

A COMPARISON OF SILENT READING COMPREHENSION AND LISTENING
COMPREHENSION IN FOURTH, SIXTH, AND EIGHTH GRADE STUDENTS

A Dissertation

by

WOLFRAM ESMOREYT VERLAAN

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Abstract

This study investigated the relationship between listening and reading comprehension to determine: (a) if there has been a change in the equalization age for these two modalities from what was theorized by Thomas Sticht; and (b) to determine if there are interrelationships between proficient reading and listening comprehension, gender, and/or SES. The study employed a cross-sectional correlational design to test the listening and reading comprehension of 945 participants in two South Texas school districts; 223 fourth-, 354 sixth-, and 368 eighth-grade students participated in the study. Students were administered the Reading Comprehension sub test of the Gates-MacGinitie Reading Test Fourth Edition (GMRT-4) Forms S and T to measure both reading and listening comprehension. Mean reading scores significantly exceeded mean listening scores at the fourth-grade, $t(222) = 6.13, p < .001, d = 0.41$, sixth-grade, $t(353) = 11.63, p < .001, d = 0.62$, and eighth-grade levels $t(367) = 17.19, p < .001, d = 0.90$, indicating a possible change in the age at which reading and listening comprehension had previously been theorized to equalize. In addition, results indicated that reading comprehension and listening comprehension were highly correlated at each of these grade levels with correlation values ranging from .62 to .64. This study also found an even higher correlation between listening comprehension and reading comprehension for proficient readers (students reading at or above grade level) with correlation values ranging from .65 to .74. Proficient reading was related to gender at the sixth-grade level and to SES at the eighth-grade level. Because the relationship of proficient reading to either SES or gender did not extend across more than one grade level, no firm conclusions regarding these factors could be reached.

Dedication

This dissertation is dedicated to my wife, Sue, whose constant support and faith in me were instrumental in the completion of my doctoral program. This dissertation is also dedicated to my parents, Lucia Moers Verlaan and Jan Anthony Verlaan, who throughout their lives have been models of faithfulness, hard work, and dedication. Finally, this dissertation is dedicated to Sri Aurobindo and Mirra Alfassa whose lives exemplified what should be the crowning achievement of any educational system: instilling in students a never-ending pursuit of self-discovery and self-mastery.

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Table of Contents

<u>Chapter/Section</u>	<u>Page</u>
Abstract	iii
Dedication	iv
Acknowledgements	v
Table of Contents	vi
List of Tables and Figures	vii
Chapter One: Introduction	1
Theoretical Rationale	1
Practical Rationale	6
Importance of Study	10
Purpose of Study	12
Definition of Terms	13
Summary	14
Chapter Two: Literature Review	16
Language Acquisition's Relationship to Comprehension	16
Considerations for Assessing Listening Comprehension in Relation to Sticht's Research	28
Research Studies Informing Sticht's Work	36
Sticht's Hypotheses for the Unitary Nature of Reading and Listening Comprehension	40
Research into the Effects of Media on Learning and Language	44
Relevance of Study	48
Summary	49

<u>Chapter/Section</u>	<u>Page</u>
Chapter Three: Methods and Procedures	50
Purpose	50
Overview of Study	51
Participants	51
Measurement Instrument	55
Design of Study	61
Procedures	62
Data Analysis	63
Summary	64
Chapter Four: Results	65
Preliminary Data Analysis	65
Research Questions	68
Conclusion	83
Chapter Five: Discussion	84
Summary	84
Results	85
Discussion	88
Limitations	99
Significance of the Study	100
Recommendations for Future Research	102
References	104
Appendices	121

List of Tables and Figures

<u>Table/Figure</u>	<u>Page</u>
Table 1 Summary of the Effects of Presentation Rate Controls on Reading(R) and Listening(L) Outcome Measures for Studies Informing Sticht's Work	32
Table 2 Summary of Assessment Equivalence for Studies Sticht Analyzed	35
Table 3 Date Ranges of Studies Informing Sticht's Work	39
Table 4 Participant Demographics	54
Table 5 Oral Presentation Rates for Each Level/Form of the GMRT-4	60
Table 6 Fourth-Grade Reading/Listening Comparison Data	70
Table 7 Sixth-Grade Reading/Listening Comparison Data	72
Table 8 Eighth-Grade Reading/Listening Comparison Data	74
Table 9 Descriptive Data for the Variable "Reading At or Above Grade Level"	79
Table 10 Differences Between LNCE Mean Scores for Participants "Reading At or Above Grade Level" and those Reading Below Grade Level	82
Figure 1 Reading and Listening NCE Scores by Grade Level	87

Chapter 1: Introduction

Theoretical Rationale

The act of reading, or making meaning from text, has long been considered one of the more complex cognitive processes in which humans engage. For over 100 years, reading researchers have described reading as consisting of an intricate interaction of multiple cognitive functions that work in unison to allow humans to communicate through the medium of text (Anderson, Hiebert, Scott, & Wilkinson, 1985; Huey, 1908/1968), with the text symbolizing the oral language serving as the basis for this communication. The complexity of the reading process is largely indisputable, with a significant portion of this complexity being attributable to those cognitive functions that govern the various language processes employed during the reading act. Models of reading have sought to explain the reading act as being comprised of two overarching processes – the decoding of text into the phonological equivalent of the oral language that the text represents, and the linguistic functions that allow for comprehension of the decoded text. In other words, reading comprehension is dependent not only on the ability to decode text into its phonological equivalents, but also on the ability to understand that phonological representation. Hence, one's ability to comprehend text via reading is related to some extent to one's ability to comprehend the oral language equivalent of that same text.

Although some early models of reading suggested that the processes governing the decoding of text occurred *prior to* those cognitive functions controlling comprehension (Gough, 1972; La Berge & Samuels, 1974), current views of reading have become heavily influenced by models that describe reading in terms of an

interaction between decoding and comprehension, viewing both of these functions as being governed by multiple cognitive processes (Kintsch, 1998; Rumelhart, 1977; Sadoski & Paivio, 2001). Although decoding and comprehension have been shown to be functions that facilitate each other in an interactive manner (Stecker, Roser, & Martinez, 1998), this study is primarily concerned with those linguistic processes that allow comprehension to occur after decoding ability has been sufficiently developed, which typically occurs by late elementary school. More specifically, this study investigates the relationship between oral language (listening) comprehension and reading comprehension.

The dominant view of reading comprehension up to the 1970s was that reading comprehension was some combination of decoding and listening comprehension. The theoretical basis contributing to this belief was the view, shared by many notable reading researchers and psychologists, that reading comprehension and listening comprehension seemed to be governed by either the same or a similar set of cognitive processes (Berger & Perfetti, 1977; Fries, 1963; Gibson & Levin, 1975; Goldman, 1976; Goodman, 1966; Kintsch & Kozminsky, 1977; Sticht, Beck, Hauke, Kleiman, & James, 1974; Thorndike, 1973). Fries (1963) summarized this view as follows:

Learning to read is not a process of learning new or other language signals than those the child has already learned. The language signals are all the same. The difference lies in the medium through which the physical stimuli make contact with his nervous system. In talk, the physical stimuli of the language signals make their contact by means of sound waves received by the ear. In reading, the physical stimuli of the same language

skills consist of graphic shapes that make their contact with his nervous system through light waves received by the eye. The process of learning to read is the process of transfer from auditory signals, which the child has already learned, to the new visual signs for the same signals. (p. xv)

Sticht and his colleagues (Sticht, et al., 1974) undertook one of the more ambitious attempts to formulate a theoretical basis for what Danks (1980) termed a “unitary” process or set of processes governing both listening comprehension and reading comprehension. This unitary view of comprehension influenced attempts at creating models of reading such as Carver’s (1977) *rauding*, and the “simple view” of reading (Gough & Tunmer, 1986; Hoover & Gough, 1990), which attempted to explain reading in terms of decoding and listening comprehension.

It was during the 1970s, however, that it began to be clear to the research community that the complexities of the reading act could not be fully explained solely in terms of decoding and listening comprehension. A critique shared by both Carver’s proposed model (Pearson & Kamil, 1977) and the “simple view” (Hannon, 2012) is that they lacked sufficient elaboration on how the comprehension process actually occurs, either via listening or reading. In contrast to the view that reading and listening comprehension were accomplished by similar or shared cognitive processes, some researchers posited that the cognitive processes governing reading and listening comprehension might be more distinct than previously assumed (Danks, 1980; Hildyard & Olson, 1982; Horowitz & Samuels, 1985; Leu, 1982; Redeker, 1984; Rubin, 1980; Schreiber, 1980). Of particular concern to some of these researchers was that written text

contained almost no signs that indicated the prosodic features of the language such as pitch, tone, stress, and phrasing. Some researchers argued that in developing decoding fluency these prosodic features had to be supplied by the reader, thereby requiring cognitive faculties not employed in the listening comprehension process. Schreiber (1980) specifically stated:

That is, a major sign to the child of which words go together to form a syntactic (and semantically coherent) phrase is the prosodic contour which binds together a series of words; indeed, it is far from obvious that the child's perceptual parsing strategies operate in terms of units smaller than phrases. But whatever the details of the perceptual process may be, there is clearly something of a mismatch between what is represented in the acoustic signal and what the graphic representation provides or, rather, fails to provide. (p. 181)

The researcher certainly agrees that in the decoding process, the reader must rely on cognitive functions not necessarily needed by a listener in order for the reader to recreate from the text what would be conveyed by the spoken or oral language equivalent of the text being read. Conversely, the reader has assistance from the text that the listener does not, such as immediate recognition of a homonym by its spelling, for example, “Goldilocks woke up and saw two *bear* feet,” while the listener may not understand the significance of *bear* feet until later in the story. What is important to note, however, is that Schreiber seems to suggest that the reader must still be successful in recreating to some degree the oral language equivalent of the text being read in order to comprehend it. What seems to be at the heart of the debate concerning the extent to which reading and

listening comprehension are controlled by similar or distinct cognitive processes is which cognitive processes to include under a denotative definition of comprehension in either or both modalities. Even though this debate is still not settled, Danks (1980) stated that few researchers were willing to suggest that reading and listening comprehension were controlled by totally unrelated cognitive processes.

The researcher takes the position that after the decoding process has been adequately accomplished by the reader, reading comprehension is achieved by relying on cognitive processes similar to those that allow listening comprehension to occur. Consequently, this study focuses on the relationship that exists between reading and listening comprehension after the reader has developed some level of decoding skill. Indeed, research seems to confirm that after decoding ability has been sufficiently acquired (third/fourth grade), the factor correlating most highly to reading comprehension is attributable to linguistic competence or listening comprehension, with the correlation ranging from .35 in earlier grades to .71 in later grades (Curtis, 1980; Hoover & Gough, 1990; Singer & Crouse, 1981; Stanovich, Cunningham, & Feeman, 1984). A long-term study by Hart and Risley (1995) indicated that linguistic competence, especially that which is acquired in early childhood, plays a significant role in the development of early reading skills and is still highly correlated with reading ability at age nine. Data from the most recent results of the Program for International Student Assessment (PISA) also indicated a high correlation between the assessment scores of teenage students and the amount of oral language to which they were exposed at a young age (OECD, 2010). Thus, a large body of research tends to confirm the existence of a significant relationship between listening comprehension ability and reading comprehension development.

Practical Rationale

In 2000, the National Institute of Child Health and Human Development (2000) released the report of the National Reading Panel's (NRP) study of research in the area of reading instruction. The NRP report contained recommendations spanning the spectrum of reading development from emergent literacy and phonemic awareness to comprehension instruction. Based on the NRP's selection criteria, seven instructional strategies were recommended that seemed to facilitate comprehension acquisition: "(in alphabetical order) comprehension monitoring, cooperative learning, graphic and semantic organizers including story maps, question answering, question generation, and summarization" (p. 4-42). Absent from the NRP's recommendations of strategies to improve comprehension was listening instruction or listening activities. A possible reason for this omission was the small number of studies meeting the NRP's selection criteria that explicitly investigated the effects of listening instruction or activities on reading comprehension. This resulted in the NRP's conclusion that there were not enough data to support the inclusion of listening instruction/activities in the recommendations for instructional practices in the area of reading comprehension. However, four studies meeting the NRP's criteria were identified that indicated a positive effect on reading comprehension as a result of listening training/activities, and these studies spanned grades 1 through 6 (Bodt, 1984; Shany & Biemiller, 1995; Sheperd & Svasti, 1987; Sippola, 1988). It seems unusual that the NRP was only able to identify four studies meeting their criteria for inclusion, especially considering the fact that listening comprehension has been correlated repeatedly with reading comprehension (Curtis, 1980; Hoover & Gough, 1990; Singer & Crouse, 1981; Stanovich, et al., 1984; Sticht, et al.,

1974), and that listening instruction has been included in the English/language arts standards of nearly every state in the U.S. (Goulden, 1998).

