, who helped the researcher conduct the assessments. The data collection tools were also shown and explained (by the researcher) to the homeroom teachers and participants.

Data collection tools were adopted from Zipke's study (2007). There were 22 structural riddles (Appendix I) and 40 ambiguous sentences (Appendix II). At the onset of the study, the researcher met with the students and explained the assessments to the participants. Questions were answered, and the participants were assured that their answers would remain confidential and autonomous. In total, the students needed 2 hours to complete all three assessments; thirty minutes for the sentence ambiguity task, 30 minutes for the riddle task and 60 minutes for the reading comprehension task.

First, students were shown the list of 40 sentences with the numbers 1 and 2

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printed under each sentence. They were asked to read each sentence silently to themselves, decide how many meanings each sentence had and circle the corresponding number. Multiple examples were given. The researcher and the homeroom teacher circulated around the classroom, as the students were responding to the sentences, to insure that they were working on their own. Adults did not answer any comprehension questions. Thirty minutes were allotted to this task.

Next, the students received the riddle task sheet. The 22 riddle questions were handed out to the same participants. There were two punch lines after each riddle. The students were instructed to circle the punch line that solved the riddle. Thirty minutes were allotted for this task.

Finally, the participants sat for a reading comprehension assessment task. Sixty minutes were allotted for this task. The fifth grade students read a text about Mount Everest while the sixth grade students read a selection about Athens.

Instruments

In the riddles assessment, two punch-lines were provided under each riddle. The participants were expected to select the punch line that turned the question into a riddle. For the purpose of this study, a riddle is defined as "a puzzling question with a surprising answer and it usually makes us laugh" (Zipke, 2007, p. 5).

The ambiguity detection assessment included 40 sentences which could be categorized under four categories; these being 10 deep structural ambiguous sentences, 10 surface structural ambiguous sentences, 10 lexically ambiguous sentences and 10 foil sentences. Sentences that are lexically ambiguous contain a word with more than one meaning without a class violation; for example, in the sentence 'The boy sat by the bank,' the word 'bank' can refer to either the edge of a river or an institution for handling money. In this sentence, however, 'bank' is necessarily a noun. In other contexts 'banks'

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can be a verb, but neither of the meanings in this sentence requires it to cross class boundaries and become another part of speech.

Sentences with surface structure ambiguities are those whose words can be combined to form grammatical phrases in two different ways. For example, words in the sentence 'They are cooking apples' can be grouped to mean 'They (people as subject)-are cooking (verb)-apples' (object) or 'They (apples as subject)-are- cooking (modifier of) apples.'

Sentences containing ambiguity at the deep structural level cannot be disambiguated on the surface. Rather, the alternative grammatical relations among the words are disambiguated beneath the surface and involve sorting out who does what to whom, with some of these relations left unspecified on the surface, for example, 'The horse is ready to ride' may mean 'The horse is ready to ride (in the trailer)' or 'The horse is ready (for the cowboy) to ride.'

The reading comprehension test included a reading passage followed by comprehension questions that satisfied the literal and inferential levels, especially designed to test reading comprehension of fifth and sixth graders. This assessment included a reading passage with subjective and objective reading comprehension questions. These questions catered to the various levels of cognitive thinking (knowledge, comprehension, application, analysis, synthesis (creativity), and evaluation).

The instruments were piloted before use for assessment. The pilot process helped determine duration and item ambiguity. Six students were randomly selected from the sample population. These students then sat for the riddle, ambiguous sentence and reading comprehension assessments. The results were used in order to determine duration needed for each assessment and item ambiguity. These students were excluded

from the actual study.

Data Analysis

This study followed a correlation analysis and regression. The constructs of meta-linguistic awareness (deep structural, surface structural and lexical ambiguities) are the predictor variables and reading comprehension is the dependant variable.

Assumptions

The following assumptions were made:

1. Students can understand the language and the content found in the instruments.

2. The content of the scales is in agreement with the Lebanese culture.

3. The students will answer the scales objectively.

Limitations

One of the limitations in this study is that data was collected from one Lebanese school. Consequently, the results cannot be generalized to Lebanese students in other schools and other parts of the country. Furthermore, the sample size is relatively small and limited to a number of grade levels, which also does not allow for the generalization of results. It is recommended that future studies include a larger group of participants coming from different socioeconomic backgrounds.

CHAPTER II

LITERATURE REVIEW

Introduction

In the existing research into the relationship between different facets of meta-linguistic awareness and learning to read, much attention has been allotted to phonological awareness (Kuo & Anderson, 2006; Hino, Lupker & Pexman, 2002). However, research has revealed that reading is more than just being phonologically aware of the words within a text; it requires converting orthographic forms into phonological forms and then mapping them into semantic information (Kuo & Anderson, 2006; Hino, Lupker & Pexman, 2002). Hence, teaching reading requires more than just teaching alphabets, sounds and blends. It is a mix of processes that work together in order to help a reader decode and comprehend.

Research that dates far back into the 1970's shows the potentially powerful role of meta-linguistic skills on reading. For example, Weaver (1979) illustrated how instruction in meta-syntax leads to the improvement in reading comprehension scores of third graders (as cited in Roth, Speece & Cooper, 1996). The results of Weaver's study highlighted how other meta-linguistic variables might be more important once children advance into the stages after the initial stages of reading development, an example here would be decoding and phonemic awareness (as cited in Roth, Speece, & Cooper, 1996; Dreher & Zenge, 1990).

To illustrate the point that many researchers are trying to make when it comes to meta-linguistic awareness and reading comprehension, it is important to understand and derive, from the present literature, the operational definition for meta-linguistic

awareness as it pertains to reading comprehension (Zipke, 2007).

For many years, research has consistently shown that phonemic awareness alone is not enough. This was shown when research revealed that children with sufficient phonemic awareness did not necessarily do well in reading comprehension (Tunmer, Nesdale & Write, 1987; Zipke, Ehri & Cairns, 2009). The same studies also showed that no child who performed poorly on the phonemic awareness task, performed well on the comprehension tasks (Tunmer, Nesdale & Write, 1987; Dreher & Zenge, 1990; Nation & Snowling, 1998; Nation & Snowling, 1999; Nation & Snowling, 2000). Therefore, research so far has indicated that having phonemic awareness skills is important, but not necessarily a guarantee of successful predictor of beginning reading (Roth, Speece & Cooper, 1996; Wang, Yeong & Choi, 2009; Zipke, Ehri & Cairns, 2009).

To this day, little research has studied the role of meta-linguistic awareness in reading comprehension (Zipke, 2007; Andrews & Bond, 2009). However, the level of research is not necessarily reflective of the academic interest in the field, as some studies date back to the 1980's. For example, Tunmer and Bowey (1984) proposed a model which highlighted the role that meta-linguistic awareness plays in reading comprehension. They claim that a beginning reader's primary focus is on the meaning of words, but this focus is always set aside when a reader is first learning how to read. This occurs because all efforts are focused on decoding; once the decoding skills are mastered, a reader is capable of shifting his/her attention to meaning (as cited in Zipke, 2007).

Along the same lines, another model states that a novice reader approaches the reading act without the clear idea that reading requires extraction of meaning, and that decoding and word recognition are only a means to attaining this goal (Roe, Smith &

Burns, 2005; Zipke, 2007). Therefore, both models claim a role for meta-linguistic knowledge. On one hand, Downing's (1978) model states that such knowledge is important for attaining meaning, but it is not a prerequisite for decoding (as cited in Zipke, 2007). On the other hand, in Tunmer and Bowey's (1984) model, the meta-linguistic awareness required for comprehension is different from the ones required for decoding. For example, decoding requires lower levels of meta-linguistic awareness, which are morphemic and phonemic awareness, while comprehension requires higher levels of meta-linguistic awareness such as lexical and super-lexical skills (as cited in Zipke, Ehri & Carins, 2009; Zipke, 2007).

For novice readers, shifting attention while reading from decoding to attaining meaning from the text is not easy. This is why Tunmer and Bowey were the first to claim that such students need meta-linguistic awareness generally, and syntactic awareness specifically, to help them shift from form to meaning and to help them monitor their comprehension (as cited in Zipke, Ehri & Cairns, 2009). This research shed light on the idea that meta-linguistic awareness also helped in comprehension monitoring, which in turn also boosted comprehension scores (Yuill, 1998; Zipke, Ehri & Cairns, 2008; Zipke, Ehri & Cairns, 2009).

Therefore, research is indicating that if a reader has meta-linguistic awareness, he/she has the skills required to tackle an unknown word in a sentence (Ehri, Nunes, Stahl & Willows, 2001). In other words, when readers face a word that they do not know, they have the ability to use the meaning of the sentence, as well as the grammatical structure, in order to figure it out (Zipke, 2007). This, of course, improves vocabulary acquisition and in turn improves comprehension because this way, next time a child encounters the word, he/she does not need to spend any time guessing, consequently leaving the reader with the cognitive space and time (working memory)

needed in order to reach comprehension (Carlisle, 1995).

One can then conclude, given the discussion above, that the basic abilities required from any reader for reading comprehension are decoding, vocabulary, and higher-level skills (understanding and flexibility with words and sentence structures). Hence, one understands that meta-linguistic skills include the ability to simultaneously attend to the content and form of a language and the ability to talk and think about a language as an object, rather than just a means of communication (Zipke, Ehri & Cairns, 2009).

Since the 1960's, researchers have been interested in a specific form of meta-linguistic awareness known as ambiguity detection (Mackay & Beaver, 1967). This awareness involves the ability to understand that a single sentence or word can have more than one meaning. Meta-linguistic awareness has been marked as the first characteristic of meta-linguistic abilities. The second characteristic involves the ability to discuss the two meanings of a given sentence or word (Cairns, Waltzman & Schilsselberg, 2004).