There are several possible reasons why the NRP was able to indentify so few listening comprehension studies. First, the NRP considered only research studies into the effects of actual classroom instruction, and then only those conducted within the previous 20 years (1980) – a significant number of studies establishing the relationship between listening comprehension and reading comprehension had been conducted prior to this time. And although within that 20-year time window leading reading researchers such as P. David Pearson (Pearson & Fielding, 1983) were drawing attention to the importance of listening instruction, a limited amount of actual listening comprehension curricula contributed to the difficulty of testing the efficacy of listening comprehension instruction. Pearson and Fielding noted:

It is likely that the reason that people haven't talked much about a revolution in the listening comprehension curriculum (while such rumors are alive and well in reading and writing) is simply that there really are not very many listening comprehension curricula around. (pp. 15-16)

Second, although reading and listening comprehension were viewed by many researchers as being either controlled by or accessing the same or similar cognitive processes, reading comprehension research in the 1970s and 1980s focused more on how the comprehension process functioned vis-à-vis reading (Fielding & Pearson, 1994; Pearson, 2002). Insights from the field of cognitive psychology that emerged during this time, especially schema theory, led reading researchers to concentrate on how background knowledge of a topic and the semantic features of the language (Pearson & Johnson, 1978) affected

comprehension. Though not viewed as unimportant, the contribution of the syntactic features of the language to comprehension, many of which are initially acquired through oral language development prior to learning to read, have not been as widely researched as the phonological and semantic features. Third, the work of Sticht and his colleagues (Sticht, et al., 1974) seemed to indicate that listening comprehension exceeded reading comprehension up to about seventh grade, at approximately which time they tended to equalize, with reading comprehension then exceeding listening comprehension at later grades. Because Sticht's work was highly influential at the time, the equalization age that Sticht posited seems to have been viewed and even accepted as a developmental norm (Cain & Oakhill, 2007; Downing & Leong, 1982; Pearson & Fielding, 1983; Perfetti, Landi, & Oakhill, 2005; Vidal, 2011) rather than as an artifact of the time period in which the research studies informing Sticht's work were conducted.

The majority of the research studies on which Sticht based this equalization age of seventh grade, however, had been conducted prior to 1970, with many of the studies having taken place in the first half of the 20th century. The advent of the computer age and the concomitant proliferation of media affording much greater visual stimulation have dramatically changed the environment in which children grow up today from the one in which they grew up 40 years ago or more. Surveys have shown that the average child between the ages of eight and eighteen consumes nearly 11 hours of media on a daily basis, such as watching television, playing video games, "texting" and communicating via cell phones, listening to portable music devices, and using a computer for various purposes (Rideout, Roberts, & Foehr, 2010). Recent studies seem to suggest that playing of video games and watching of television can have a negative effect on

students' attention and verbal cognitive performance (Christakis, Zimmermann, DiGiuseppe, & McCarty, 2004; Dworak, Schierl, Bruns, & Struder, 2007). Because attention processing has been demonstrated to be significantly correlated with comprehension development (Carretti, Borella, Cornoldi, & De Beni, 2009; Commodari & Guarnera, 2005; Solan, Shelley-Tremblay, Ficarra, Silverman, & Larson, 2003; Solan, Shelley-Tremblay, & Hansen, 2007; Torgesen, Alexander, Wagner, Rashotte, Voeller, & Conway, 2001), it is possible that external influences such as the modern media environment are having an effect on oral language/listening comprehension development and by extension, on reading comprehension development. Thus, it is not clear whether the developmental relationship between reading and listening comprehension posited by Sticht and his colleagues still holds or if environmental influences may be affecting this relationship.

Demographic factors such as socioeconomic status (SES) and gender have also been shown to be related to oral language development and listening comprehension ability. Not only have studies demonstrated a relationship between SES and oral language development (Durham, Farkas, Hammer, Tomblin, & Catts, 2007; Hart & Risley, 1995; OECD, 2010; Snow, Burns, & Griffin, 1998), data from National Assessment of Educational Progress (NAEP) indicate that SES is significantly correlated with reading achievement (NCES, 2011). In addition, studies have also indicated that gender may play a factor in listening comprehension ability, but these studies have had mixed results, with some studies indicating that males may outperform females in listening comprehension (Brimer, 1969), that females may outperform males (Lehto & Antilla, 2003), that presentation conditions may favor one gender over another (Riding & Vincent, 1980), or

that there are no differences between males and females (Badian, 1999). Although the research seems to indicate that SES and gender may have some effect on listening comprehension, it is not immediately evident if these demographic factors have also had an effect on the developmental relationship between reading and listening comprehension theorized by Sticht.

Importance of Study

Determining the current relationship between listening comprehension and reading comprehension is important for several reasons. First, data indicate that in 2011, over 60% of high school seniors scored below the proficient level in reading (NCES, 2011), and of particular interest to this study, the reading proficiency level of these seniors was below that of seniors in 1992, despite attempts over the last decade to improve reading skills, especially reading comprehension. Second, there is limited current data demonstrating the relationship between reading and listening comprehension over the grade ranges this study seeks to investigate – fourth through eighth grade. Although a study investigating reading and listening in these age ranges was conducted in Cypress in 2005 (Diakidoy, Stylianou, Karefillidou, & Papageorgiou, 2005), because the students were tested in a different language and grew up in a different cultural and educational environment, it is not clear to what extent that this data generalizes to the current U.S. population. The collection of new data could indicate whether the age at which reading and listening comprehension are currently believed to equalize (sixth/seventh grade) is still accurate or has changed, perhaps as a result of the different media environment in which children are growing up. Data that suggest a change in the equalization age could have important implications for effective instructional practice.

For example, in the study by Diakidoy and her colleagues, Diakidoy noted that listening activities may have positively affected reading performance. Third, the NRP suggested that listening training could have a positive impact on reading comprehension, and specific studies have called for further investigation into the relationship between listening and reading comprehension (Shany & Biemiller, 1995; Sheperd & Svasti, 1987; Sippola, 1988). Data generated by the research in this study could help inform future initiatives to research, develop, and deliver the type of listening training that the NRP found to be efficacious for the development of reading comprehension.

Even though research has demonstrated a significant relationship between listening comprehension and reading comprehension, this relationship seems to have been less widely researched in recent years than it once was. Indeed, in the last two years, listening comprehension was not even included as a topic in the most recent list of current "hot" topics in reading (Cassidy, Ortlieb, & Shettel, 2011; Cassidy & Loveless, 2012). And although listening ability has been highly correlated with academic achievement in college students (Conaway, 1982), it has been estimated that listening instruction accounts for less than 7% of the instructional time in those subjects emphasizing listening skills (Beall, Gill-Rosier, Tate, & Matten, 2008). Furthermore, the latest data from the NAEP (NCES, 2011), which indicate a correlation between reading achievement and both gender and SES, make a strong case for further research into the extent to which gender and SES may also be related to listening comprehension. Because reading comprehension is viewed as a crucial element in the current educational endeavor, it is important that the relationship between listening comprehension and reading comprehension achievement be revisited.

Purpose of the Study

A problem that presents itself is that because there is a lack of current data describing the developmental relationship between listening comprehension and reading comprehension, we do not know if the environment in which children are growing up may require us to change our assumptions about this relationship. More specifically, we do not seem to have recent data that confirm Sticht's assertion that listening comprehension ability and reading comprehension ability equalize at about seventh grade. In addition, there is little current research as to what extent listening comprehension and reading comprehension are correlated at various age ranges and abilities. In other words, do those students with better reading comprehension skills also have better listening comprehension skills and vice-versa? Finally, there is little current data that seem to indicate the extent to which factors such as gender and socioeconomic status (SES) are related to listening comprehension, especially in the grade range this study is investigating – fourth through eighth.

This dissertation has three main purposes: (a) to compare reading comprehension and listening comprehension at the fourth, sixth, and eighth grades; (b) to determine if measures for reading comprehension and listening comprehension indicate a change from the developmental relationship that Sticht posited as existing between these two comprehension modalities (i.e., an equalization of these measures during middle school) (Sticht, et al., 1974); and (c) to determine to what extent proficient reading (reading at or above grade level) and listening comprehension are related both to each other and to demographic factors such as gender and SES.

The following research questions guided this study:

1. Do the *reading comprehension* scores and *listening comprehension* scores of fourth-, sixth-, and eighth-grade students indicate a change in the developmental relationship of these comprehension modalities as posited by Sticht (Sticht, et al., 1974) ?
2. Is *reading at or above grade level* related to *listening comprehension*, *gender*, and/or *SES*?

Definition of Terms

- *Gates-MacGinitie Reading Test Fourth Edition (GMRT-4)* – The Gates-MacGinitie Reading Test Fourth Edition (GMRT-4) (MacGinitie, et al., 2000) is a standardized, norm-referenced test comprised of two sub tests: a Vocabulary sub test and a Reading Comprehension sub-test. The publisher provides alternate forms of the test – Form S and Form T. The Reading Comprehension subtest includes both narrative and expository passages. Each of the 11 passages is accompanied by three to six questions for a total of 48 questions.
- *Reading Comprehension* (or silent reading comprehension) – The score achieved on the Reading Comprehension sub test of the GMRT-4 (either Form S or Form T) for the version of the test appropriate to the subjects' grade level.
- *Listening Comprehension* – The score achieved on an oral administration of the Reading Comprehension sub test of the GMRT-4 (either Form S or Form T) for the version of the test appropriate to the subjects' grade level.
- *Grade Equivalency (GE)* – The participant's grade equivalency score, obtained by converting a raw score on the GMRT-4 using the appropriate norming table (for example, a GE of 4.8 is defined as the eighth month of the fourth-grade year)

- *Reading at or above Grade Level* – A participant whose *reading comprehension* score is:
 - greater than a GE of 5.0 at the fourth-grade level
 - greater than a GE of 7.1 at the sixth-grade level
 - greater than a GE of 9.2 at the eighth-grade level
- *Reading below Grade Level* – A participant whose *reading comprehension* score is:
 - less than a GE of 4.6 at the fourth-grade level
 - less than a GE of 6.5 at the sixth-grade level
 - less than a GE of 8.4 at the eighth-grade level
- *Grade Level* – The public school grade in which the participant was enrolled at the time of testing.
- *Socioeconomic Status (SES)* – Defined by a participant's qualification for "Free or Reduced Lunch" such that the subjects are classified as either "Qualifies" or "Does not Qualify".
- *Gender* – Defined by whether the participant is male or female.

Summary

This chapter provides an overview of the relationship between listening and reading comprehension. Although this relationship has a significant research base, the most significant work investigating the nature of this relationship was conducted nearly 40 years ago. This chapter offers both a theoretical and a practical rationale for investigating whether the relationship between reading and listening comprehension has changed. Once thought to be developmental in nature, the relationship between reading

and listening comprehension may be more influenced by environmental factors than was previously believed; a change in this relationship could have potential consequences for reading comprehension development. In addition, this chapter establishes both the importance and purpose of this dissertation research, which investigates whether (a) the relationship between reading and listening comprehension may have indeed changed, and (b) listening comprehension and/or demographic factors play a role in proficient reading. Finally, this chapter provides a list of the operational definitions for the terms to which this study's methodological procedures will refer.

Chapter 2: Literature Review

The literature reviewed in this chapter is separated into six sections. The first section provides a brief overview of language acquisition and its relation to reading development. The second section presents a discussion of considerations for assessing listening comprehension in relation to Sticht's Research. The third section reviews some of the research that informed Sticht's work and its relevance to the current study. The fourth section describes Sticht's hypotheses regarding a unitary cognitive process governing listening and reading comprehension and their developmental nature. The fifth section reviews studies suggestive of the effects of the modern cultural and media environment on cognitive development in general and the development of verbal processes in particular. The sixth section presents a rationale for undertaking the current study.

Language Acquisition's Relationship to Comprehension

Reading has been described as the act of making meaning from text, and for the purposes of this study, we will limit the definition of *text* to the graphic representation of a spoken language. To the extent that a certain level of comprehension of a spoken language, often referred to as linguistic competence, is typically considered a prerequisite for reading comprehension, it is important to briefly examine the components of a spoken language that allow comprehension to be achieved – the phonological system, the semantic system, and the syntactic system – and the role each of these components plays in reading comprehension. In addition, it will also be important to describe different views of the relationship between listening and reading comprehension.

Language acquisition.