Relevant research indicates that that there tends to be a relationship between meta-linguistic awareness and comprehension (Dreher & Zenge, 1990). This may be so, because such knowledge seems to have the reader flexibly think about what the 'correct' meaning may be. In addition to that, such knowledge should enable readers to monitor their comprehension by having them revisit an ambiguous word or sentence in order to improve comprehension (Pexman, Hino & Lupker, 2004). Thus, research on meta-linguistic awareness is beginning to reveal that readers who are capable of identifying and comprehending ambiguous words and sentences tend to achieve better results in reading comprehension (Cairns, 1999; Pexman, Hino & Lupker, 2004; Rubman &Walters, 2000; Zipke, 2007; Zipke, 2008; Zipke, Ehri & Cairns, 2008).

In light of the above, it is evident that ambiguity detection and resolving skills are important because the majority of the one thousand most commonly used words in the English language are multiply ambiguous by nature (Zipke, 2008). Such ambiguities include both structural and lexical ambiguities. Structural ambiguities include whole sentences and phrases that have more than one meaning. For example, 'The boy spoke about the problem with his neighbor.' This sentence may mean that a child has a problem with his neighbor and he confronted him/her, or it may mean that the child was telling a third party about a personal problem which he shared with his neighbor. Lexically, an ambiguity may include a homonym; for instance the word 'ball' could either mean a round object that is frequently used in sports, or a fancy party. Such ambiguities can only be deciphered through context (Yuill, 1998). In other words, meta-linguistic abilities like rearranging syntax, semantics and pragmatics of a sentence are necessary for comprehending ambiguities which happen to make up a big part of the English language (Zipke, 2008).

Therefore, reading is a psycholinguistic skill; it is a task that requires various processing operations (Cairns, Waltzman & Schlisselberg, 2004). This discussion begs the question: How does a reader resolve an ambiguous sentence and/or word once he/she encounters it?

At the lexical level orthographic representations are transformed into phonemic information (via decoding) and then through working memory they make contact with phonetic representations which are stored in the lexicon. Finally, information about the meaning of the word (as well as other grammatical information) is retrieved (Lively, Pisoni & Goldinger, 1994; Cairns, 1999; Cairns, Waltzman & Schlisselberg, 2004). In the case of homonyms (ambiguous lexical items) multiple meanings are retrieved (because all are associated with the same phonetic representation). The individual

selects one meaning, using relevant context, if available, and inserts it into the sentence being processed (Simpson, 1994; Cairns, Waltzman & Schlisselberg, 2004). After several trial and error processes (if needed) comprehension is attained.

At the structural level, the process is carried out a bit differently under normal circumstances, only one structural analysis will be computed, even if more than one is compatible with the grammar (Cairns, 1999; Cairns, Waltzman & Schlisselberg, 2004). The parser operates with a number of extra grammatical preferences that guide initial computation of structure. Thus, the reader's internalized syntactic system leads to a preferred analysis for structural ambiguities that either is temporary (i.e. resolved before the end of the sentence) or results in a structurally ambiguous sentence. For example, if a reader encounters the following sentence, 'The boy found the bat near the desk', both meanings of the ambiguous word 'bat' are retrieved (unconsciously) from the lexicon and only one meaning is selected (also unconsciously) to participate in the meaning of the sentence. If the selected word does not fit the context, then the reader is required to reprocess the sentence and select the other meaning. In order for this process to take place, two main things must happen; first, the structure must be reprocessed and second, the next time around, the preferences of the parser must be set aside so that a completely new structure may be computed (Cairns, Waltzman, & Schlisselberg, 2004).

Two points then follow: first, the ability to reprocess a sentence underlies ambiguity detection, and second, reprocessing a lexically ambiguous sentence is easier than reprocessing a structurally ambiguous one because the alternative meaning of the ambiguous lexical item has been available (briefly and unconsciously) during the initial processing of the sentence. Hence, recent research is questioning whether successful reading comprehension requires a reader to carry out both lexical and structural processing operations rapidly and efficiently and to recover from errors by reprocessing

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information when initial processing goes awry (Cairns, Waltzman & Schlisselberg, 2004; Dreher & Zenge, 1990).

Cairns et al. (2004) tested children on their ability to report the ambiguity of sentences whose ambiguities resulted from homonyms (lexical ambiguities). They also investigated their ability to detect structurally ambiguous sentences. It was found that 4 and 5 year olds failed to identify both kinds of ambiguities. Children in the first grade could not identify structural ambiguities but they could identify with a few lexical ambiguities. By second grade, the same children showed abilities to detect structural ambiguities. Regression analysis in Cairns's *et al.* (2004) study showed that the lexical ambiguity detection scores of the first graders accounted for more than half the variance in their second grade reading scores. In addition to that, their ambiguity scores in the second grade were significant predicators of their third grade reading scores. Cairns et al. (2004) suggested two explanations for this relationship between ambiguity-detection and reading ability; one relates to the meta-linguistic skill required to perform the detection tasks and the other relates to the operation of psycholinguistic processes (Zipke, Ehri, & Cairns, 2009; Dreher & Zenge, 1990).

All the above illustrate that ambiguity is very common in the English language. Research today is beginning to question whether knowing when there are two meanings for a single word, phrase or sentence and having the skills and strategies to determine which meaning is preferred, are necessary skills for successful reading comprehension (Zipke, Ehri, & Cairns, 2009).

In investigating the effect of unknown and/or ambiguous words on reading comprehension, researchers recorded a reader's eye fixations as they read sentences containing either balanced or biased ambiguous words. Biased ambiguous words have one high-frequent dominant meaning and one (or more) low frequent subordinate

meanings. Balanced ambiguous words are words with two frequent ambiguous meanings (Rayner, Pacht & Duffy, 1994; Binder & Morris, 1995; Roth, Deborah, Cooper & De La Paz, 1996). In these studies, it was noted that longer reading times were required for a balanced ambiguous word than an unambiguous control word (Rayner, Pacht & Duffy, 1994; Binder & Morris, 1995; Roth *et al.*, 1996). The literature claims this to be a time consuming competition between meanings of the ambiguous word at the access of selection stage (Rayner, Pacht & Duffy, 1994; Binder & Morris, 1995; Roth *et al.*, 1996). This time tends to slow down when two equally likely meanings are retrieved from the lexicon. This is so because the reader has to choose between two meanings which are available at the same time. When it comes to balanced ambiguous words with no prior disambiguating context, readers have a 50-50 chance of selecting the wrong meaning (Cairns, Waltzman, & Schlisselberg, 2004). If the wrong word is selected, more time is allotted to the re-analysis of the ambiguous word.

It has also been noted that once a child encounters and resolves an ambiguous word or phrase, he/she continues to read with alert. This was recorded through the eye fixation records and it was observed that the reader tended to read for ambiguities (Pacht & Rayner, 1993). It was also found that less skilled participants found it more difficult to suppress an ambiguous word's inappropriate meaning than to enhance the contextually appropriate one, hence making the efficiency of the suppression mechanism an important component of the general comprehensive skill (Gernsbacher & Faust, 1991).

Despite the many studies which took place in this field, most focused on adults (Andrews & Bond, 2009; Ehri *et al.*, 2001; Gernsbacher & Faust, 1991; Gernsbacher, Varner & Faust, 1990), and only a few examined the role that ambiguity resolving plays in the reading comprehension of young children (Cairns, Waltzman & Schilisselberg,

2004; Carlisle, 1995; Dreher & Zenge, 1990). This is surprising since ambiguity detection and resolution draw on at least two component skills of comprehension which may not be fully developed in children; these being context use and monitoring (Zipke, Ehri & Cairns, 2009).

Context Use

In general, it is important to integrate information in a text because it helps the reader attain a solid representation of the meaning (Gernbacher, Varner & Faust, 1990; Zwaan & Radvansky, 1998). In specific, lexical ambiguity requires context integration in order to resolve the ambiguous words (Hino, Lupker & Pexman, 2002).

Monitoring

Comprehension monitoring has shown to be an important reading skill in children as it regulates the processes by which a reader evaluates his/her understanding of a given text (Rubman & Walters, 2000; Zinar 2000; Cairns *et al*., 2004). Readers who monitor their reading continuously ask themselves whether what they are reading "makes sense." This helps the reader identify whether or not the choice he/she made to resolve the ambiguous word, phrase or sentence fits well within the context (Rubman & Walters, 2000).

It is important to note the difference between the above mentioned sentence processing operations and ambiguity detection. Ambiguity detection is carried out unconsciously and quickly, while the meta-linguistic skills - which come into play during ambiguity detection -are not only conscious, but also require time and effort on behalf of the reader (the person making the judgment) (Zipke, Ehri, & Cairns, 2009).

In light of the possible relationship between ambiguity detection and

comprehension, researchers have begun to identify how educators could teach ambiguity in order to improve comprehension. One fun way is through the use of riddles. Zipke, Ehri & Cairns (2009) found that teaching ambiguity detection to children through riddles was very effective because they are fun and consists of short texts; hence making them particularly suitable for both teaching and assessing ambiguity detection in children. Several researchers have used riddles in their studies (Mahony & Mann, 1992, 1998; Yalisove, 1978; Shultz, 1974). Yuill (1998) was the first to examine the effect of teaching children sentence ambiguity, through the use of riddles, on reading comprehension. In Yuill's (1998) study, she focused on Tunmer and Bowey's (1984) model, where various meta-linguistic skills are considered to affect several aspects of reading ability, with a few others contributing to comprehension. She found that being able to solve morpho-phonological riddles correlated with word reading accuracy, both significantly and positively, whereas, being able to solve riddles at both the syntactic and lexical levels significantly correlated with reading comprehension (Hagvet, 2003; Hino, Lupker & Pexman, 2002; Tunmer, Nesdale & Write, 1987).

In her study, Yuill examined whether training in riddles and ambiguities improved the reading comprehension of seven and eight year olds. The experimental group received seven weeks of treatment sessions. The researchers taught the children about the meaning of words in isolation and in sentences. The children also received training in riddle resolving. The control group read (any other word adjective you can use here?) stories and played phonemic awareness games. While the results showed that both groups improved in reading comprehension after training, the experimental group significantly outperformed the control group by six months in comprehension age (Zipke, Ehri, & Cairns, 2009; Yuill, 1998).

These results revealed that training children to be flexible with words and to

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attend to syntax is a form of meta-linguistic awareness that improves reading comprehension. In addition to that, the study indicated that this training helped improve children's self-monitoring skills during reading, which in turn improved reading comprehension (Hagvet, 2003; Yuill, 1998; Zipke, Ehri & Cairns, 2008).

In extension to Yuill's study (1998) and Cairns et al. (2004), the most recent study by Zipke, Ehri and Cairns (2009) taught their experimental group to reprocess ambiguous words, sentences and riddles. The results indicated that meta-linguistic awareness, which involves processing multiple meaning and detecting ambiguities, improves reading comprehension.

In light of the above, research is beginning to indicate how riddles are a perfect tool for teaching students how to manipulate language (Zipke, 2008). This research suggests that riddles are an important teaching tool because they teach a student how to understand the nature of ambiguity in language through the use of metaphors, multiple meanings and idioms. In other words, in order for a student to understand the humor of a riddle, he/she must exercise meta-linguistic skills (Shade, 1991). More recent research has highlighted why riddles are such effective teaching tools for children in the elementary grades (Zipke, 2008). According to Zipke's study, riddles were found to be especially engaging because most children are already familiar with them. Many children might not understand the ambiguity in them, but they have heard of them before and enjoy tackling them, according to questionnaires and observations (Kazemek, 1999; Zipke, 2008). Over and above, riddles have shown positive effects on the learning outcomes of the younger children, because they are short texts which include a whole content. As short as they are, they still carry units of meanings (Kazemek, 1999; Zipke, 2008).

Wilson & Kutiper (1993) illustrated the benefits of riddles by linking the

learning outcomes to enjoyment. They claimed that riddles help the educator establish a fun and humorous atmosphere which will automatically be reflected on the reading act. They also noted that riddles help teachers assess reading comprehension because once a student smiles or laughs after reading a riddle it will automatically indicate reading comprehension. Furthermore, being able to resolve an ambiguous riddle also indicates reading comprehension (Zipke, 2008).

A riddle Zipke (2008) used in several studies was: "Why are fish so smart? Because they swim in schools." In this example, the word "school" is ambiguous because it could either mean the way fish swim or it could be where children go to learn. If we are to look more critically at this riddle, we notice that the child is expected to retrieve both meanings for the word "school" from their lexicon, because this is the only way they will understand the twist in this riddle. Following is another riddle used in Zipke's (2008) study: "How do you make a hot dog stand? You take away its chair!" Understanding this riddle requires rearranging the syntax of the question (ex. Structural Ambiguity). Here the word "stand" has two meanings, but children are expected to choose the meaning which fits the context best. This process has shown to have a positive effect on reading comprehension (Zipke, 2007; Zipke, 2008).

Other research has also studied the effect of riddles on reading. In one study, the researchers asked 48 children from grades 1 through 6 to rate the humor and explain the joke contained in a variety of riddles (Wilson & Kupner, 1993). The researchers found that the easiest riddles to explain where those whose ambiguities resulted from lexical interpretations or transparent semantic properties. As for the more difficult ones, they had both phonological and surface structure ambiguities, as well as deep structure ambiguities (McGhee, 1974). A limitation in this study was the reading comprehension assessment. According to the results, it was noted that retelling a riddle or explaining

the joke was in itself a difficult task for the young children, making it a poor indicator of reading comprehension.

Other research tried to address this limitation. Yuill (1998) tried to address the relationship between reading comprehension and riddle disambiguity by performing an experiment on twenty-nine 8 to 11 year olds. She found that riddle recall (comprehension assessment) and the overall riddle scores were significantly related to reading comprehension.

In a follow up study, Yuill (1998) explored the same issues with a similar group of participants. This time, however, she provided the participants with riddle questions alongside two different punch lines (one intended and one that did not resolve the incongruity). The participants were instructed to choose the best answers, and the results revealed a significant positive correlation between the riddle resolving task and reading comprehension.

Zipke (2007) studied the role meta-linguistic awareness plays in reading comprehension. Zipke administered two meta-linguistic tasks on 105 sixth and seventh graders. The first task involved providing the students with a riddle question and two possible punch lines. This is an important part of the assessment because choosing the correct punch line implies that the student has recognized the ambiguity inherent in the riddle.

The second test used to measure meta-linguistic awareness was an ambiguous sentence recognition task. The sentences involved ambiguities at the lexical, surface structure and the deep structure levels. The participant had to indicate whether or not each had two different meanings (Zipke, 2007). The study revealed that the riddle scores correlated higher with reading comprehension than the ambiguous sentence scores. The findings indicate that solving riddles is a stronger potential contributor to

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reading comprehension than ambiguous sentence recognition.

The research on hand suggests that riddles have been recently considered to be a fun teaching tool in the elementary English classroom. Riddles tend to stimulate meta-linguistic awareness, offering a positive influence on reading comprehension. Riddles therefore may be an effective tool used to teach children how to identify ambiguous language, and considering all possible meanings, in turn, may improve a student's reading comprehensive ability. Brief training in these skills may be enough to increase a student's sensitivity to the vast amount of permutations inherent in the English language. This sensitivity may help the students recognize the need to monitor their comprehension ultimately improving their reading comprehension Using riddles and ambiguous texts that rely on humor are fun for the children. They create an invaluable enthusiasm for literacy learning that is all too often missing in the typical elementary curriculum (Zipke, 2008). However, can it confidently be stated that riddles have a positive correlational relationship with reading comprehension?

Recently, and in light of the various theoretical and formal reading models briefly discussed above, research has been trying to derive an operational definition for meta-linguistic awareness as it pertains to reading comprehension (Zipke, 2007; Zipke, Ehri, & Cairns, 2009). So far, it has been identified that being able to understand the multiple meanings of words and sentences; ease in manipulating the order of words within a sentence or phrase; and flexibility in reprocessing ambiguous words and sentences, all contribute to reading comprehension (Zipke, 2008). In other words, ambiguity detection is being studied as an important factor in the reading comprehension process. The fact that the majority of the most common English words used in speech are ambiguous in nature further validates research into the subject area (Roth, Speece, Cooper & De La Paz, 1996). In order to develop understanding in this

field, it is imperative to study whether the ability to play with language and consciously rearrange the syntax, semantics and pragmatics of a sentence help to create multiple meanings that constitute meta-linguistic abilities.

CHAPTER III

METHODOLOGY

This section describes the methodology of the study including the study design, sample, and procedures that were followed to implement the riddle task, reading comprehension task, and the ambiguous sentence task.

Design

The study followed a correlational design. The variables that were included are meta-linguistic awareness (deep structural ambiguities, surface structure ambiguities and lexical ambiguities) as measured by the riddle task and the ambiguous sentence task (Zipke, 2007) and their correlation with reading comprehension, as measured by the Houghton Mifflin Reading Comprehension Test (Cooper & Pikulski, 2008). The riddle task and the sentence ambiguity task were replicated from Zipke's (2007) study which also investigated the role of meta-linguistic awareness in reading comprehension of Elementary children. The researcher used these tasks as suggested by Zipke (2007). The riddle task measured the child's ambiguity detection at all three levels (deep, surface and lexical). The riddle task consists of 22 riddles that are ambiguous at all three levels (deep structural, surface structural and lexical). Therefore, in order for a reader to comprehend and solve the riddle, he/she must decipher the ambiguity evident in each riddle. The sentence ambiguity task consisted of 40 ambiguous and unambiguous sentences. The sentences could be categorized into 4 groups: ten deep structural ambiguous sentences, ten surface structural ambiguous sentences, ten lexical ambiguous sentences and ten foil sentences; these being sentences with no ambiguities whatsoever.

As for the comprehension assessment, it was based on the participant's English program. This is a Language Arts program especially designed for children who are studying English as their second language (Cooper & Pikulski, 2008). The participants have been studying English through this program for at least six consecutive years.

Participants

The sample included 62 elementary students from grades 5 and 6. All the participants came from one private school located in the suburbs of Beirut (Lebanon). The age of the participants ranged between 10 and 12 years old. Twenty eight (n=28) students participated from grade 5, twelve (n=12) of which were girls and sixteen (n=16) boys. Another 28 (n=28) students participated from grade 6, eleven (n=11) of which were girls and seventeen (n=17) were boys. The participants have been studying English for at least 7 consecutive years. English is also the language of instruction in all subjects at the participants' school. It is also important to note that the participants' Elementary school follows the American program, standards and curriculum in all subjects, except Arabic and French.

Procedure

After receiving the clearance from the Institutional Review Board (IRB), the researcher sought the approval of the school director to conduct the study in the school. Once approval was granted, the researcher distributed the parent/guardian consent form to the parents/guardians of the potential participants. Finally, after the parents/guardians returned the signed consent forms, the researcher distributed to each potential participant an assent form. The students read the content of the assent form and signed the document if they wished to participate.