The phonological system of a language can be described as the sounds from which the words in the language are created. Development of phonological competence requires, among other things, that language learners be able to recognize the individual words that make up that language and where those words start and end in the speech stream. For example, when we hear a foreign language that we do not know, it is difficult to determine where words begin and end. In addition to phonological awareness, language learners also need to develop some level of phonemic awareness, a more granular auditory discrimination that allows them to distinguish between the smaller sound units, or phonemes, such as consonants and vowels, of which individual words are comprised. Phonemic awareness enables language learners to hear the subtle distinctions between the words *bark* and *park*, *time* and *dime*, and so forth. Other features of the phonological system include inflections in tone and pitch that may signal whether the speaker is making a declarative statement or asking a question. A rise in tone at the end of the sentence can transform the declarative statement, “You are going to give me some milk.” to the interrogative “You are going to give me some milk?” In addition, a change in word emphasis can alter the nature of the interrogative to be a clarification of either the indirect object, “You are going to give *me* some milk?” or the direct object “You are going to give me some *milk*?” By the time most children start school, they have developed a level of phonological awareness that allows them sufficient comprehension of one or more languages to communicate with each other and with adults.

In addition to development of the phonological system, a language learner needs to learn the semantic features of the language. The semantic features of a language not only include vocabulary, but also how different words in that language are conceptually

interrelated. These relationships include classification schemes, categories, hierarchies, and so forth. For example, *dogs* share a similar classification scheme with *wolves*, as do *cats* with *lions*, and they can each be classified under the hierarchical label of *animals* or more specifically, *mammals*. *Dogs* and *cats*, however, can also be categorized together as house pets, just as *lions* and *wolves* could be categorized together as wild animals. In addition, it is semantic knowledge of the relationship between dogs and cats that allows most children to identify the sentence, “The *dog* chased the *cat* up the tree,” as being more correct than, “The *cat* chased the *dog* up the tree,” or especially, “The *tree* chased the *cat* up the *dog*”.

The syntactic system of a spoken language dictates the order in which words are placed in relationship to each other in order to ensure comprehension, typically thought of as the language’s grammar and syntax. The syntactic system allows us to know that “today to go store I the” is incorrect and to rearrange it into “I go to the store today”. Although the rules for ordering words in a language are typically codified in the grammar and usage rules for that specific language, children seem to learn syntax from a very early age without explicit instruction in these rules. Children typically are able to implicitly learn without direct instruction many of the basic rules for plurality, tense, subject-verb agreement, the placement of the verb in relation to the subject, and the various forms that a sentence can take. The rules governing allowable syntax for the entire spectrum of mature or what we might characterize as adult speech, however, are incredibly complex. Despite extraordinary efforts to derive rules for the syntactical derivation of permissible sentences in the English language (Chomsky, 1957; Chomsky, 1965), an all-encompassing list of these rules has yet to be completely formulated. Nevertheless, it has

been theorized that by the time children begin school, they are familiar with as much as 80 – 90% of the elementary syntactic structures used in adult speech (Pearson & Johnson, 1978).

Because a written language in alphabetic systems is typically a graphical representation of the phonology of a spoken language, comprehension of a written language, like that of a spoken language, is also related to the extent to which a reader has acquired mastery of the phonological, semantic, and syntactic features of that language. It should be noted that these three elements of the language should not be viewed as discrete in their operation, because each of these three elements influences the other two in an interactive manner (Vellutino, Tunmer, Jaccard, & Chen 2007). For example, the development of phonological discrimination supports the development of semantic and syntactic facility with the language: when we begin to recognize words and the sounds from which they are comprised, this allows us both to learn word meanings and to learn the order in which words are used in relation to each other. In addition, semantic knowledge supports both syntactic and phonological development: recognizing words and their meanings in the speech stream (semantic knowledge) can assist the language-learner both in developing a phonological discrimination for a new word when it is heard and in developing an awareness of the syntactic structure within which the new word occurs. Similarly, knowledge of the syntactic system supports the language learner's ability both to detect a new word (phonological knowledge) and to attempt to ascertain a meaning for it (semantic knowledge) based on its position in the syntactic structure of the speech stream.

To underscore the importance of phonology, syntax, and semantics in the

acquisition of comprehension, it will be useful to examine research demonstrating that insufficient development in phonological, semantic, and/or syntactic knowledge has been implicated in causing difficulties both with listening comprehension and with reading comprehension. The relationship between an individual's phonological development and the acquisition of reading ability has received considerable attention in the research literature. Although young children can typically demonstrate comprehension of a spoken language through speaking and listening, it is difficult to determine how a child actually conceptualizes the speech stream. Research suggests that the ability to attend to discrete phonological segments of the language is a factor in listening comprehension because of the requirement of the listener to store these units to develop a conceptualization of what is being communicated (Goff, Pratt, & Ong, 2005; Seigneuric & Ehrlich, 2005). Furthermore, phonological and phonemic awareness also seem to play an important role in the acquisition of reading proficiency, and researchers have demonstrated that these skills are significantly correlated with developing reading ability (Blachman, 2000; Torgesen, Wagner, & Rashotte, 1999; Vellutino, Fletcher, Snowling, & Scanlon, 2004; Vellutino & Scanlon, 1987).

Much research has also been conducted into the importance of semantic knowledge in the development of reading ability. The semantic system includes not only a language's vocabulary but also the relationships that exist between the concepts that a language's vocabulary represents. To state that some degree of vocabulary knowledge is a requisite for oral language comprehension borders on the tautological, that is, "one must know the meanings of words to comprehend the meanings of words." Words, however, do not serve only as markers for definitions but form the conceptual

frameworks, also referred to as *schema*, that allow communication to occur between users of a language (Anderson & Pearson, 1984; Rumelhart, 1977). Indeed, the contribution of schema development to comprehension figured prominently in reading research during the 1970s and 1980s (Pearson, 2002). Put simplistically, because our conceptual frameworks for a subject are represented largely by the vocabulary associated with that subject, the level of one's understanding of communication about a subject is thus directly related to one's knowledge of the vocabulary associated with that particular subject. Not surprisingly, a wide body of research has confirmed the relationship between the development of the semantic system and the development of reading ability, with the range of a student's oral vocabulary being correlated with the acquisition of both decoding ability and later reading comprehension (Chall, Jacobs, & Baldwin, 1990; Spira, Bracken, & Fischel 2005; Storch & Whitehurst 2002; Verhoeven, van Leeuwe, & Vermeer, 2011; Vellutino, et al., 2007).

The importance of the syntactic system in facilitating comprehension acquisition also has a research base. Syntactic knowledge includes the ability to recognize correct and allowable grammatical structures for a sentence or phrase (Tunmer, Nesdale, & Wright, 1987). There is a significant body of research demonstrating the relationship between syntactic knowledge and reading comprehension development (Gillam & Johnston, 1992; Nippold, Mansfield, Billow, & Tomblin, 2009; Scarborough, 2001; Scarborough & Dobrich, 1990; Thompson & Shapiro, 2007). As previously noted, the role of the syntactic system in supporting comprehension development has not received as much attention in the recent research literature as that of the semantic or phonological systems, which is surprising, especially when we consider the fact that the formulas used

to calculate the readability of text and which, by extension, also figure into the assessments used to establish students' reading ability are largely based on syntactic complexity (Rudell, 1985). This relative lack of attention to syntax's role in reading comprehension development may be due to conflicting research about the relationship between oral language development and early reading acquisition (Storch & Whitehurst, 2002). It has become increasingly clear, however, that: (a) students enter school with significant qualitative and quantitative differences in their linguistic competence levels, which is largely attributable to home environment and SES (Chall, et al., 1990; Durham, Farkas, Hammer, Tomblin, & Catts, 2007; Hart & Risley, 1995; Milner, 1951, OECD, 2010; Snow, Burns, & Griffin, 1998), and (b) these differences in linguistic competence affect syntactic competence. Consequently, calls have recently been made to broaden the research into the role of syntactic competence in facilitating reading comprehension (Scott, 2009).

Thus, comprehension of a language requires some level of knowledge of the phonological, semantic, and syntactic features of that language. Knowledge of these features has been shown to be related to both listening comprehension and reading comprehension, with insufficient development in any one of these features leading to comprehension difficulties. Furthermore, it is clear that students enter school with large disparities in their facility with the phonological, syntactic, and semantic features of a language. Finally, a wide body of research has established the importance of these linguistic features in the relationship between listening comprehension and reading comprehension.

The relationship between listening comprehension and reading

comprehension.

Perhaps the most important issue surrounding an investigation into the relationship between reading and listening comprehension is the theoretical discussion concerning the extent to which these two modalities are governed by either similar or distinct cognitive processes. Studies investigating listening and reading comprehension date back to early in the 20th century. One of the earliest studies comparing reading and listening comprehension (which was also analyzed by Sticht for his research) was conducted in 1917 by Erickson and King (Erickson & King, 1917). Erickson and King administered tests of reading and listening comprehension to students ranging from third through ninth grade (results are discussed later in this chapter). Anderson and Grant (1937) conducted a study (which was also analyzed by Sticht) that compared the listening and reading vocabulary of college students, finding high correlations between the two modalities. In one of Gray's *Summary of Reading Investigations* (1941) series, he called attention to a study by Larsen and Feder (1940) that compared reading and "hearing" comprehension in college-age students. This study, though not specifically attempting to analyze the cognitive processes involved in comprehension, was important in that the authors provide some of the early support for a unitary process controlling comprehension: "... comprehension is largely a centrally-determined function operating independently of the mode of presentation of the material" (p. 251).

Although the aforementioned studies from the first half the 20th century compared reading and listening comprehension, primarily with the goal of investigating their relationship, the study of the actual cognitive processes involved in comprehension did not begin in earnest until the 1950s and 1960s. Venezky (1984) stated the following:

It should also be noted that the present-day importance given to comprehension in reading is a phenomenon of the last two or three decades. Through the first decade of this century, “reading” usually meant oral reading, wherein understanding was generally assumed when pronunciation was correct and natural. With the development of testing instruments and the shift in instructional emphasis to silent reading from 1915 to 1920, understanding gained in importance. Yet research on comprehension processes was so sparse up to the 1950s that even the phrase “reading comprehension” was seldom found. Woodworth (1938), for example, does not use the phrase at all in his chapter on reading and devotes no space to the topic. Anderson and Dearborn (1952), which claims to be “a text for professional courses on the psychology and teaching of reading,” offers no general treatment of comprehension. The term appears here and there, but mostly in relation to methods of teaching reading or to testing. In contrast, both eye movements and word perception are afforded entire chapters. (p. 13)

Up until the 1970s, many linguists, educators, and psychologists who studied reading held the view that reading comprehension was achieved by relying on the same or similar cognitive processes that were used in listening comprehension – during the reading process, text was decoded and subsequently comprehended by processing it similarly to speech (Berger & Perfetti, 1977; Fries, 1963; Gibson & Levin, 1975; Goldman, 1976; Goodman, 1966; Kintsch & Kozminsky, 1977; Sticht, et al., 1974; Thorndike, 1973).

The view that a “unitary process” (Danks, 1980) controlled comprehension,

however, came to be challenged as being overly simplistic, and several researchers asserted that the relationship between reading comprehension and listening comprehension was more complicated than previously believed (Bormuth, 1972; Danks, 1980; Hildyard & Olson, 1982; Horowitz & Samuels, 1985; Leu, 1982; Redeker, 1984; Rubin, 1980; Schreiber, 1980; Weaver & Kingston, 1971). In a review of the Durrell Listening-Reading Series, Bormuth (1972) noted “ we can no longer use listening abilities to estimate reading aptitude in the simple fashion we heretofore thought possible” (p. 1135).

As noted previously in Chapter One of this study, several researchers have pointed out that phonological markers such as stress, pitch, and tone that are readily available to listeners, have to be created or inferred by readers, thereby involving cognitive processes not required of a listener to facilitate comprehension of a text. In contrast to the listener, the reader has access to graphical input that allows for instantaneous identification of ambiguous words such as homonyms – a listener may have to rely on context and further information from the text being heard before being able to identifying the correct form of the word in question. Moreover, a reader has the ability to go back to parts of the text for clarification, which the listener does not. Weaver and Kingston (1971) pointed out that it had not been demonstrated that there was an immediate transfer of oral language comprehension to the reading comprehension task; in other words, although some level of oral language comprehension was *necessary* for the development of reading comprehension (in addition to decoding), it was not clear that oral language comprehension skills were *sufficient* for the acquisition of reading comprehension. Furthermore, a study by Guthrie and Tyler (1976) comparing reading

and listening comprehension in both good and poor readers came to mixed conclusions about comprehension in both modalities. On one hand the authors claimed: “It appears that the acquisition of reading comprehension is dependent not only on a global language capability, but on a precise set of relationships between semantic and syntactic functions in oral language processing” (p. 423). On the other hand, the authors qualify this somewhat by stating “Our findings also suggest that the failure of some children to comprehend written language cannot totally be attributed to a failure to comprehend spoken language” (p. 423).