The pilot studies of the riddle task, reading comprehension task and sentence ambiguity task were implemented. Six (n=6) students were randomly selected (three from grade 5 and three from grade 6) to be part of the piloting process. The pilot studies were implemented over the period of two consecutive days. On the first day, the 6 participants solved the riddle task (30 minutes) and the sentence ambiguity task (30 minutes). The participants were given instructions and multiple examples before they started. The next day, the participants solved the reading comprehension task. Sixty minutes were allotted for this task. The participants were given instructions without any examples. It is important to note that the researcher and class teacher did not answer any comprehension questions.

Each student was given a number to represent his/her name. This ensured anonymity while still allowing the researcher to compare and correlate between each participant's scores on each of the three assessments.

On the sentence ambiguity task, the participants were first handed a list of 40 sentences in random order with the numbers 1 and 2 printed under each sentence (Zipke, 2007) (See Appendix II). They were asked to read the sentences silently to themselves, decide if the sentence had 1 or 2 meanings, and circle the corresponding number. Multiple examples of ambiguous and unambiguous sentences were given on the board prior to the assessment. For example, the researcher wrote the following example on the board with the numbers 1 and 2 printed under it; 'The child found a bat near the river.' The researcher read the sentence and showed the participants how this sentence could have 2 meanings resulting from the ambiguous word 'bat'. After demonstrating the thinking process out loud, the researcher circled the number 2 which indicated that the sentence could have two meanings; and is therefore ambiguous. The researcher and the classroom teacher both circulated to make sure that the participants

understood the task and they worked on their own. The adults among the students did not answer any comprehension questions. Thirty minutes was allotted for this task. Each participant received a score indicating the number of correct answers out of 40.

Next, the sentence response sheets were collected and the riddle task was distributed. The 22 riddles, in question format, were typed on a sheet of paper in random order, with two punch lines: one which solved the riddle and one which did not (Zipke, 2007) (See Appendix I). Participants were asked to read the items silently to themselves and then choose the answer that turned the question into a riddle. Multiple examples were given on the board. One of the examples was: 'Where can you see a man eating fish? A seafood restaurant.' The adults among the students also walked around the classroom in order to insure that the participants knew what they were supposed to be doing and that they were working on their own. Adults did not answer any comprehension questions. Each participant received a score indicating the number of riddles identified correctly out of 22 maximum. It is important to note that both the 5th and 6th grade students, participating in this study, are familiar with riddles and that they have addressed them in their English curriculum. Thirty minutes were allotted for this task.

The next day, the participants were given the Houghton Mifflin Reading Comprehension Assessment (Cooper & Pikulski 2008). Participants had to answer 10 reading comprehension questions, five of which were open ended and another 5 were multiple choice (See Appendix I and II). Each correct item received a 4; this added up to a 40 total score on the reading comprehension task. One hour was allotted for this task. The class teacher and researcher also walked around the classroom in order to insure that the participants knew what they had to do and they worked alone. Adults did not answer any comprehension questions.

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Piloting

The main purpose behind the piloting process was to examine whether the students were able to read and understand the items clearly and if not, how the unclear items should be revised or rephrased. The researcher took note of the questions the participants asked. The notes revealed that the students were able to understand most of the content found in all 3 assessment tasks. The questions they asked were mainly about pronunciation and articulation rather than comprehension and vocabulary. For example, one question a participant asked was: "How do I read this word?" The work he was pointing to was 'lobster'. Once he heard the researcher say it out loud he directly made the connection and said: "Ah the one we eat." These questions about word pronunciation and identification did not interfere with comprehension. Some other examples are: two students asked how to read the word 'grapefruit' on page 1 in the riddle task. Three other students asked how to read the word 'marvelous' on page 2 in the ambiguous sentence task. Despite the few pronunciation questions, the students were able to complete the 3 tasks without any language or comprehension difficulties.

Another reason behind the piloting was to make sure that the pre-decided time for each task was adequate. The researcher recorded the time in which the participants began the riddle task and stopped them after 30 minutes. The same was applied for the ambiguous sentence task. The next day, the participants were handed the reading comprehension task and the start time was recorded. One hour later, the researcher collected the reading comprehension assessments. After scoring the three assessments, the researcher noted that all six students completed and answered all the questions handed to them in the allotted time, and the timing was deemed adequate.

Instruments

Riddle Assessment Task

Twenty two riddles were selected from Zipke's (2007) study. Zipke selected the riddles from various compilations written for children from different backgrounds and cultures (Zipke 2007). Riddles that had ambiguities which hinged on the arrangement of the words within the riddle or double meanings of the words were selected for use (See Appendix I). Two punch lines were provided for each question and the student's task was to select the punch line that turned the question into a riddle. Although the participants were familiar with riddles and had studied them in their English program, a riddle was still defined as a 'puzzling question with a surprising answer that sometimes makes you laugh. You know the question and answer make a riddle when the same words have two different meanings.' The number of correct responses constituted to the participant's riddle score. An internal consistency of .57 was reported by Zipke (2007).

Ambiguous Sentences

Forty ambiguous sentences were also derived from Zipke's (2007) study (See Appendix II). Thirty of the 40 ambiguous sentences represented one of the three written types Deighton's (1971) taxonomy. These sentences were either created or selected from studies by Lefevre and Ehri (1974) or Mac Kay and Bever (1967) (as cited by Zipke, 2007). These included deep structural ambiguities (ambiguities that occur when the structure of a sentence implies something different from the underlying meaning); surface structure ambiguities (difficulties resulting from the syntactic arrangement of words); and lexical ambiguities (sentences in which a word had more than one meaning, without a class violation). The remaining 10 sentences were foil sentences and did not include ambiguities of any kind.

Sentences that are lexically ambiguous contain a word with more than one meaning without a class violation; for example, in the sentence 'The boy sat on the bank', the word 'bank' can refer to either the edge of the river or an institution for handling money. In this sentence however, 'bank' is a noun. Sentences with surface structure ambiguities are those whose words can be combined to form grammatical phrases in two different ways. For example in the sentence 'They are cooking apples', it can be grouped to mean 'they (people as subject) are cooking (verb) apples (object)' or 'they (apples as subject) are being cooked'.

Sentences containing ambiguities at the deep structural level cannot be disambiguated on the surface; rather, the alternative grammatical relations among the words are disambiguated beneath the surface and involve sorting out who did what to whom, with some of these relations left unspecified on the surface, for example, 'the bull is ready to ride' may mean that the bull is ready for someone to ride or that the bull is ready to ride the trailer. The ten foil sentences were selected from a novel called "*A Wrinkle in Time*" (L'Engle, 1962, as cited by Zipke, 2007).

Houghton Mifflin Reading Comprehension Assessment

The reading comprehension scores were collected and correlated with the scores received on the riddle and sentence ambiguity assessments. This reading comprehension assessment was specifically designed to assess a student's reading comprehension level using texts in line with the student's grade level. This assessment tool has been designed for children who learn English as a second language through a curriculum which follows the American program (Cooper & Pikulski 2008).

The researcher selected two different texts, one for 5th graders and another for 6th graders (See Appendix I and II). Both texts were informative selections that discussed topics the students have studied in their social studies classes. The selection

given to grade 5 was about Mount Everest, and the participants have studied the historical and geographical aspects of Mount Everest in their Social Studies class. As for the selection for grade 6, it was about Athens. The students have also studied the geographical, historical and political aspects of Athens in their Social Studies class. The researcher selected these selections having the background knowledge needed in order to make the comprehension connections needed is an important component in reading comprehension. These informative texts were also chosen because they do not have cultural and social barriers which could stand in the way of the participant's reading comprehension. This is an assumption the researcher made with a professional in the field of Reading and Language.

The selected reading comprehension texts consisted of both multiple choice and open ended questions. The grading of the assessment was made based on the accompanying marking key. The marking key highlights the correct letter for each multiple choice question and it includes 4 key words for each open ended question. The participant received one point for each mentioned key word in their written response. The maximum grade that could be attained in the reading comprehension assessment was a 40.

Data Analysis

Descriptive statistics were reported for the 3 assessment tools, reading comprehension (Cooper & Pikulski, 2008), riddle ambiguity and sentence ambiguity (Zipke, 2007). Means and standard deviations were calculated for each of the three assessment tools. Means were calculated for each participant to identify whether most of the participants received a score above the midpoint of scale in each of the three assessment tools stated above.

A Pearson correlation coefficient was calculated among the variables. It examined the correlation between the three assessments; Houghton Mifflin Reading Comprehension (which assessed reading comprehension) (Cooper & Pikulski, 2008), Riddle Ambiguity (which assessed lexical ambiguity) and Sentence Ambiguity (which assessed lexical, surface and deep structural ambiguities) (Zipke, 2007). Finally, multiple regression analysis was conducted to evaluate the necessity of riddle solving and ambiguity detection in predicting reading comprehension among children in 5th and 6th grade.

CHAPTER IV

RESULTS

This study explores whether meta-linguistic awareness, as assessed by riddle solving and ambiguous sentence detection, was related to reading comprehension among children in 5th and 6th grade. A correlational analysis was conducted to investigate the relationship among the variables. In addition to that, the study investigated the role of riddle solving and ambiguous sentence detection in predicting reading comprehension among 5th and 6th grade students. A stepwise regression was conducted to assess this relationship.

Validating the Instruments

In order to test for the validity of the measures used, reliability analysis was conducted for all 3 assessment tools; reading comprehension, ambiguous sentences and riddles (See Table 1).

Table 1

Reliability Statistics for Reading Comprehension Assessment, Ambiguous Sentence Assessment, and Riddle Assessment

	Number of Items	Cronbach's Alpha
Reading Comprehension	10	.69
Riddle Assessment	22	.52
Sentence Ambiguity	40	.68

As noted in Table 1, reliability analysis of the Houghton Mifflin Reading Comprehension Assessment and the Ambiguous Sentence Assessment revealed an acceptable level of internal consistency as shown by alpha coefficients. Given the relatively low alpha coefficient for the Ambiguous Riddle Assessment, results related to this variable should be interpreted with caution.

Descriptive Statistics

In line with the questions raised in this study, descriptive statistics on all the scores from the three assessment tools (reading comprehension, riddle ambiguity and sentence ambiguity) were conducted (See Table 2).

Table 2

Mean Scores and Standard Deviations of the three Assessment Tools; Reading Comprehension, Sentence Ambiguity and Riddle Ambiguity

	X	Std. Deviation	N
Reading Comprehension	27.85	9.18	56
Riddle Ambiguity	13.55	3.36	56
Sentence Ambiguity	18.73	5.52	56

The number of participants who sat for each of the three assessments during the two consecutive testing days indicates that no participant missed an assessment; all assessments were collected and scored. There was no participant absent on either one of the two test days. In addition to that, no participant was excluded from the study, except

for the 6 students who participated in the piloting.

In order to examine whether there is a relationship between meta-linguistic awareness (as measured by riddle ambiguity and sentence ambiguity) and reading comprehension (as measured by the Houghton Mifflin Reading Comprehension Assessment) a Pearson Correlation Product Movement test was conducted. The Pearson Coefficients were calculated and the findings are reported in Table 3 below.

Table 3

Inter-correlation between Performance on the Riddle Solving, Ambiguous Sentence Recognition and Reading Comprehension

Measure (n=56)	Reading Comprehension	Riddles
Reading Comprehension	____	.64**
Riddles		____
Ambiguous Sentences	.10	.38**

** $p < .01$

Performance on the riddle task was strongly and significantly correlated with reading comprehension, $r=.64$ $p<.01$. However, performance on the ambiguous sentence task was not significantly correlated with reading comprehension, at $p<.05$. The findings also show that there was a significant correlation between riddle task and the ambiguous sentence task, $r=.38$, but that this correlation is weak.

A stepwise multiple regression analysis was conducted to determine which variable (riddle solving or ambiguous detection) predicted reading comprehension. The variables entered into the equation were riddle ambiguity and ambiguous sentences (See

Table 4).

Table 4

Standardized β Coefficients for the Predictor Variables

Model	Standardized β Coefficient	Sig.
Riddle Solving	.70	.00
Ambiguous Detection	-.16	.13

Table 5

Inter-correlation between Performance on the Riddle Solving, Ambiguous Sentence Recognition and Reading Comprehension in Grade 5

Measure (n=29)	Reading Comprehension	Riddles
Reading Comprehension	____	.89**
Riddles		____
Ambiguous Sentences	.48**	.53**

** p < .01

In Grade 5, performance on the riddle task was strongly and significantly correlated with reading comprehension, r=.89 p<.01. In addition to that, performance on the ambiguous sentence task was also significantly correlated with reading comprehension, r=.48 p<.01. The findings also show that there was a significant correlation between the riddle task and the ambiguous sentence task, r=.53.

Table 6

Inter-correlation between Performance on the Riddle Solving, Ambiguous Sentence

Recognition and Reading Comprehension in Grade 6

Measure (n=29)	Reading Comprehension	Riddles
Reading Comprehension	____	.53**
Riddles		____
Ambiguous Sentences	-.17	.25

** p < .01

In Grade 6, performance on the riddle task was significantly correlated with reading comprehension, r=.53 p<.01. However, performance on the ambiguous sentence task showed no correlation with reading comprehension. The findings also show that there is a weak correlation between the ambiguous sentence task and the reading comprehension task.

The results show that the overall model was significant R^2 = .41 = 41%, F(2) = 20.41, p < .05, indicating that these predictors (riddle solving and ambiguous sentence detection) accounted for 41% of the variance in reading comprehension achievement. Examining the Standardized Beta Coefficient (β), as presented in Table 4, riddle ambiguity solving was the only predictor of reading comprehension achievements in this sample. Sentence ambiguity detection was excluded from the model.

CHAPTER V

DISCUSSION

This chapter discusses the results of this study in comparison with existing and recent research. Moreover, classroom implications and suggestions for possible further research are proposed.

After administering all three instruments to a sample of 56 fifth and sixth grade students, the results were analysed. The following paragraphs discuss the findings in relation to existing and recent research and attempt to explain the changes in terms of existing theories.

Findings

The findings of this study provide some further knowledge about the possible relationship between meta-linguistic awareness (deep structural, surface structural and lexical ambiguities) and reading comprehension of children in grades 5 and 6. The absence of substantial research devoted to the relationship between meta-linguistic awareness and reading comprehension in Lebanon makes the results of this study both valuable and introductory. On one level, the results present a possible relationship between meta-linguistic awareness and reading comprehension. On another level, the results examine the role meta-linguistic awareness plays on the reading comprehension of fifth and sixth graders; as measured by deep structural, surface structural and lexical ambiguities.

The first goal of this study was to examine the relationship between meta-linguistic awareness (deep structural, surface structural and lexical ambiguities) and

reading comprehension. The results indicated that a positive relationship between both variables exists. In fact the riddle task was significantly correlated with reading comprehension, as assessed by the Houghton Mifflin Reading Comprehension Test, in both grades 5 and 6. Although the sentence ambiguity task was significantly correlated with reading comprehension in grade 5, no correlation between the two variables was found in grade 6. Although the results in grade 6 do not reveal a positive correlation between the sentence ambiguity task and the reading comprehension task, the findings depict a significant correlation between the riddle task and the reading comprehension task. As stated above, since the riddle task assessed ambiguity detection at all three levels (deep, surface and lexical), it can be stated that the results in this study show a more positive relationship between meta-linguistic awareness in grade 5 than in grade 6, but one cannot deny that a relationship does exist between meta-linguistic awareness and reading comprehension in grade 6.

Some of the above findings are in line with previous research studies which also examined this relationship. Research suggests that there is a relationship between reading comprehension and meta-linguistic awareness (Yuill, 1998; Zipke, 2007). Findings suggest that students who have the ability to think about and discuss language in and out of context tend to be better in reading comprehension. They tend to understand a given text from the first reading, rather than reading it over and over again (Zipke, 2007). Although it is not a surprise that meta-linguistic awareness aids in reading comprehension, it is important to study the components of meta-linguistic awareness that have a more significant relationship with reading comprehension.

For instance, Tunmer and Bowey's (1984) study suggested that phonological skills are the component of meta-linguistic awareness that is most relevant to reading comprehension. On the other hand, Leong (1984) claimed that lexical and super-lexical

skills are the components of meta-linguistic awareness that have the strongest relationship with reading comprehension. In a more recent study, Kuo and Anderson (2006) stated that vocabulary is the meta-linguistic awareness component that has the strongest relationship with reading comprehension. Evidently, existing research is inconclusive is terms of the meta-linguistic awareness component that is most linked to reading comprehension. This is unfortunate because educators and teachers need to know what influences reading comprehension the most so that they could begin addressing them in class. This is why the researcher of this study focused on one major component of meta-linguistic awareness; ambiguity detection. The subcomponents of ambiguity detection investigated in this study are deep structural, surface structural and lexical ambiguities.

The researcher used the riddle task to assess the participants' abilities to flexibly test out multiple meanings of homonyms and garden path ambiguities, rearrange the syntax in some sentences and reflect on deep and surface structural meanings in order to successfully choose the punch line which turns the question into a riddle (Zipke, 2007). This method allowed the riddle task to measure the larger construct of meta-linguistic ability. Similar to Zipke (2007), the results on this task correlated highly with the reading comprehension scores. The researcher of this study used the same riddle task as Zipke (2007) on another population in order to study whether the results could be extended to the present Lebanese sample. Since the riddle task measured the larger construct of meta-linguistic awareness in this study, it is safe to say that the results in this study do highlight the correlation between ambiguity detection (a component of meta-linguistic awareness) and reading comprehension.

On the other hand, the sentence ambiguity task used in this study, also taken from Zipke (2007), did not have a positive correlation with the reading comprehension

assessment. Although the sentence ambiguity task also assessed for the three subcomponents of ambiguity detection measured by the riddle task, the results yielded no correlation between them and the reading comprehension assessment. This could be a result of various reasons. One possible reason could be that the ambiguous sentence task was not interesting to the participants; an important feature of riddles is the inherent humorous pay off involved in solving a puzzle. Perhaps, for some of the poorer readers, the prospect of answering 40 questions was a daunting one, causing their interest to wane, resulting in less care and effort put into solving the riddles. The role that task motivation plays in learning has been much studied (Eccles, 2005; Locke & Lathma, 2002), but it has not been specifically applied to meta-linguistic awareness and word play (Zipke, 2007).

One alternative reason for the comparative success of the riddle task that can be ruled out with a look at the statistics is the idea that enough of the individual riddles were known to the participants, making the riddle resolution task more of a memory task than one of meta-linguistic awareness. The mean and standard deviation for the riddle task tell us that there were no floor or ceiling effects. Therefore, it is unlikely that many of the participants were either unfamiliar or extremely familiar with many of the riddles. Even though riddles have a form that is familiar to children, this does not mean that all riddles are equally familiar.

Riddles vary widely in what they ask the solver to do in order to understand them. For example, strong phonological awareness is necessary to understand the riddle *'What clothing does a house wear? Address'*. But solving this riddle does not require sophisticated meta-linguistic awareness of the type in this study. All of the riddles chosen for this riddle assessment were carefully screened for their reliance on homonyms, structural ambiguities and deep structural confusions (Zipke, 2007).

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Therefore, the riddle task is considered to be an accurate measure of the patients' meta-linguistic awareness (Zipke, 2007). It should be noted here that the researcher did not just rely of Zipke's interpretation of the assessment tools; rather, the reliability and validity of all the assessment tasks were calculated in this study. This is relevant because the population of this study is different from the one used in Zipke's study. Both the reading comprehension and sentence ambiguity tasks yielded good alpha coefficients, but the riddle task yielded an alpha coefficient that is less than the ambiguous sentence task. Therefore, although the riddle task is still considered both reliable and valid, any results associated with this tool must be handled with caution.