Gender and SES are other factors that have been identified as being related to both listening and reading comprehension. The relationship between SES and oral language development has been fairly well documented with studies indicating that students coming from a lower SES environment tend to have less developed oral vocabulary and language skills than students coming from a middle/upper SES environment (Chall, et al., 1990; Durham, et al., 2007; Hart & Risley, 1995; OECD, 2010; Snow, et al., 1998). Although research indicates a significant relationship between linguistic competence and reading comprehension (Curtis, 1980; Hoover & Gough, 1990; Singer & Crouse, 1981; Stanovich, et al., 1984), and results from the NAEP indicate a significant gap in reading achievement between students coming from a lower SES environment and those coming from a middle/upper SES environment, it is not clear what role SES plays in the developmental trajectory of the listening/reading relationship.

In addition to an SES gap in reading achievement, a gender gap in reading achievement favoring females has also been documented not only in the U.S. by the most recent NAEP (NCES, 2011), but also internationally by the 2006 Progress in

International Reading Literacy Study (PIRLS) (Mullis, Martin, Kennedy, & Foy, 2007). The gender-related gap, however, seems neither as dramatic nor as definitively supported as the SES-related gap. Although some studies have indicated that a greater number of males than females are diagnosed with reading difficulties (Badian, 1999; Liederman, Kantrowitz, & Flannery, 2005), a well-known study (Shaywitz, Shaywitz, Fletcher, & Escobar, 1990) has suggested that males may be diagnosed in greater numbers than females due to what is known as a “referral bias.” In other words, more males are referred for diagnosis of reading problems than females because of a greater incidence in males of factors such as behavior problems, thereby resulting in greater numbers of males being diagnosed. Indeed, some studies have found either no differences between males and females in the incidence of reading problems (Siegel & Smythe, 2005) or small effect sizes in comparisons of reading achievement (Hyde, 2005).

The research literature is also not entirely consistent in confirming a relationship between gender and listening comprehension. While one study indicated that among participants ages 5 to 11 that boys seemed to have a better listening vocabulary than girls (Brimer, 1969), another study found that at a similar age range, females had higher (but statistically insignificant) scores on measures of listening comprehension (Lehto & Antilla, 2003). In addition, a study by Riding and Vincent (1980) indicated that while females outperformed males on listening comprehension assessments delivered at a slower presentation rate, males outperformed females at higher presentation rates. Finally, a long-term study by Badian (1999) found that although females scored higher than males in reading comprehension, there were no differences between genders in listening comprehension.

Thus, there is a lack of consensus in the research literature regarding not only the nature of the cognitive functions that govern the relationship between listening and reading comprehension, but also the extent to which factors such as gender and SES affect the listening/reading relationship. Indeed, much work still needs to be done just in isolating and precisely describing those cognitive processes that are involved in assembling both written and spoken pieces of text into intelligible units, let alone the complex of processes that constitute what Gough (1972) famously referred to as “the place where sentences go when they are understood.” It has been demonstrated, however, that linguistic competence (listening comprehension) is significantly related to reading comprehension after decoding skill has been acquired. In addition, gender and SES have both received attention as possible factors in reading comprehension development. Therefore, the overall relationship between reading and listening comprehension and the possible effects of gender and SES on this relationship are significant for the purposes of this study.

Considerations for Assessing Listening Comprehension in Relation to Sticht’s Research

Because this study compares reading comprehension and listening comprehension by assessing both, it is necessary to examine some of the issues surrounding the assessment of these two modalities, specifically focusing on listening comprehension. In addition, it will be useful to examine how listening instruction was assessed in the studies Sticht analyzed to form his hypotheses regarding the developmental relationship between listening and reading comprehension. It will be especially important to investigate the methodological considerations that informed the research on which Sticht based his

conclusions since these same considerations help inform the present study.

The process by which one measures comprehension has been one of the more debated issues in reading research. According to the RAND Reading Study Group report, a major criticism of current measures of reading comprehension is that widely used "comprehension assessments are heavily focused on only a few tasks: reading for immediate recall, reading for the gist of the meaning, and reading to infer or disambiguate word meaning" (2002, p. 54). This criticism may be valid in terms of the shortcomings of using these comprehension assessments to obtain an in-depth diagnosis of reading difficulties for informing the day-to-day instruction of individual students (Mesmer & Mesmer, 2008; Lipson & Wixson, 2009). However, a measure of a student's ability to perform comprehension tasks such as immediate recall, gist of the meaning, and inferred word meaning can provide meaningful data with which to compare groups of students and to indicate potential comprehension difficulties that individual students may have (Pearce & Verlaan, 2012). For the purposes of this study, which compared nearly identical performance tasks via both listening and reading comprehension, the selection of a comprehension assessment with a narrow focus (the GMRT-4) allowed for a direct comparison of these two modalities.

Although there may be no clear consensus concerning what constitutes a "true" measure of comprehension, it is incumbent upon the researcher to understand the effects of presentation conditions, subject characteristics, and comprehension measures on a quantitative comparison of measures of listening and reading comprehension (Danks, 1980). The presentation condition is probably the most important difference between reading comprehension and listening comprehension. Although someone reading has

access to the entire text for the purposes of performing those tasks by which comprehension is measured, a listener has access to a relatively smaller amount of the text due to factors such as memory constraints and listening skills. One way to overcome this difference is to limit the amount of text that the listener is required to process for the performance task (Young, 1973). In addition, the rate at which the text is presented may need to be controlled because silent reading rates can be faster than the rate at which speech is normally presented (Danks, 1980). To address presentation condition differences between measuring reading and listening comprehension, two approaches have been suggested: (a) use time compressed speech to increase oral presentation rates to the level of silent reading rates, or (b) limit the time of access to the reading task (access to the text) so that it is comparable to that of the listening task.

Because listening and reading comprehension rates vary considerably based on age range, it is not clear that either of these approaches has much effect on the assessment outcome. Indeed, an analysis of the research studies Sticht analyzed at the fourth, sixth, and eighth-grade levels indicates that there were no clear differences in outcome measures as a result of controlling presentation conditions. At the fourth-grade level, only one of the studies controlled presentation rate, but listening comprehension still exceeded reading comprehension as it did in seven out of the nine fourth-grade studies. At the sixth-grade level, five studies out of nine controlled presentation rate, with listening comprehension exceeding reading comprehension in three of these while the other two showed these two measures to be equal. At the eighth-grade level two studies out of eight controlled presentation rate and showed listening and reading comprehension to be equal, but so did three other studies in which there were no controls. Results are summarized in

Table 1.

Table 1

*Summary of the Effects of Presentation Rate Controls on Reading(R) and Listening(L)
Outcome Measures for Studies Informing Sticht's Work*

Grade	Studies Controlled L > R	Studies Controlled L = R	Studies Not Controlled L > R	Studies Not Controlled L = R	Total Studies L > R	Total Studies L = R
4	1	0	6	2	7	2
6	3	2	3	1	6	3
8*	0	2	3	3	5	3

*Data from grades 7, 8, and 9 combined

Another factor to consider in comparing reading and listening comprehension is subject characteristics. The most apparent characteristic is the age of the subject, because listening comprehension is not correlated with reading comprehension before the ability to decode has been acquired, which typically occurs from the second through fourth grades. It is after decoding that reading and listening comprehension begin to be more closely correlated (Curtis, 1980; Hoover & Gough, 1990; Singer & Crouse, 1981; Stanovich, et al., 1984). In addition, the majority of studies that have investigated listening and reading comprehension have looked at a single or limited age range. At a given age, especially when children are young, there can be considerable individual differences in psychological development and cognitive ability. These differences in chronological age become less of a factor as the child gets older. The researcher contends that individual differences will have a minimal impact on the present study because the researcher has investigated a relatively wide age range beginning with late elementary school and extending through middle school (grades 4, 6, and 8). Even at the youngest age range that was investigated (the end of the fourth-grade year), all of the participants had acquired at a minimum a basic level of decoding and reading comprehension ability. In addition, this study's use of a fairly large sample size representing a wide range of abilities further minimized the effects of individual subject characteristics on the overall results.

A third consideration in assessing reading and listening comprehension is the choice of assessment instrument. Because part of this study focused on testing Sticht's theory concerning the developmental relationship between listening and reading comprehension, it was important that the assessment instrument used to test reading and

listening comprehension had similar characteristics to those that were used in the research studies informing Sticht's theory. One of the most important characteristics that Sticht noted in his research was whether the listening and reading assessments were identical/equivalent in terms of the performance tasks that were measured (a summary of the relevant studies is contained in Table 2). In addition, Durrell (1969) contended that "equal tests must be used for both abilities" (p. 456), and that "relationships between listening and reading are more meaningful when expressed in *reading* grade equivalents. This requires that both the listening comprehension raw scores and the reading raw scores use the *same reading grade equivalent table*" (p. 458, emphasis in original). To ensure equivalent performance tasks, the researcher selected the GMRT-4 as an assessment instrument for both the reading and listening tasks (for a further discussion of the listening assessment instrument see Chapter Three). Using the GMRT-4 allowed the researcher to adhere to Durrell's recommendations because: (a) the GMRT-4 provides two forms for each grade level assessment that are nearly identical in their performance task requirements with high alternate form reliability measures, and (b) the researcher used the same norming table (reading grade equivalent table) for the reading and listening versions of each test form.

Table 2

Summary of Assessment Equivalence for Studies Sticht Analyzed

Grade	Identical Materials	Equivalent Materials	No Information	Total
4	8	0	1	9
6	6	2	1	9
8*	8	0	0	8

*Data from grades 7, 8, and 9 combined

Research Studies Informing Sticht's Work

An important reason for undertaking the present study is that almost all of the research that Sticht analyzed to arrive at his conclusions concerning the relationship between listening comprehension or *auding* (the term used by Sticht and others to denote listening comprehension) was conducted prior to 1970, and much of it was conducted prior to 1960, in a media environment dominated by radio while television was still either nonexistent or in its infancy. It will be useful to investigate which studies Sticht used in his work to get a sense of the temporal environment in which these studies took place. In addition, I confine this analysis to those studies conducted at the grade levels which the current study investigates – fourth, sixth, and eighth.

Of particular interest to the current study is the research Sticht analyzed concerning the age at which reading and listening comprehension seemed to equalize. For those studies spanning two or more grade levels, the results for each grade level were analyzed separately. For fourth grade, Sticht included data coming from nine studies spanning dates from 1917 to 1970. Sticht included studies by Erickson and King (two studies in 1917), Young (1930), Miller (1941), Hanna and Liberati (1952), Emslie, Kelleher, and Leonard (1954), Joney (1956), Hampleman (1958), and Brassard (1970). In seven of these studies, listening comprehension ability exceeded reading comprehension, and in the other two they were equal. One study was published in 1970, four studies were published during the 1950s, and four more were published prior to 1942. At the sixth-grade level, Sticht included nine studies spanning the same date range. For sixth grade, Sticht analyzed studies by Erickson and King (1917), Young (two studies in 1930), Kelly, Loughlin, Gill, and Monteith (1952), Hampleman (1958), W.H. King (two studies in

1959), Many (1965), and Brassard (1970). Listening comprehension exceeded reading comprehension in six of the nine studies, and they were equal in the remaining three. For the sixth-grade data, one study was published in 1970, one was published in 1965, four studies were published in the 1950s, and three were published prior to 1931.

Since Sticht only listed one study for eighth grade, I will also list the studies for seventh and ninth grade that Sticht analyzed. For seventh grade, Sticht analyzed studies by Erickson and King (1917), Russell (two studies in 1923), and Kelly, et al. (1952). For eighth grade, Sticht analyzed a study by Erickson and King (1917). For ninth grade, Sticht analyzed a study by Erickson and King (1917) and two studies by Russell (1923). For seventh grade, listening comprehension exceeded reading comprehension in one study, but they were found to be equal in the other three studies. In the one eighth-grade study, listening comprehension exceeded reading comprehension. In the ninth grade, listening comprehension exceeded reading comprehension in one study, but they were found to be equal in the other two. Collectively analyzed, of the eight studies spanning seventh through ninth grade that Sticht included in his analysis, listening comprehension exceeded reading comprehension in three of these studies, while they were equal in the other five. This tends to confirm Sticht's contention that reading comprehension begins to equal listening comprehension ability during this developmental period. However, what particularly stands out in the seventh through ninth grade studies Sticht used in his research is that the most recent study forming this part of the data was published in 1952, and the remaining seven studies were published prior to 1924 - over 85 years ago.