Limitations

Similar to any research study, this investigation has a few limitations. Had the participants done better on the ambiguous sentence assessment, it may have been possible to break down the specific abilities involved in meta-linguistic awareness and see how each relates to reading comprehension, and yet the current results are inconclusive in that regard. Other researchers have shown that lexical ambiguities are the easiest to understand, and surface structural ambiguities are more difficult (Cairns, Waltzman, & Schlisselberg, 2004). In light of that, another assessment that measures these three types of ambiguities separately might be helpful in showing the progression of understanding as the reader becomes more skilled at comprehending. This task needs to be more active for the participants and much shorter. An individually administered task where the participant explained both meanings of the ambiguous sentences to the experimenter could be more interesting and fun to the students.

Another limitation inherent in this study is that comprehension monitoring was not measured. One theory explaining the role of comprehension monitoring is to

hypothesize it as an intervening variable between meta-linguistic awareness and reading comprehension. Many studies have found a relation between the meaning that readers construct from text and their comprehension monitoring (e.g. Baker & Anderson, 1982; Baker & Zimlin, 1989; Kinnunen & Vaurus, 1995). This is because comprehension monitoring includes two important components: evaluation (or awareness of the extent to which one comprehends) and regulation (being able to control the meaning made form text). Comprehension monitoring means that readers need to know not only when they have not understood a text but what they need to do to correct that failure. Similarly, successful riddle resolution depends on realizing that there are alternative understandings of the question and applying regulatory strategies (rereading, slowing down reading speed, focusing on key words, maybe even enunciating aloud) to discern the correct meaning.

Comprehension monitoring may also have played a role in the relative success of the meta-linguistic awareness task. As mentioned earlier, riddles have a form that is familiar to kids; they not only feel familiar with riddles, but may have a well-developed understanding of the strategies needed for understanding them. While the abilities and strategies needed for recognizing ambiguous sentences are similar to those needed for riddle solving, it is possible that the declaration form and lack of context if the sentences in the ambiguous sentence task of this study did not trigger the comprehension monitoring needed for successful comprehension. Since riddles are such a well-known form, the comprehension monitoring needed to comprehend them was familiar to most participants. Counterbalancing the order of assessments might have shed light on this issue by actively demonstrating for some kids the activities demanded.

The results of the current study are correlational. Large-scale experimental studies employing a control group are necessary to draw definitive conclusions about

the effect of meta-linguistic awareness on reading comprehension and/or comprehension monitoring, as well as to test the utility of testing with riddles to increase meta-linguistic awareness.

Finally, the results that resulted from the riddle task must be handled with caution. The riddle task's low alpha coefficient means that any results yielded from this task much be handled with caution and cannot be used to draw larger general conclusions about the proposed correlation between meta-linguistic awareness and reading comprehension. In order to draw expand on the exploratory nature of this study, a larger population is needed in order to help make the results of such a study more conclusive. A larger population from different backgrounds and school contexts much be used in order to help generalize such findings.

Classroom Implications

The riddle task employed in this study to measure meta-linguistic awareness correlated positively with reading comprehension. In addition to that, both of the tasks employed in Zipke's (2007) study to measure meta-linguistic awareness correlated positively with reading comprehension. Together, the two tasks administered in both this study and that of Zipke (2007), are considered to represent a form of higher level meta-linguistic awareness necessary for comprehending text. Therefore, the most interesting question generated by these findings is whether or not meta-linguistic abilities is a teachable skill that can (or should) be separated from reading. Some children carry around word puzzle books in their bags and enjoy coming to school each day with a new riddle memorized. Does this imply that some children are able to bootstrap their own meta-linguistic knowledge? Does this improve their reading comprehension, or do the commonalities in the skills need to be made explicit?

Yuill (1998) is one of the few researchers to date to attempt to remediate comprehension difficulties with riddles and word play. Her rationale for doing so is explicitly based on developing the reader's understanding of ambiguity: She defines riddles as a "linguistic device that makes explicit use of ambiguity for humorous effect" (p.315).

On the strength of her correlational findings, Yuill (1998) trained thirty-six 7 to 8 year olds in ambiguity comprehension, using a mixture of riddles and word games. Of the 36 participants, half had been pre-screened and found to be good decoders but poor with comprehension. They were matched on word decoding and vocabulary scores with children who were poor decoders and poor with comprehensioin. Yuill administered seven treatments of 30 minutes each to the experimental group participants. These students were taught about the double meaning of words and sentences; they made up jokes with word compounds; they played communication games with ambiguous messages and ones in which they had to construct clues with two words of similar or dissimilar meanings; and finally, they read ambiguous stories. The control group read stories, played with rhyming words, tapped out phonemes, and the like. It was found that there was a significant main effect of treatment group, but no significant effect of skill group. The results were not medicated by improvements in accuracy skill and the training was relatively brief – it occurred across a period of 7 consecutive weeks.

The results of Yuill's (1998) study suggest that reading comprehension can be taught (or at least reinforced) through language games and riddle manipulation. This study provides convergent evidence for the idea that being flexible with language results with better reading comprehension. Further research should take the form of intervention studies in which readers are taught to think about language as a flexible device and then to reflect consciously on how it affects the meaning of a text.

Additional attention should be paid to the value of utilizing ecologically valid tasks, such as riddle manipulation. Finally, the role of comprehension monitoring needs to be assessed in terms of meta-linguistic awareness and reading comprehension.

APPENDIX I

RIDDLES

1- What has a bed but never sleeps?
   a. A tired man.
   b. A river.*

2- How do you stop a skunk from smelling?
   a. Wrap it in a paper.
   b. Cut off its nose.*

3- What did the silly boy say when his mother asked: "Did you drink your orange juice after your bath?"
   a. "No, I had grapefruit juice instead."
   b. "After drinking the bath, I wasn't thirsty for orange juice."*

4- Why did the girl eat a lamp?
   a. She wanted to have a light snack.*
   b. She wanted to see what it tastes like.

5- What did the teacher say when the mother asked if her son was really trying?
   a. Very!*
   b. He could do better.

6- What did the clerk say when the woman asked to try on the dress in the window?
   a. Don't you think it would be better to use the dressing room?*
   b. Do you think it will fit you?

7- How was the blind carpenter able to see?
   a. He picked up his hammer and nails.
   b. He picked up his hammer and saw.*

8- What kind of stamp do you have to stick on yourself?
   a. All of them.
   b. None. You stick them on envelopes.*

9- When eyes are not eyes?
   a. When they are on potatoes.
   b. When the wind makes them water.*

10- Why is a dog dressed more warmly in summer than in winter?
   a. In winter he wears only a fur coat, but in summer he wears that same coat and pants.*
   b. He lives in a cold climate.

11- What is the best way to prevent diseases caused by biting insects?
    a. Don't get sick.
    b. Don't bite the insects.*

12- What has four wheels and flies?
    a. A garbage truck.*
    b. Nothing.

13- What did the doctor say when the patient said, "Doctor, my hair keeps falling out. Can you give me something to keep it in?"
    a. How about a paper bag?*
    b. How about medicine?

14- Why was the girl scratching herself?
    a. She was the only one who knew where it itched.*
    b. There was nothing else to do.

15- When did the lobster blush?
    a. When he saw the knife and fork.
    b. When he saw the salad dressing.*

16- What animal makes the most of its food?
    a. The hippo. It eats a lot.
    b. The giraffe. It makes a little go a long way.*

17- How can you make a slow horse fast?
    a. Don't give it food.*
    b. Tell him to hurry up.

18- Why did the man hit his hand with the hammer?
    a. He wanted to see something swell.*
    b. It was an accident.

19- What did the doctor say to the patient who thought he was getting smaller?
    a. You'll just have to be a little patient.*
    b. You're not getting smaller.

20- What did the boy say when he was told that his dog had been chasing a man on a bicycle?
    a. "Don't be silly! My dog can't ride a bicycle."*
    b. "Stop him quick!"

21- What's white, has four legs, and a trunk?
    a. A mouse going on a vacation.
    b. A painted elephant.*

22- What gets wet as it dries?
    a. A towel.*
    b. Skin

APPENDIX II

AMBIGUOUS SENTENCES, WITH TYPE OF SENTENCES IN PARENTHESIS

1- The chicken is ready to eat. (Example)

       1   2

2- The man with red eyes nodded. (Foil)

       1   2

3- Meg rushed at the man imprisoned in the column. (Foil)

       1   2

4- Sam sat by the bank. (Lexical)

       1   2

5- He was tired after several performances. (Deep Structural)

       1   2

6- I asked how old George was. (Surface)

       1   2

7- The Eskimos soon learned how good meat tastes. (Lexical)

       1   2

8- The bowl might have been buried with the spoon. (Surface)

       1   2

9- She felt a delicate touch of tentacle to her cheek. (Foil)

       1   2

10- The agent found a bug in his room. (Lexical)

       1   2

11- He acted out of sympathy for the poor people. (Lexical)

        1   2

12- Koala bears eat leaves from gum trees and bark. (Surface)

        1   2

13- The idea of the babysitter was dreadful. (Deep Structural)

        1   2

14- John is the one to help today. (Deep Structural)

        1   2

15- The growing of the spring flowers was marvelous. (Deep Structure)

        1   2

16- They are playing cards. (Surface)

        1   2

17- He handed her a paper bag. (Foil)

        1   2

18- I was continually bothered by the cold. (Lexical)

        1   2

19- Several scarves of assorted colors were tied about the head. (Foil)