If the publishing dates for the fourth-, sixth-, and eighth-grade studies that Sticht used for his research are viewed as a whole, two studies were published in 1970, one in

1965, nine during the 1950s, and 14 published prior to 1942, with 13 of those published prior to 1931 (results are summarized in Table 3). Although Sticht's conclusions may have been valid concerning the age range at which listening comprehension ability and reading comprehension seem to equalize for the time period in which these studies were conducted, his conclusions were based on research studies the majority of which were conducted over 70 years ago. Certainly a strong case can be made for collecting current listening comprehension and reading comprehension data for these age ranges, especially given the vast changes that have taken place over the last 70 years in our social and cultural environments, as well as the possible effects these changes may have had on listening comprehension ability with its concomitant effects on reading comprehension.

Table 3

Date Ranges of Studies Informing Sticht's Work

Grade	1970s	1960s	1950s	1940s	1930s	1920s	1910s	Total
4	1		4	1	1		2	9
6	1	1	4		2		1	9
8*			1			4	3	8

*Data from grades 7, 8, and 9 combined

Sticht's Hypotheses for the Unitary Nature of Reading and Listening

Comprehension

Thomas Sticht's *Auditing and Reading* (Sticht, et al., 1974) presented perhaps the most thorough analysis to date of research spanning the previous 50 years that investigated the relationships between listening comprehension and reading comprehension. Sticht's goal in this work was to present evidence to support several hypotheses he developed in an attempt to make a case that reading and listening comprehension relied on the same or similar cognitive processes. I examine the basis for some of Sticht's conclusions in this work because many of them have been accepted as seemingly valid, specifically Sticht's suggestion that the equalization age for listening comprehension and reading may represent a developmental norm.

Sticht's first hypothesis was that listening comprehension will exceed reading comprehension up to a certain point at which time they should equalize. The studies Sticht evaluated for this hypothesis were comparisons of listening comprehension and reading comprehension of students at various age levels. When the data were combined and analyzed, Sticht noticed that listening comprehension exceeded reading comprehension up to about the seventh- or eighth-grade, at which point they equalized. Sticht referred to the equalization stage as that of becoming a "mature reader." Readers at this stage seem to demonstrate the smoothed-out eye movement patterns associated with proficient reading. That some of the studies indicated superiority of reading to listening comprehension at later ages, especially late high school and college levels, Sticht attributed to "improved skill in extracting information from the stable visual display of print rather than indicating an ability to comprehend some material by print that cannot

be comprehended by auditing” (p. 92, 1974). Of relevance to the current study is Sticht's position that the age at which listening comprehension and reading comprehension equalize is at the seventh- or eighth-grade level and that listening comprehension tends to exceed reading up to that point.

Sticht's second hypothesis was that listening comprehension ability, not phonological awareness but actual listening comprehension, should be predictive of later reading comprehension ability *after* decoding has been acquired, and that correlations between these two measures should be low at early grade levels prior to decoding acquisition and increase as decoding skills are mastered. Sticht found no ideal studies to unequivocally confirm this, but data from a number of studies including one longitudinal study yielded data that lent support to this hypothesis – listening comprehension performance was correlated with reading comprehension performance. The conclusions Sticht drew from these various studies have been critiqued for at least two reasons (Danks, 1980): first many of the studies varied in terms of comprehension measures, administration conditions, task requirements, etc., so it was difficult to construct a holistic picture of the results that would withstand procedural challenges; second, Sticht combined results of "good" studies with results of questionable studies, which also brings into question the overall conclusions he developed from their analysis. In the current study, the researcher used a fairly large sample to attempt to establish meaningful correlation data for listening comprehension and reading comprehension spanning the developmental period during which reading comprehension has been theorized to undergo a significant portion of its development (i.e. from approximately fourth through eighth grade).

Sticht's third hypothesis stated that listening comprehension and reading comprehension can be accomplished at similar rates and that there is a maximal rate for both modalities at which point they show a similar decline. Because speakers typically speak at 150 – 175 wpm whereas good readers typically read at 250 – 300 wpm, Sticht compared studies analyzing listening comprehension using compressed speech for a presentation method, thus allowing effective speaking rates of up to 250 - 300 wpm to be sustained. These studies revealed that listening comprehension and reading comprehension in good readers were seemingly equal, and that both presentation modes yielded a nearly identical decline in comprehensibility of text at different presentation rates with a maximum being achieved at or about 300 wpm, at which point comprehension decreased sharply. The relevance of this to the current study is that it seems to build a case for the unitary nature of the cognitive processes governing listening comprehension and reading.

Sticht's fourth hypothesis is that transference should be demonstrable between the two processes – in other words, improvements in listening comprehension via training should result in improvements in reading comprehension and vice-versa. Sticht identified 12 studies that met the validation criteria he had established. These studies investigated whether training in a listening comprehension task would have a positive effect on a reading comprehension task. Ten of the 12 studies showed a positive result, with two of the studies being critiqued for not demonstrating that the listening comprehension training had been effective in and of itself (i.e., a skill not learned could certainly not be transferred). No studies were identified that attempted to measure transference in the other direction, from reading comprehension achievement to listening comprehension

tasks. The relevance of these findings to this research study is that they present further evidence for a strong relationship between listening comprehension and reading comprehension in terms of reading instruction, thereby adding impetus to the importance of attempting to determine the nature of the current relationship between listening comprehension and reading comprehension.

Although some critiques of Sticht's work are that it was perhaps "overly ambitious" (Clark, 1975), and that some of the hypotheses could be explained by models that viewed reading and listening as being controlled by different cognitive processes as well as by a unitary model, there was much consensus that it built a strong argument for the interrelatedness of listening comprehension and reading comprehension, albeit one that required more research to fully support. If there is indeed a link between listening comprehension and reading comprehension acquisition, then several gaps still exist in the current research. Because most of Sticht's data was obtained from studies conducted prior to the 1970s, what immediately seems evident is that not only was the ethnicity of the subjects being tested likely to be very homogenous, but the predominant media for much of this time was orally based (i.e., radio). Looking at Sticht's first hypothesis, one gap in the research that seems apparent is that there is little current research confirming that oral language comprehension and reading comprehension still equalize by the seventh or eighth grade. There may be wide ranging implications for comprehension instruction (e.g., an increased emphasis on listening skills) if a significant difference in this equalization age exists either for the general population or for various sub-populations. In addition, if media and cultural effects have produced a diminished listening comprehension ability in the general population, this may well have an effect on the

development of reading comprehension.

Sticht's second hypothesis concerning the correlation of listening comprehension and reading comprehension also has implications for this study. Hart and Risley (1994) showed that vast differences in reading ability are already evident by first grade based on the qualitative and quantitative differences in oral language that children from different SES backgrounds are exposed to between ages one and three. Studies have confirmed that oral language interaction with adult caretakers prior to the start of school is significantly correlated with test performance at the high school level (OECD, 2010). Stanovich's (1987) theory that institutional effects may, over time, contribute to weaker readers making fewer gains than stronger readers (termed "Matthew-effects" in reference to "the rich get richer and the poor get poorer" from the Gospel of Matthew), suggests the possibility that institutional effects may exacerbate reading acquisition problems for students entering school with less developed oral language skills. If listening comprehension ability has decreased in the overall population due to the effects of media and popular culture, this does not bode well for those students who are already at a disadvantage in acquiring linguistic skill due to influences from their home environment.

Research into the Effects of Media on Learning and Language

One of the purposes of this study was to determine whether there was evidence to indicate that the developmental relationship between listening comprehension and reading comprehension has changed from what Sticht had posited. A change in this developmental relationship would implicate environmental factors in addition to developmental factors in contributing to the relationship between listening and reading comprehension. It is important, therefore, to review literature suggestive of

environmental influences on listening comprehension. For the purposes of this study, the review of applicable research is limited to studies indicating a relationship between factors related to comprehension, such as attention, and studies indicating the effect of environmental influences, such as media exposure, on these particular factors.

With the advent of television and the computer age, the amount of visual stimulation to which children are exposed has increased dramatically in the last 40 years. Recent data from a Kaiser Family Foundation study show that children between the ages of eight and 18 spend on average seven hours and 38 minutes per day of clock time exposed to media content, or as much time as most adults spend at a full time job (Rideout, Roberts, & Foehr, 2010). If time spent during multiple simultaneous exposures to media is added in – for example listening to music while playing video games – this figure escalates to 10 hours and 45 minutes of total media exposure per day. These figures jump enormously for students in the 11–14 year age range. In addition, Blacks and Hispanics consume more media than other ethnicities. During the 1990s concern began to grow over the impacts of television and computer screen exposure on attention disorders and cognitive development in general (Hartmann, 1996; Healy, 1990) and reading in particular (Koolstra & Van der Voort, 1996). Concern over the exposure to television on early neurological and cognitive development led the American Academy of Pediatrics Committee on Public Education (AAPCPE, 1999) to initially recommend that parents should prevent children younger than two years of age from having *any* exposure to television screens:

Pediatricians should urge parents to avoid television viewing for children under the age of two years. Although certain television programs may be

promoted to this age group, research on early brain development shows that babies and toddlers have a critical need for direct interactions with parents and other significant care givers (e.g., child care providers) for healthy brain growth and the development of appropriate social, emotional, and cognitive skills. Therefore, exposing such young children to television programs should be discouraged. (p. 342)

It should be noted that the resulting backlash against this seemingly “harsh” recommendation caused the AAPCPE to moderate its language to include minimizing exposure rather than eliminating it altogether.

What has also drawn the attention of researchers are the possible effects of television viewing and video games on different cognitive processes associated with attention and memory. Links between elevated television viewing and the manifestation of attention disorders as early as the age of seven or eight have been recently documented (Christakis, et al., 2004). A study that drew national attention compared the effects of extended television viewing to those of playing video games on memory and verbal cognitive performance (Dworak, et al., 2007). In this study, subjects were asked to either play video games or watch a reasonably exciting movie for one hour in the evenings for several days. Subjects were given a visual and verbal memory test to determine the effects of video game playing and movie watching. Sleep patterns were also observed and recorded. A significant decrease in performance on the verbal memory test was observed in the students who played video games. In addition, both test conditions, video game playing and movie viewing, had some negative effects on the subjects' sleep patterns, with video game playing having the greatest effects. The researchers concluded that

media consumption, especially the playing of video games, could contribute to attention problems, a decrease in verbal cognitive performance, and other health issues.

It is important to note the effects of media exposure on cognitive functions related to attention and memory, because studies have confirmed that these processes are important in reading comprehension. In a recent study (Carretti, et al., 2009), researchers noted that 10 and 11 year-olds categorized according to comprehension as poor readers did not perform as well as good readers on tasks designed to measure working memory and attention capabilities. In addition, Commodari and Guarnera (2005) found that reading performance was linked to how well students performed on a computer-based test measuring attention, with poorer readers demonstrating poorer performance on attention measures than better readers. Another study demonstrated that when computer-based “attention therapy” software was used with sixth-grade students having moderate reading difficulties, the intervention group that received the attention therapy scored significantly higher on measures of attention, recall, and reading comprehension than did the control group (Solan, et al., 2003). Finally, a long-term study comparing the effects of two different instructional strategies on children with reading disabilities found that teacher assessment of student attention was among the factors having the highest predictive skill for student reading improvement (Torgeson, et al., 2001).

What seems to be evident is that the current media environment to which children are exposed during their developmental years is vastly different from the one encountered by the subjects of the research studies upon which Sticht based his developmental theory of listening and reading comprehension. Children today consume some form of media for at least eight hours per day. In addition, those students coming from minority

backgrounds that national data indicate are less proficient readers (i.e., Black and Hispanic) consume even more media than their White counterparts. Furthermore, excessive media exposure has been linked to attention disorders, and even a relatively small amount of media consumption (one hour per day of video games) seems to have an almost immediate negative impact on verbal memory tasks. This is of great significance because studies have consistently demonstrated that attention and memory are significantly correlated with comprehension. It seems likely, then, that the potential effects of the modern day media environment on cognitive processes in general and verbal linguistic processes in particular should not be discounted in an examination of the current relationship between reading and listening comprehension.

Relevance of Study

This study, which examines the current relationship between listening and reading comprehension, is relevant for several reasons. First, listening comprehension and reading comprehension are both facilitated by the same language processes – the phonological, semantic, and syntactic. Research has suggested that deficits in one or more of these processes can have adverse effects on the acquisition of comprehension, thus indicating a link between these two comprehension modalities. Second, although Sticht posited a developmental relationship between listening and reading comprehension, the majority of the research informing his developmental model was conducted in the first half of the twentieth century during markedly different cultural and media environments than the ones in which we find ourselves today. No current research exists that confirms whether the developmental relationship posited by Sticht is still valid. Third, not only do recent studies seem to indicate that the current media

environment to which children are exposed may have detrimental effects on cognitive functions such as attention and memory, but additional studies confirm that attention and memory are significantly correlated with both reading and listening comprehension. Finally, SES and gender have both been shown to have some relationship to reading comprehension, but their respective relationships to listening comprehension in the age range this study is investigating have not been as thoroughly researched.