        1   2

20- Visiting relatives can be a pain. (Deep Structural)

        1   2

21- The horse ran into the stable. (Lexical)

        1   2

22- He had a slender, dark beauty that was all his own. (Foil)

        1   2

23- The stolen wallet was found by a garbage pail. (Deep Structural)

        1   2

24- He described their plans for us. (Deep Structure)

        1   2

25- Josie looked for her ant all afternoon. (Lexical)

        1   2

26- She could feel the pressure of Calvin's hand about her. (Foil)

        1   2

27- Alice talked to a girl younger than Laura. (Deep Structure)

        1   2

28- The women looked over the fence. (Surface)

        1   2

29- The solution seemed clear in chemistry class. (Lexical)

        1   2

30- They could no longer see where the opening had been. (Foil)

        1   2

31- She tried to open her eyes but the lids would not move. (Foil)

        1   2

32- The museum needs more helpful guides. (Deep Structural)

        1   2

33- She studied her hand before making a move. (Lexical)

        1   2

34- She heard a sound behind her and turned around. (Foil)

        1   2

35- He told me to go without hesitation. (Surface)

        1   2

36- The doctor helped the snake bite victims. (Surface)

        1   2

37- He rode the little girl's bike. (Surface)

           1   2

38- I gave the advice to the man with Jack. (Surface)

           1   2

39- They sent the request over a week ago. (Deep Structural)

           1   2

40- Everyone knew they were making money. (Lexical)

           1   2

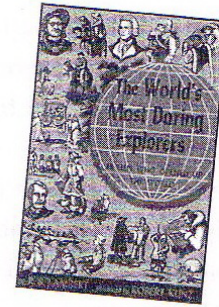41- The teenage boys and girls had a party. (Surface)

           1   2

APPENDIX III

GRADE 5 ASSESSMENT ABOUT MOUNT EVEREST

Climbing Mount Everest

— by R. S. Lambert —

from *The World's Most Daring Explorers*

The highest mountain in the world is Mount Everest in the Himalayas, a range that extends along the north-eastern part of India. Men have learned to calculate the height of a mountain without climbing it. Over a hundred years ago, Everest, which was named after an English surveyor, was found to be at least 29,000 feet high. That is, its top rises nearly five and a half miles above sea level!

It was not until about 1920 that anyone thought seriously of climbing

Test 2   Benchmark Progress Tests, Level 5   **51**

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Mount Everest. It stands on the borders of two countries, Tibet and Nepal, into which Europeans were not usually admitted. To the people of Tibet, Everest was a sacred mountain, called in their language "Goddess-Mother of the Earth." They believed that if strangers were allowed there, the goddess would be angry with them.

In 1921, however, the ruler of Tibet gave some British explorers permission to examine the district around Everest, and prepare to climb the mountain. They soon found that the task was going to be very difficult, if not impossible.

The south side of Everest rises in a sheer cliff 15,000 feet high. Nothing could be done there.

On the north-east side the only approach is up a long glacier. This leads to a shelf, or ridge, of rock 23,000 feet above sea level. From this ridge it might be possible to climb on to the "shoulder" of Everest, and so reach its top.

But there are only two short periods in the summer each year when climbing on Everest is possible at all. Usually the top peaks are shrouded in cloud or lashed by icy gales and blinding blizzards.

Most important of all, the air above a height of 21,000 feet is very difficult for human beings to breathe. It lacks oxygen. At 28,000 feet the air contains only one-third of the oxygen found at sea level. A climber quickly becomes exhausted at this height. His muscles, his eyesight, and his thinking-power are all affected. It seemed impossible that any ordinary man could scale the last 2,000 feet of Everest.

In the thirty years following 1921, eight expeditions were sent out to try to climb Everest. Each one was made up partly of expert European mountain-climbers, and partly of native Tibetans.

One tribe of Tibetan shepherds, called Sherpas, lives on the lower slopes of Everest. They have lived there a long time, and have developed lungs that can breathe air with less oxygen than the Europeans need. So the Sherpas served as guides and porters for these expeditions.

The European climbers took with them cylinders, or bottles, containing oxygen, which they breathed in at heights over 15,000 feet. This made it possible for them

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to camp, sleep, and climb on the upper ridges of Mount Everest.

But the weight of the oxygen and cylinders was a drawback. The longer you wanted to breathe it, the more you had to carry. Beyond a certain point, this extra weight canceled out the advantage received from breathing the oxygen.

Each expedition followed the same plan of operations as that used on Polar expeditions. First, a base-camp was set up about halfway up the side of Everest. Here the explorers lived and kept their supplies.

From this point, advance-camps were then established at points higher up the mountain. From the last and highest of these camps a team of two or three picked men, who had not used up their strength, but had kept fresh for the job, would make a final dash for the top.

The first expedition, in 1922, had a warning of the dangers of the climb. An avalanche, or fall of snow and rock, crashed down the mountain side without warning and killed seven of the Sherpa porters.

The second expedition, in 1925, came very near to success. Edward

Norton, an experienced climber, managed to reach a height of over 28,000 feet. He was only about 1,000 feet from the top. This acted as a challenge to two younger members of the party, Leigh Mallory and Edward Irvine.

On the 7th of June these men set out together to make the final dash. They were last seen through a break in the clouds by a companion who was watching from far below. They were climbing steadily toward the top, with only a few hundred feet to go.

Then the clouds closed in, and they were never seen again. Nearly ten years later the head of an ice-axe was found in the snow, at a point *below* where they had last been seen. It was recognized as belonging to one of the two missing men.

This suggests that Irvine and Mallory may have reached the top of Everest, but either lost their way, or became exhausted while coming down. It is not likely that we shall ever know just what happened.

The next six expeditions succeeded no better than the second. In 1933 two planes, specially designed for the purpose, flew from India and circled over the top of

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Everest for about fifteen minutes. All the time, they were in danger of being sucked down to death by down-draughts of air around the mountain's peak.

The following year a British airman lost his life in trying to climb the mountain by himself. It began to look as if Everest might keep its secret for ever.

After World War II, British mountain climbers prepared for an attack on Everest. By that time Tibet had fallen under Chinese control and could not be used by British explorers for their approach. Nepal, on the other hand, was being opened up. The 1953 expedition attacked the mountain from Nepal on the south side. Then the explorers made their way around to its north-east corner.

The leader of this expedition was Colonel John Hunt, an experienced mountaineer. His task was to *organize* the expedition. He did not try to make the final climb himself. This task was kept for two teams, each made up of two young men, hardened and trained. They were to be kept as fresh as possible up to the last. Then they would be sent ahead to make the final effort.

After great difficulty a base-camp was set up at a height of 15,000 feet.

From it a series of eight advance-camps were established. These led, step by step, up to a height of 27,350 feet. The last advance-camp was made on South Col, a saddle-shaped rock joining Everest and a neighboring peak, Mount Lhotse.

Tents, sleeping-bags, mattresses, food, cooking equipment, fuel, climbing-gear and oxygen — altogether weighing 500 pounds — had to be carried, with great difficulty, up to this point by the members of the expedition, mainly the Sherpa porters. They used oxygen as little as possible, in order to leave enough for the two teams waiting to make the final try. All this time, the explorers were in a race with the weather. Climbing was possible only in brief intervals between one furious gale or snow-storm and the next.

At last all was ready for the final attempt. It was arranged that each team would make a separate attempt. The first team reached a height of 28,720 feet before being forced by exhaustion to turn back. These men reported that the ridge leading to the top looked very difficult, if not impossible, to climb.

It was now the turn of the second team, made up of Edmund

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Hillary, a young New Zealand bee-keeper, and Tenzing Norkey, a Sherpa guide. Tenzing had taken part in several of the earlier expeditions.

On the 28th of May, the two men and a group of porters started from South Col, carrying supplies for the final climb. At a height of 27,900 feet, the porters left them to return to South Col, and Hillary and Tenzing made camp. Clearing away snow and pebbles, they fastened their tent down as best they could on a tiny platform of rock about six feet long and six feet wide. After supper they calculated their supply of oxygen. They found they had just enough to see them through.

One side of this platform was overhung by the mountain. The other side fell away in a precipice. Tenzing had to rest that night with his feet hanging over this precipice.

Next morning, in bright sunshine, Hillary and Tenzing began to climb along the last ridge leading to the top. The edge of this was sharp, with a drop of 12,000 feet on one side, and dangerous, jutting shelves of rock on the other. The rock was covered with soft, slippery snow. The climbers were lucky to find two spare bottles of oxygen that had been left for them by the first party, who had made the climb two days earlier.

Hillary and Tenzing roped themselves together. Each took the lead in turn, cutting steps in the frozen snow for the other to follow. They moved slowly, resting after they had gone about forty feet.

In an hour, they reached the foot of a "step" in the rock. This was about forty feet high, and too smooth to scale. They worked their way up a slanting crack in one side of the step. This was the worst part of the ascent.

After two and a half hours, just as they were nearing exhaustion, they found themselves on the top of Everest! They could not speak, because of their oxygen masks. To show their joy they shook hands, and thumped each other on the back. Then they waved flags.

"The whole world around us," said Hillary afterward, "lay spread out like a giant map, and I could take in, with a glance, country we had spent months in exploring."

Hillary took some photographs, while Tenzing buried a small cache

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of food in a hole in the snow. Then, after only fifteen minutes on the top, the climbers began to feel weak and short of breath. Taking this as a warning not to delay, they lost no time in beginning their downward climb. That night they slept, weary but triumphant, in the camp at South Col.

The news that Everest had been conquered reached England on the Coronation Day of Queen Elizabeth II of England. She conferred knighthoods on Hillary and Hunt, and a medal on Tenzing.

The success of the climb was due not only to the daring and endurance of the two men who made the last effort, but to the team spirit of the whole expedition, the organizing skill of its leader, and the help given by the scientific equipment with which they had been provided.

Read the questions, and write your answers on the lines. You may look back at the selection to help you with your answers.

1. Why did the idea of climbing Mount Everest probably appeal to so many people?

   _____

   _____

   _____

   _____

   _____

   _____

2. Why didn't people try to climb Mount Everest from the south side?

   _____

   _____

   _____

   _____

   _____

   _____

Go on

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3. What are two difficulties that people face in climbing Mount Everest?

_____

_____

_____

_____

_____

4. Why was the supply of oxygen so important to the climbers?

_____

_____

_____

_____

_____

5. What two qualities or abilities did the members of the 1953 expedition have that helped them succeed?

_____

_____

_____

_____

_____

Rubric Score for Items 1–5 _____
20

Go on

Test 2

Read the questions, and fill in the circles next to your answers. One, two, or three answers could be correct. You may look back at the story to help you with your answers.

6. Where is Mount Everest located?
   - ○ a. in the Himalayan Mountains
   - ○ b. on the border of Tibet and Nepal
   - ○ c. along the border of China and Tibet
   - ○ d. near the north-eastern part of India

7. On the 1925 expedition that almost succeeded, what happened to Leigh Mallory and Edward Irvine?
   - ○ a. They were last seen a few hundred feet from the top.
   - ○ b. They fell off the mountain just before they reached the top.
   - ○ c. They were never seen again.
   - ○ d. They may have reached the top, but no one knows.

8. Why are Sherpas such an important part of any attempt to climb Everest?
   - ○ a. They own Mount Everest.
   - ○ b. They know the area well and act as guides and porters.
   - ○ c. They have developed lungs that can breathe air with less oxygen.
   - ○ d. They build the base-camps and rent them to climbers.

9. In 1953, why didn't Colonel Hunt make the final climb himself?
   - ○ a. He had already been to the top, and it was someone else's turn.
   - ○ b. Younger men were needed for that part of the job.
   - ○ c. Only Sherpas could climb that high.
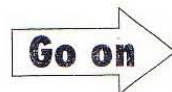   - ○ d. Hunt was injured and couldn't go on.

Go on

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10. How did Hillary and Tenzing celebrate their triumph?

    ○ a. They sang a song of victory.

    ○ b. They waved flags.

    ○ c. They shook hands and patted each other on the back.

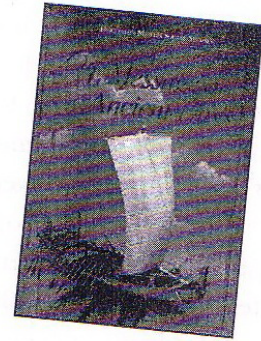   ○ d. They were too exhausted to celebrate.

Score for Items 6–10 _____
/ 20

Go on →

APPENDIX IV

GRADE 6 ASSESSMENT ABOUT ATHENS

Athens:
A City-State

from *A Message of Ancient Days*

THE EVOLUTION OF DEMOCRACY

Between the 700s and 400s B.C., the Athenians developed a new form of government that put the power to make decisions into the hands of the people. This form of government is called a *democracy*, which means government by the people.

The Origins of Democracy

The idea of democracy was developed over several centuries. Before the Dark Age, the people in the Greek city-states were ruled by kings. A system of government in which a king rules over a group of people is called a *monarchy*. In ancient Greece, the king

of a city-state was also usually the head of the most powerful family. When the king died, he usually passed on his power to govern to his eldest son.

During the Dark Age, Greek kings began to rely on wealthy landowners, or nobles, to help them defend their land from invaders. Not surprisingly, the nobles began to demand some of the king's powers. By the end of the Dark Age, a small group of nobles shared power equally with the king in many city-states. This system of government in which a few people hold power over a larger group is called an *oligarchy*. This system was a step toward democracy, since a group of men, rather than just one man, held power.

The leaders of the oligarchies improved the government of the city-states, but during the 500s B.C., some city-states had problems of a different kind. Some grew to be so large that their farmers could not provide enough food. Food shortages caused unrest and discontent. During this period, poorer farmers suffered greatly. Many lost their land to the wealthy and were forced to sell themselves into slavery. The discontent with the leaders of the oligarchies led to the rise of new leaders called tyrants.

The Rule of Tyrants

Greeks called a leader who seized power by force and ruled the city-state single-handedly a *tyrant*. Many people supported tyrants because these leaders promised to reform the laws and to aid the poor. The tyrants of Athens, for example, accomplished their aims by canceling all debt, redistributing land, and allowing other people besides the nobles to have a say in government.

The tyrants played an important role in the development of democracy. They taught citizens that by uniting behind a leader, they could gain the power to make changes. However, some tyrants were harsh and greedy. The people of a city-state sometimes threw out one tyrant and replaced him with another.

The Democracy of Athens

About 510 B.C., the citizens of Athens became upset with the harsh rule of a tyrant named Hippias. With the help of soldiers from the city-state of Sparta, Hippias was driven out of Athens. But he was not replaced by a new tyrant. Instead, the citizens of Athens chose to share the decision-making power among themselves. This

was the beginning of the world's first democracy.

Several institutions assured citizens of Athens a voice in their government. A council of 500 citizens, chosen at random every year, proposed new laws. An assembly of all the citizens of Athens met about every nine days to vote on the laws. In the law courts, citizens served as jurors. They interpreted the laws and decided guilt or innocence.

All of these institutions had existed before 500 B.C. However, now they were open to more people and they were administered more fairly. For example, the government of Athens paid council members and jurors for their services. Thus, poorer citizens, as well as rich ones, could afford to take time off from their work to take part in the government of their city-state.

Not all citizens of Athens liked this new form of government. Some wealthy citizens believed the democracy gave too much power to poor citizens. Nevertheless, most Athenians appreciated their form of government.

The development of democracy has greatly influenced Western civilization. It also was an important step for the Athenians. The Greek historian Herodotus *(hih RAHD uh tus)* wrote

that when the Athenians were ruled by tyrants, they "were not a whit more valiant than any of their neighbors." But when they established their democracy,

> They became decidedly the first of all. These things show that, while undergoing oppression, they let themselves be beaten, since then they worked for a master; but so soon as they got their freedom, each man was eager to do the best he could for himself.

Herodotus, *The Persian Wars*
c. 430 B.C.

Athens was not the only city-state with a democratic government. Several other ancient Greek city-states developed democracies. However, the democracy that developed in Athens was the most successful.

Citizenship in Athens

The democracy of Athens opened participation in government to all citizens. However, citizenship was a privilege reserved for relatively few people. Only men over the age of 18 could become citizens. And except under special circumstances, a man became a citizen only if his father had been a citizen. After 451 B.C., the rules

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regarding citizenship became stricter. A man became a citizen only if both his father and his mother's father were citizens.

Of the 300,000 inhabitants of Athens, only about 45,000 of them were citizens. Their wives and children, who were not citizens, accounted for about 145,000 inhabitants. Note that women, whether they were married or unmarried, had no political rights and they could not own land.

About 35,000 residents of Athens were metics, or foreigners. They came from other Greek city-states or from other parts of the Mediterranean region. Many were traders, shop-keepers, craftsmen, or moneylenders.

Metics could not vote or hold public office, but they were protected by Athenian law.

Slaves made up the rest of Athen's population. Many had been captured during foreign wars. Slaves could not vote, and they could not choose their jobs. They were not even allowed to have a family without the permission of their master. They had to do the jobs their owners assigned them. Many worked as farmhands. Others did household chores. Some learned crafts such as metalwork or pottery. These slaves were paid for their work. A few of them earned enough money to buy their freedom from their owners.

Read the questions, and write your answers on the lines. You may look back at the selection to help you with your answers.

1. What is an oligarchy?

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2. How were oligarchies a step toward democracy?

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3. What happened to make people unhappy with oligarchies?

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Go on

4. What were two ways that the citizens of Athens had a voice in their democracy?

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5. Who were allowed to be citizens of Athens?

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Rubric Score for Items 1–5 $\dfrac{}{20}$

**Go on** ⟹
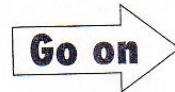
Read the questions, and fill in the circles next to your answers.
One, two, or three answers could be correct. You may look back
at the selection to help you with your answers.

6. What caused Greek kings to lose their power during the Dark Age?
   - ○ a. They were defeated in war by a group of nobles.
   - ○ b. They needed the nobles' help to defend their land from invaders.
   - ○ c. The nobles demanded some of the kings' powers.
   - ○ d. Many of them died and their sons were not as strong.

7. What good things did the tyrants of Athens do for the people?
   - ○ a. They canceled all debt.
   - ○ b. They freed all the slaves.
   - ○ c. They allowed more people to have a say in government.
   - ○ d. They set up law courts with citizens as jurors.

8. Which of these people would have been a citizen of Athens before 451 B.C.?
   - ○ a. a sixty-year-old man whose father had been a citizen
   - ○ b. a twenty-five-year-old foreigner
   - ○ c. a thirty-year-old woman whose parents were citizens
   - ○ d. a twelve-year-old male child of a citizen

9. What rights did foreigners have in Athens?
   - ○ a. They could vote on new laws.
   - ○ b. They could carry on their business there.
   - ○ c. They could be elected to public office.
   - ○ d. They were protected by Athenian law.

Go on

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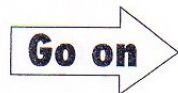
10. What control did slave owners have over their slaves?
    ○ a. They decided whether their slaves could have a family.
    ○ b. They assigned jobs to the slaves.
    ○ c. They took away all the money the slaves earned.
    ○ d. They controlled the votes of the slaves.

Score for Items 6–10 _____
20

Go on ⟩

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