Summary

This chapter contains a description of the research literature and theoretical constructs that inform and support the current study. The chapter presents an overview of the relationship between oral language acquisition and comprehension. The chapter also discusses different viewpoints regarding the extent to which reading and listening comprehension share similar cognitive processes. In addition, this chapter presents different aspects of Sticht's research into the relationship between reading and listening comprehension. Also, effects of the modern media environment on attention and memory and on cognitive functions related to comprehension are discussed. The chapter concludes with stating the relevance of the current study.

Chapter 3: Methods and Procedures

This chapter presents the methodology employed in conducting this study and consists of the following sections: (a) the first section contains a restatement of the study's purpose and the research questions guiding the study, (b) the second section contains an overview of the study, (c) the third section contains a description of the study's participants and the demographics of the school districts from which they were drawn, (d) the fourth section describes the instrument used in the study to measure reading and listening comprehension, (e) the fifth section describes the research design that was used for the study, (f) the sixth section describes the procedures used in conducting the study, (g) the seventh section describes the data analysis techniques that were employed in analyzing the data, and (h) the eighth section provides a summary of the chapter.

Purpose and Research Questions

Thomas Sticht's work, *Auditing and Reading: A Developmental Model* (Sticht, et al., 1974) posited that the relationship between reading and listening comprehension appeared to be developmental in nature with listening comprehension exceeding reading comprehension until approximately the sixth/seventh grade; at sixth/seventh grade, comprehension in either modality tended to be equal; from approximately the eighth grade on, reading comprehension tended to exceed listening comprehension. This dissertation has three main purposes: (a) to compare reading comprehension and listening comprehension at the fourth, sixth, and eighth grades; (b) to determine if measures for reading comprehension and listening comprehension indicate a change from what Sticht posited as the developmental relationship between these two comprehension

modalities, (i.e., an equalization of these measures during middle school) (Sticht, et al., 1974); and (c) to determine to what extent proficient reading (reading at grade level) and listening comprehension are related both to each other and to demographic factors such as gender and SES.

The following research questions guided this study:

1. Do the *reading comprehension* scores and *listening comprehension* scores of fourth-, sixth-, and eighth-grade students indicate a change in the developmental relationship of these comprehension modalities as posited by Sticht (Sticht, et al., 1974) ?
2. Is *reading at or above grade level* related to *listening comprehension*, *gender*, and/or *SES*?

Overview

This study was quasi-experimental, employing convenience sampling to enlist a total of 945 fourth-, sixth-, and eighth-grade participants from eight schools in South Texas. To complete the study, the researcher: (a) selected a test to measure reading comprehension, (b) developed an instrument to measure listening comprehension, (c) enlisted participants from area elementary and middle schools for testing, (d) administered tests of listening and reading comprehension to the participants, (e) scored the test results, and (f) analyzed the data. The data collection portion of the study lasted approximately five weeks.

Participants

The participants for this study consisted of 223 fourth-, 354 sixth-, and 368 eighth-grade public school students in a specific region of South Texas. The researcher

enlisted fourth-grade participants from five elementary schools, and sixth- and eighth-grade participants from three middle schools. After obtaining Institutional Review Board (IRB) and school district approval to conduct the study, the researcher used the following procedures to enlist participants: (a) the researcher secured permission from the campus principals to approach teachers about using their classrooms to conduct the study; (b) the researcher met with classroom teachers to explain the study's procedures and to enlist their cooperation in conducting the study; (c) the researcher met with the students in each class to explain the study and enlist their participation; and (d) the researcher collected all applicable student, parent, teacher, and principal permission forms from the participants.

With the exception of one elementary school in a neighboring community, all of the schools were in the same school district. The school district from which the majority of students were drawn is located in South Texas. This school district serves approximately 38,242 students across 39 elementary schools, 11 middle schools, six high schools, and four special campus schools. Of these students, approximately 79% are Hispanic, 13.9% are White, 4.2% are African American, 1.6% are Asian, with the remaining 1.3% comprised of students having American Indian, Pacific Islander, or mixed ancestry. In addition, approximately 69% are classified as Economically Disadvantaged (based on their qualifications for free or reduced lunch), 4.9% are classified as Limited English Proficient (LEP), with 52.5% classified as At-Risk (the State of Texas classifies students as being "at-risk" if they have characteristics associated with an increased risk of not completing high school, e.g., unsatisfactory performance on a state-wide assessment, failing grades in two or more academic subjects for a semester, not advancing to the next grade level for one or more years due to grades, pregnant or a

parent, and so forth).

Two sections of fourth-grade students were drawn from an elementary school in a neighboring community. This school is a charter school that is not part of a larger school district. Having demographic characteristics quite similar to the aforementioned district, this school serves 361 students from kindergarten through sixth grade. Of these students, approximately 80.1 % are Hispanic, 14.1% are White, 3.5% are Asian, and 2.2% are African American. In addition, approximately 75.9% are classified as Economically Disadvantaged (based on their qualifications for free or reduced lunch), 1.4% are classified as Limited English Proficient (LEP), with 42.1% classified as At-Risk. Demographic data for this study's participants are displayed in Table 4.

Table 4

Participant Demographics

Grade	Male	Female	% Free/Reduced Lunch
4	106	117	81%
6	171	183	62%
8	166	202	57%

Measurement Instrument

The researcher selected the reading comprehension section of the Gates-MacGinitie Reading Test (GMRT-4) Fourth Edition Forms S and T (MacGinitie, et al., 2000) to measure both reading and listening comprehension. The GMRT-4 was selected for several reasons: (a) it is norm referenced, (b) it provides alternate forms, (c) it provides alternate form reliability figures, and (d) it has a long-standing history of use as a measure of reading comprehension. Levels 4, 6, and 7/9 of the GMRT-4 were identified as being suitable for this study because of their specific application for the grade levels being tested. Each grade level version of the test contains two forms, Form S and Form T. According to the test publisher, these forms are highly correlated in terms of student achievement. The publisher reports alternate form reliability for the reading comprehension section as .86 for Level 4, .82 for Level 6, and .83 for Level 7/9 when administered to eighth-grade students. The reading comprehension section of the GMRT-4 for each of these Forms/Levels consists of 11 separate unrelated reading passages which are each followed by three to six questions. Both narrative and expository passages are included in the test, with the passages increasing in difficulty.

Listening comprehension instrument.

Although the GMRT was not specifically designed to measure listening comprehension, the researcher chose to use the GMRT to measure listening comprehension in order to keep the task demands as similar as possible between the silent reading comprehension measure and the listening comprehension measure. This follows Durrell's advice (1969) that listening comprehension and reading comprehension should be measured with the same instrument. In order to use the GMRT as a test of listening

comprehension, the researcher had to design a standard method of administering the GMRT orally. Three components were considered in developing a standardized delivery of the GMRT as a test of listening comprehension: (a) the presentation method, (b) the presentation rate, and (c) the instructions and answer document.

Presentation method.

In order to standardize the presentation method of the GMRT as a listening comprehension test, the researcher created audio recordings of the reading comprehension portion of the GMRT. Forms S and T were each recorded for Levels 4, 6, and 7/9. The researcher produced the audio recordings using commercially available audio recording software. Each of the audio recordings was comprised of a standardized instructional script (see Appendix A) along with the reading passages for that particular Form/Level of the test. The researcher also recorded a standard introductory statement at the beginning of each passage indicating for which questions the passage presented information (see Appendix B). The researcher read aloud each reading comprehension passage of the GMRT-4 along with the questions and answer choices that accompany each passage. In the recorded version of the test, the researcher identified each question by explicitly stating the question number prior to reading the question; for example, prior to reading question 1 the researcher would say “question one”, and so forth. The researcher also identified the answer choices by stating the letter corresponding to each answer choice; for example, prior to reading answer choice “A” the researcher would say “A”. To allow students the opportunity to consider their answer, the researcher used a wait time of approximately three seconds between the completion of reading the final answer choice for one question, and the beginning of reading the next question.

After recording each passage, the researcher checked the recorded version against the passage, the questions, and the answer choices in the actual GMRT-4 text to ensure both that the recorded version was identical and that the reading was fluent and without any errors. An audio file in mp3 format was created for the instructional script and for each of the passages. An audio computer disk (CD) was then created for each Form/Level of the test. Each CD had a total of 12 tracks – the instructional script occupied the first track, and each of the reading passages occupied one of the remaining 11 tracks corresponding to the order they appeared on the GMRT. A total of six audio CD's were used to administer the listening comprehension portion of the test – one for each Form/Level.

Presentation rate.

The second consideration in developing a standardized instrument to measure listening comprehension was the oral presentation rate of the recorded material – this is typically measured in words per minute (wpm). Although matching the presentation rates between listening assessments and reading assessments may not be effective or meaningful (see previous discussion in Chapter Two), it is important to use a presentation rate that is not too fast, especially at younger age ranges. To arrive at a suitable oral presentation rate for recording the GMRT-4, three factors were considered: (a) the average oral presentation rate used in the media, (b) the relationship between oral presentation rates and silent reading rates in terms of comprehension, and (c) the relationship between oral presentation rate and the age of the participants. Data suggest that broadcast journalists and professional readers of audio books typically present text in the range of 150 – 200 wpm, with the average being about 175 wpm +/- 25 wpm

(Foulke, 1969; Foulke & Sticht, 1969). This seems to indicate that the public is accustomed to hearing oral language delivered through the media at rates falling within this range. Studies by Foulke and Carver using recordings of compressed speech indicated that comprehension of oral language is still effective at rates ranging from 250 – 300 wpm, but begins to drop off rapidly at rates exceeding that (Carver, 1973; Foulke, 1971). Carver also suggested that an oral presentation rate of 150 wpm could conservatively be considered a “threshold” above which comprehension begins to decline. These findings suggest that a suitable oral presentation rate for an assessment designed to measure oral comprehension should probably be at or below 150 wpm.

Because the aforementioned studies establishing oral presentation and comprehension rates were conducted using adults, the researcher needed to use additional data to arrive at a suitable reading rate for younger students. Sticht was able to find little evidence that individuals read text silently at rates that are much greater than those at which they are able to orally comprehend text (Sticht, et al., 1974). Data from NAEP indicated that the effective median silent reading rate of adult readers ranged from 186 – 195 wpm (NAEP, 1971). These results seem to coincide with the average rate of broadcast speech of 175 wpm cited previously. Using the relationship between oral and silent reading rates that these findings seem to suggest – the rate at which individuals read silently is close to the rate at which they orally comprehend – the researcher decided to use the same silent reading rate data cited by Sticht to establish a suitable presentation rate for age ranges being tested. The NAEP data (1971) cited by Sticht indicated that at age 9 (fourth grade), the median silent reading rate ranged from 117 – 123 wpm; by age 13 (eighth grade), this range increased to 165 – 173 wpm. These data seem to suggest that

silent reading rates progress rather rapidly between fourth and eighth grade, at which point the silent reading rate approaches the level of an adult reader.

Using the available data for fourth- and eighth-grade students, the researcher extrapolated a presentation rate for sixth-grade students that falls somewhere between the fourth- and eighth-grade rates. Furthermore, because silent reading rates seem to progress rather rapidly from fourth to eighth grade, and because the average age of the fourth-grade participants being tested in this study was approximately 9.85 years of age, slightly higher than the 9 years of age cited by the 1971 NAEP report, the researcher decided that the presentation rate could also be slightly higher than the 120 wpm average cited by the NAEP. The researcher decided on the following presentation rates for recording the oral administration of the GMRT: Level 4, Forms S & T – approximately 130 wpm; Level 6, Forms S & T – approximately 140 wpm; Level 7/9, Forms S & T – less than 150 wpm. In order to establish an effective presentation rate, the researcher first had to determine the number of words in the passages and establish a word count. Words such as “it”, “the”, “is”, and “caterpillars” were each counted as single words, compound words were counted as a single word, and hyphenated words were counted as two words. Several trial recordings allowed the researcher to arrive at a presentation rate for each level and form of the GMRT-4 that fell within the target range. To calculate the presentation rate of the final recordings, the researcher divided the total word count of the 11 passages of the GMRT-4 by the total time it took to read the passages aloud. The presentation rates for each of the three levels are presented in Table 5.

Table 5

Oral Presentation Rates for Each Level/Form of the GMRT-4

Level	Form S	Form T
4	130.4 wpm	131.3 wpm
6	141.8 wpm	139.4 wpm
7/9	145.6 wpm	143.2 wpm

Instructions and answer document.

A third consideration in developing a standardized measure of listening comprehension was deciding upon a suitable set of instructions and an answer document. To arrive at a suitable set of instructions, the researcher modeled the instructional script used for delivering the GMRT as a listening test after the instructional script used for the listening comprehension subtest of the Stanford Achievement Test, Tenth Edition (SAT-10) (Harcourt Brace, 2003). In addition to using an instructional script similar to that of the SAT-10 (see Appendix A), the researcher followed the SAT-10 procedures in two additional ways. The first was to provide participants paper with which to take notes during the administration of the listening test. The second was an answer document that presented the text of the answer choices for each question, but not the question stem – this answer document format is nearly identical to the one used by the listening comprehension portion of the SAT-10. In addition, the answer document was similar to the format used in the GMRT reading comprehension section booklet, with the question numbers and answer choices grouped together for each reading passage.

Research Design

The researcher employed a cross-sectional correlational design to investigate the relationship between reading and listening comprehension at grades 4, 6, and 8. Although the researcher employed convenience sampling for the purposes of this study, the researcher enlisted a large number of participants from schools in different geographic areas of the school district. In addition, the researcher's familiarity with the locale enabled him to select schools whose collective demographic composition was similar to that of the entire school district. Furthermore, the researcher tested all or most of the

students in an entire grade level at each of the schools participating in the study. For the fourth-grade cohort, the researcher administered the tests to all of the fourth-grade classrooms in each of the elementary schools participating in the study. At the participating middle schools, the researcher administered the test to almost all of the sixth- and eighth-grade English/Language Arts classes (a few sections were unavailable for testing due to scheduling constraints).

Procedures

The researcher administered the tests using identical procedures for each grade level. The administration of both portions of the test was accomplished in a single class period or block of time. One form of the test was used for reading comprehension and the other form was used for listening comprehension. The reading comprehension portion of the test was administered following the GMRT-4 guidelines. For the oral administration of the test, the instructions, the reading passages, and the answer choices were pre-recorded, and the recording played for the participants. The participants did not have the text of the passage or the question stems, but had the answer choices to each question available to them on an answer document. The administration procedures for the oral administration of the test allowed participants to take notes while listening, and the researcher provided them paper and pencil.

To control for order effects, at each grade level the researcher administered the reading comprehension portion of the test first followed by the listening comprehension portion of the test to approximately half of the participants; the other half of the participants received the listening comprehension portion of the test first followed by the reading comprehension portion. The researcher also controlled for form-related score bias

by alternating the forms used for administering the reading and listening portions of the test. For example, of those participants who were administered the reading portion of the test first, approximately half received Form S Reading followed by Form T Listening, and the other half received Form T Reading followed by Form S Listening. The researcher employed this same variation for the participants receiving the listening portion first – approximately half received Form S Listening followed by Form T Reading, and the other half received Form T Listening followed by Form S Reading.

Data Analysis

The researcher hand-scored the answer documents for the reading and listening portions of the test and double checked the scoring for accuracy. After the scoring was complete, the researcher employed four methods of data analysis: paired sample *t*-tests, biserial correlation, logistic regression, and multiple-regression.

Equivalence of Forms S and T of the listening comprehension instrument.

Although published alternate form reliability figures are available for the reading comprehension portion of the GMRT-4, the researcher had to establish if there was a statistically significant difference between the alternate forms of the test that were developed as listening comprehension measures for this study. The researcher employed multiple-regression analysis to verify the statistical equivalence of the orally administered versions of Forms S and T of the GMRT-4; the same statistical test was also employed to investigate whether there were order effects for the reading portion of the test and /or the listening portion of the test.

Differences between reading comprehension and listening comprehension.

To determine if differences existed in the NCE Mean scores for reading

comprehension and listening comprehension, the researcher used a paired sample *t*-test for each of the three grade levels being tested. Due to the use of multiple *t*-tests for data analysis, a Bonferroni adjustment was applied to the alpha level to reduce the probability of a Type 1 error (Tabachnick & Fidell, 2007).

Relationship between proficient reading and other factors.

The researcher employed binary logistic regression to determine whether reading at grade level was significantly affected by gender and SES. Biserial correlation was used to determine the relationship between proficient reading and listening comprehension.

Summary

This chapter provides a description of the methods and procedures used to collect data for the purposes of determining the relationship between listening comprehension and reading comprehension in fourth-, sixth-, and eighth-grade students. This chapter restates the purpose of the study and research questions. In addition, an overview of the study is provided. This chapter also describes the participants, measurement instruments, research design, and procedures. The chapter concludes with a description of the data analysis techniques that were employed in evaluating the data. Chapter Four contains the results of this study.

Chapter 4: Results

This chapter contains the results of the analysis conducted on the data collected from an administration of the GMRT-4 as a measure of reading comprehension and listening comprehension. The data was analyzed to compare listening and reading comprehension, to determine if a relationship exists between reading at grade level and listening comprehension, gender, and/or SES, and to determine if a relationship exists between listening comprehension and gender and/or SES. The first section of this chapter presents the results of a preliminary data analysis that was conducted to examine the data for potential order effects and/or form-bias effects. The second section of this chapter presents the results of the analyses employed to answer the research questions. The final section of this chapter contains a summary of the results of the data analyses.

Preliminary Data Analysis

As was previously stated, participants were administered alternate forms of the GMRT-4 for reading and listening comprehension: those participants receiving reading Form S (RS) received listening Form T (LT), and those receiving reading Form T (RT) received listening Form S (LS). To control for order effects, approximately half the participants received the reading comprehension portion of the GMRT-4 followed by the listening comprehension portion; the other half received the listening comprehension portion followed by the reading comprehension portion. To control for form bias effects, approximately half of the participants taking the reading portion of the GMRT received Form S and the other half received Form T; this was duplicated with the listening portion of the GMRT – approximately half received Form S and the other half received Form T. This counter-balanced design resulted in the creation of four presentation conditions

based on the GMRT form and the reading/listening test order: RS/LT, RT/LS, LS/RT, LT/RS. A preliminary data analysis was conducted to determine if the experimental design had sufficiently controlled for order effects and form bias effects.

Detecting order effects – reading comprehension.

To test for the presence of order effects for the reading portion of the GMRT-4, a multiple regression was conducted for each grade's data using the reading norm-curve equivalent (RNCE) score as the dependent variable and using gender, SES, and presentation order (reading followed by listening or listening followed by reading) as predictor variables. In the fourth-grade data, no significant effect on RNCE scores was detected for presentation order, gender, or SES, $F(3,219) = 1.23, p > .05$. A significant effect was detected in the sixth-grade data for presentation order and gender and also for the overall model, $F(3,350) = 3.19, p < .05$. In addition, a significant effect was detected in the eighth-grade data for presentation order and SES and also for the overall model, $F(3,364) = 14.72, p < .05$. A multiple regression was used to examine presentation order as a contributing factor to the RNCE scores of each grade's data. Because no clear pattern emerged indicating that one or more of the variables significantly affected RNCE scores across all grade levels, a regression model based on the data that was collected would likely not be meaningful and was therefore not constructed.

Detecting order effects – listening comprehension.

To test for the presence of order effects for the listening portion of the GMRT-4, a multiple regression was also conducted for each grade's data using the listening norm-curve equivalent (LNCE) score as the dependent variable and using gender, SES, and presentation order (reading followed by listening or listening followed by reading) as

predictor variables. For the fourth-grade data, a significant effect on LNCE scores was detected for gender but not for the overall model, $F(3,219) = 2.04, p > .05$. No significant effect was detected in the sixth-grade data for presentation order, SES, or gender, $F(3,350) = 1.64, p > .05$. A significant effect was detected for the eighth-grade data for presentation order and SES, and also for the overall model $F(3,364) = 14.23, p < .01$. A multiple regression was used to examine presentation order as a contributing factor to the LNCE scores of each grade's data. Because no clear pattern emerged indicating that one or more of the variables significantly affected LNCE scores across all grade levels, a regression model based on the data that was collected would likely not be meaningful and was therefore not constructed.

Detecting form bias – listening comprehension.

Published alternate-form reliability data is available for the GMRT-4, so it was not necessary to examine the reading portion of the GMRT-4 for form bias. It was, however, necessary to attempt to determine if form bias existed for the listening comprehension portion of the GMRT-4 because it was created by the researcher. To test for the presence of form-bias effects for the listening portion of the GMRT-4, a multiple regression was conducted for each grade's data using the LNCE score as the dependent variable and using gender, SES, and form version (Form S listening or Form T listening) as predictor variables. To control for possible order effects in testing for form bias, the researcher used only the scores of the participants who were administered the listening portion of the test first. In the fourth-grade data, a significant effect on LNCE scores was detected for gender, but not for form version, SES, or the overall model, $F(3,139) = 2.03, p > .05$. No significant effect was detected in the sixth-grade data for form version,

gender, SES, or the overall model, $F(3,195) = .74, p > .05$. A significant effect was detected in the eighth-grade data for SES and the overall model, but not for gender or form version, $F(3,217) = 3.52, p < .05$.

Research Questions

Research question one: Do the *reading comprehension* scores and *listening comprehension* scores of fourth-, sixth-, and eighth-grade students indicate a change in the developmental relationship of these comprehension modalities as posited by Sticht (Sticht, et al., 1974)?

Sticht posited that listening comprehension exceeds reading comprehension up until about sixth or seventh grade, at which point comprehension in each modality tends to equalize. From eighth grade onward, reading comprehension begins to exceed listening comprehension. To test whether there has been a change in this developmental relationship between reading and listening comprehension, participant scores on the reading comprehension portion of the GMRT-4 were compared with their scores on the alternate form of the GMRT-4 administered as a listening comprehension test. At each of the grade levels tested, a paired-samples *t*-test was used to compare the participant's reading and listening NCE scores.

Fourth-grade results.

Because neither order effects nor form-bias effects were found to contribute significantly to the listening or reading NCE scores of fourth-grade students, data for the entire sample were included in the paired-sample *t*-test analysis. Mean reading comprehension scores significantly exceeded mean listening comprehension scores, $t(222) = 6.13, p < .001, d = 0.41$. In addition, listening comprehension and reading

comprehension were highly correlated, $r(221) = +.62$, $p < .001$. Results are displayed in Table 6.

Table 6

Fourth-Grade Reading/Listening Comparison Data

N	Mean Reading (NCE)	SD	Mean Listening (NCE)	SD	<i>p</i>	<i>d</i>
223	45.88	14.62	41.00	12.07	.000*	0.41

* $p < .01$

Sixth-grade results.

Although no form-bias effects were detected in the sixth-grade data, an order effect was detected for reading NCE scores. Because a perceived order effect could be caused by cohort differences rather than actual presentation order (for a further discussion of this see Chapter 5), two analyses of the sixth-grade data were conducted: (a) a paired-sample *t*-test of the data for all the participants; and (b) a more conservative paired-sample *t*-test of the data for just those participants receiving the reading portion of the test first, thereby reducing the possibility of order effects. For the overall sixth-grade sample, reading comprehension significantly exceeded listening comprehension, $t(353) = 11.63$, $p < .001$, $d = 0.62$. Listening comprehension and reading comprehension were highly correlated, $r(352) = +.64$, $p < .001$. The more conservative test of just those participants receiving the reading portion of the test first also indicated that reading comprehension significantly exceeded listening comprehension, $t(154) = 8.75$, $p < .001$, $d = 0.70$), with a similarly high correlation value, $r(153) = +.66$, $p < .001$. Results are displayed in Table 7.

Table 7

Sixth-Grade Reading/Listening Comparison Data

N	Mean Reading (NCE)	SD	Mean Listening (NCE)	SD	<i>p</i>	<i>d</i>
354(ALL)	45.83	15.04	38.44	12.50	.000*	0.62
155(Read 1st)	47.28	15.14	39.04	13.01	.000*	0.70

* $p < .01$

Eighth-grade results.

As with the fourth- and sixth-grade data, no form-bias effects were detected in the eighth-grade data. Order effects were detected, however, for both the listening NCE scores and the reading NCE scores. Although these order effects may be explained by the cohort (for a further discussion of this see Chapter 5), three analyses of the eighth-grade data were conducted: (a) an analysis of the data for all the participants; (b) an analysis of the data for just those participants receiving the reading portion of the test first, thereby reducing the possibility of order effects on the reading scores; and (c) an analysis of the data for just those participants receiving the listening portion of the test first, thereby reducing the possibility of order effects on listening scores. For the overall eighth-grade sample, reading comprehension significantly exceeded listening comprehension, $t(367) = 17.19, p < .001, d = 0.90$. Listening comprehension and reading comprehension were highly correlated, $r(366) = +.64, p < .001$. The analysis of just those participants receiving the reading portion of the test first also indicated that reading comprehension significantly exceeded listening comprehension, $t(146) = 9.24, p < .001, d = 0.76$, with a high correlation value between reading and listening comprehension, $r(145) = +.58, p < .001$. A similar analysis of just those participants receiving the listening portion of the test first also indicated that reading comprehension significantly exceeded listening comprehension, $t(220) = 14.97, p < .001, d = 1.01$, with a high correlation between reading and listening comprehension, $r(219) = +.65, p < .001$. Results are displayed in Table 8.

Table 8

Eighth-Grade Reading/Listening Comparison Data

N	Mean Reading (NCE)	SD	Mean Listening (NCE)	SD	<i>p</i>	<i>d</i>
368(ALL)	53.78	18.06	41.10	14.67	.000*	0.90
147(Read 1st)	48.15	18.01	36.29	15.24	.000*	0.76
221(Listen 1st)	57.53	17.07	44.30	13.39	.000*	1.01

* $p < .01$

Research question two: Is *reading at or above grade level* related to listening comprehension, gender, and/or SES?

One of the purposes of this study was to examine the relationship between proficient reading, which is operationally defined as *reading at or above grade level*, and listening comprehension, gender, and SES. The latest data from the NAEP indicate that the majority of students in grades four and eight are considered less than proficient in reading (NCES, 2011), with only 34% of students at each of these grades scoring at or above the proficient level (the NAEP does not assess sixth-grade students). Long term trend data (NCES, 2011) indicate that it is not unreasonable to assume that the reading proficiency levels at grades 4 and 8 are also likely to be indicative of the reading performance of sixth-grade students. Because there are no validity figures comparing the NAEP to the GMRT-4, it was not possible to determine a precise score or range of scores on the GMRT-4 that would equate to a proficient reading level on the NAEP. To arrive at a means of comparing results on the GMRT-4 with the NAEP, the researcher chose to dichotomize the GMRT-4 reading comprehension score (a continuous variable) to approximate what might be considered a proficient reading level on the NAEP. The researcher created the dichotomous variable *reading at or above grade level* by dichotomizing the norm curve equivalent (NCE) of the reading comprehension score (RNCE) so that participants could be classified as either *reading at or above grade level* or reading below grade level.

An issue that frequently arises in dichotomizing a continuous variable is deciding whether to dichotomize the variable at a single point or on either side of a score range. Using a single score point to dichotomize a variable may diminish how indicative the

dichotomous variable is of the condition one is attempting to test. For example: a reading NCE (RNCE) score of 50 on the GMRT-4 is returned by a raw score that is equivalent to reading at grade level; on the GMRT-4 the difference between an RNCE score of 50 and the next lower RNCE score (48 or 49) amounts to answering one question correctly or incorrectly out of a total of 48 questions; classifying a participant as *reading at or above grade level* or below grade level based on one question out of 48 may be problematic.

For the purposes of this study, therefore, the researcher chose to dichotomize the RNCE variable on either side of a score range by using the GMRT-4's Grade Equivalency (GE) score as one of the criteria for dichotomization. The GE score was better suited for this purpose than simply using the RNCE score by itself because the RNCE score had slight variations in its GE equivalency based on the test form that was administered (Form S or Form T). For example, the spring norming values for the GMRT-4 Level 6 (sixth grade), indicate that an RNCE score of 52 on Form S equates to a GE of 7.2 (technically three months above grade level), but that an RNCE score of 52 on Form T equates to a GE of 7.1 (technically two months above grade level). In addition, these same RNCE values from the two different forms of the GMRT-4 are each associated with a slightly different raw score: 35 correct out of 48 for Form S, and 34 out of 48 correct for Form T.

In arriving at a GE score range to use for dichotomizing the RNCE score, it was also important to consider that a given difference in a GE score at a lower grade level may be more critical in terms of reading importance than it would be at a higher grade level. On the GMRT-4 for example, a GE score of 3.8 in the spring of fourth grade (typically interpreted as reading achievement that is approximately one year behind grade

level) equates to being in approximately the 33rd percentile, indicating that 66 percent of students fourth-grade students in the GMRT-4's national norming sample exceeded this score on this reading test. At the sixth-grade level, however, a GE score of 5.8 in the spring of sixth grade (typically interpreted as reading achievement that is approximately one year behind grade level) equates to being in the 38th percentile, indicating that 61 percent of students sixth-grade students in the GMRT-4's national norming sample exceed this score on this reading test. By eighth grade this gap in percentile score closes even further – a GE score of 7.8 in the spring of eighth grade (typically interpreted as reading achievement that is approximately one year behind grade level) equates to being in the 41st percentile, indicating that 58 percent of eighth-grade students in the GMRT-4's national norming sample exceed this score on this reading test. Thus, the researcher chose percentile rank as the other criterion to use (along with GE score) in dichotomizing the RNCE variable.

Because a range of $\pm 5\%$ is typically considered a standard sampling error, the researcher decided to dichotomize the RNCE variable by using a percentile range of approximately five percentile points to determine the GE score range to use at each grade level for dichotomizing the RNCE variable – in other words, two to three percentile points on each side of the 50th percentile (which equates to grade level reading). At the fourth-grade level, this percentile range amounted to a difference in GE scores of two months on either side of what would be considered grade level reading, resulting in a GE score range of 4.6 to 5.0. This range equated to a raw score difference of 3 questions out of 48 separating those students categorized as *reading at or above grade level* from those categorized as reading below grade level. At the sixth-grade level, this five point

percentile range amounted to a difference in GE scores of three months on either side of what would be considered grade level reading, resulting in a GE score range of 6.5 to 7.1. This range equated to a raw score difference of 4 questions out of 48 separating those students categorized as *reading at or above grade level* from those categorized as reading below grade level. At the eighth-grade level, this five point percentile range amounted to a difference in GE scores of four months on either side of what would be considered grade level reading, resulting in a GE score range of 8.4 to 9.2. This range equated to a raw score difference of 4 questions out of 48 separating those students categorized as *reading at or above grade level* from those categorized as reading below grade level.

It should be noted that in using a score range to eliminate scores for the purposes of dichotomizing a variable, one runs the risk of eliminating a significant number of participants if a large number of scores from a sample fall within the excluded score range, thereby potentially losing statistical power. Because a relatively small number of scores in this study fell into the excluded score range, the slightly reduced sample sizes (a reduction of less than 10% at the fourth- and sixth-grade levels and less than 12% at the eighth-grade level) created no significant loss of statistical power. Descriptive statistics for the sample sizes tested with the variable *reading at or above grade level* are contained in Table 9.

Table 9

Descriptive Data For the Variable “Reading At or Above Grade Level”

Grade	N (Total)	N (Above)	N (Below)	N (Excluded)	Correct Answers Separating “Above” And “Below”
4	223	71	132	20	3
6	354	117	205	32	4
8	368	187	137	44	4

Because *reading at or above grade level* is a dichotomous dependent variable, the researcher used binary logistic regression to test whether *reading at or above grade level* is related to gender or SES. At the fourth-grade level, no significance was found for either gender or SES. At the sixth-grade level, a significant relationship was found for gender, but not for SES. At the eighth-grade level, a significant relationship was found for SES but not for gender. Because neither of the independent variables was significantly related to *reading at or above grade level* across more than one grade level, the researcher did not consider the construction of a prediction model to be meaningful.

The researcher employed biserial correlation to examine the relationship between *reading at or above grade level* and listening comprehension, using the listening norm-curve equivalent (LNCE) score as a comparison variable. At the fourth-grade level, there was a significant correlation between *reading at or above grade level* and LNCE, $r_b(201) = +.69, p < .001$. At the sixth-grade level, there was a significant correlation between *reading at or above grade level* and LNCE, $r_b(320) = +.65, p < .001$. At the eighth-grade level, there was a significant correlation between *reading at or above grade level* and LNCE, $r_b(327) = +.74, p < .001$. The relationship between *reading at or above grade level* and LNCE is perhaps best illustrated by statistics that indicate the differences between mean LNCE scores for those participants categorized as *reading at or above grade level* and those participants categorized as reading below grade level, and also by what these two mean LNCE scores translate into in terms of a grade equivalency for listening comprehension. At the fourth-grade level the mean LNCE score for participants categorized as *reading at or above grade level* was 49.62 (GE of 4.8) versus 35.97 (GE of 3.5) for those participants categorized as reading below grade level. At the sixth-grade

level the mean LNCE score for participants categorized as *reading at or above grade level* was 46.97 (GE of 6.3) versus 33.51 (GE of 4.5) for those participants categorized as reading below grade level. At the eighth-grade level the mean LNCE score for participants categorized as *reading at or above grade level* was 49.25 (GE of 8.8) versus 31.16 (GE of 5.6) for those participants categorized as reading below grade level. Results are displayed in Table 10.

Table 10

Differences Between LNCE Mean Scores for Participants “Reading At or Above Grade Level” and Those Reading Below Grade Level

Grade	Mean LNCE (at or above)	Listening GE (at or above)	Mean LNCE (Below)	Listening GE (Below)	r_b	p
4	49.62	4.8	35.97	3.5	.69	.000*
6	46.97	6.3	33.51	4.5	.65	.000*
8	49.25	8.8	31.16	5.6	.74	.000*

* $p < .001$

Conclusion

The purpose of this study was to: (a) examine the relationship between reading and listening comprehension to determine if the developmental relationship posited by Sticht has shifted, and (b) determine to what extent proficient reading (reading at grade level) and listening comprehension are related both to each other and to demographic factors such as gender and SES. This chapter presents the results of the data analyses that were used to serve the purposes of the study. In assessing reading comprehension and listening comprehension at the fourth-, sixth-, and eighth-grade levels, reading comprehension was found to significantly exceed listening comprehension at each of these grades. Effect sizes for these differences varied from medium to large, but the eighth-grade cohort may have contributed to the large effect size in the eighth-grade data. Furthermore, reading comprehension and listening comprehension were shown to be significantly correlated at all grade levels with correlation values ranging from .62 to .64. In addition, the relationship between *reading at or above grade level* and listening comprehension was shown to be as strong or stronger with correlation values ranging from .65 to .74. A relationship between *reading at or above grade level* and gender was detected at sixth grade and between *reading at or above grade level* and SES at eighth grade. Because no relationship was detected for *reading at or above grade level* and gender or SES that spanned multiple grade levels, however, no firm conclusions could be reached regarding the relationship of these variables. The same holds true of the relationship between listening comprehension and gender and/or SES.

Chapter 5: Discussion

Summary

This study employed a cross-sectional correlational design using convenience sampling to investigate the relationship between reading comprehension and listening comprehension in fourth-, sixth-, and eighth-grade students. The purpose of this study was to: (a) compare reading comprehension and listening comprehension at the fourth, sixth, and eighth grades; (b) determine if measures for reading comprehension and listening comprehension indicate a change from what Sticht posited as the developmental relationship between these two comprehension modalities (i.e., an equalization of these measures during middle school) (Sticht, et al., 1974); and (c) determine to what extent proficient reading (reading at grade level) and listening comprehension are related both to each other and to demographic factors such as gender and SES.

The following research questions were evaluated:

1. Do the *reading comprehension* scores and *listening comprehension* scores of fourth-, sixth-, and eighth-grade students indicate a change in the developmental relationship of these comprehension modalities as posited by Sticht (Sticht, et al., 1974)?
2. Is *reading at or above grade level* related to *listening comprehension*, *gender*, and/or *SES*?

To develop the purpose for conducting this study, the researcher presented both a theoretical and a practical rationale for revisiting the relationship between reading and listening comprehension. In addition, the researcher reviewed literature that (a) established a linguistic basis for a relationship between reading comprehension and

listening comprehension, (b) examined the debate concerning the extent to which these two comprehension modalities are controlled by similar or distinct cognitive processes, (c) investigated the research studies that formed a basis for Sticht's conclusions regarding the reading/listening relationship (d) reviewed several of the hypotheses posited by Sticht as a result of the studies he examined, and (e) reviewed recent studies indicating the possibility that environmental influences may have effects on factors related to the development of listening comprehension.

To test the study's research questions, the researcher enlisted 223 fourth-, 354 sixth-, and 368 eighth-grade students as participants. With the exception of two fourth-grade classes from a charter school in a neighboring community, the participants were all drawn from the same school district in a medium-sized city in South Texas. The researcher used alternate forms of Levels 4, 6, and 7/9 of the reading comprehension portion of the GMRT-4 to measure reading and listening comprehension. The researcher administered the reading and listening versions of the GMRT-4 to each of the participants over a four-week period, alternating presentation order and form version to control for order and form-bias effects, respectively.

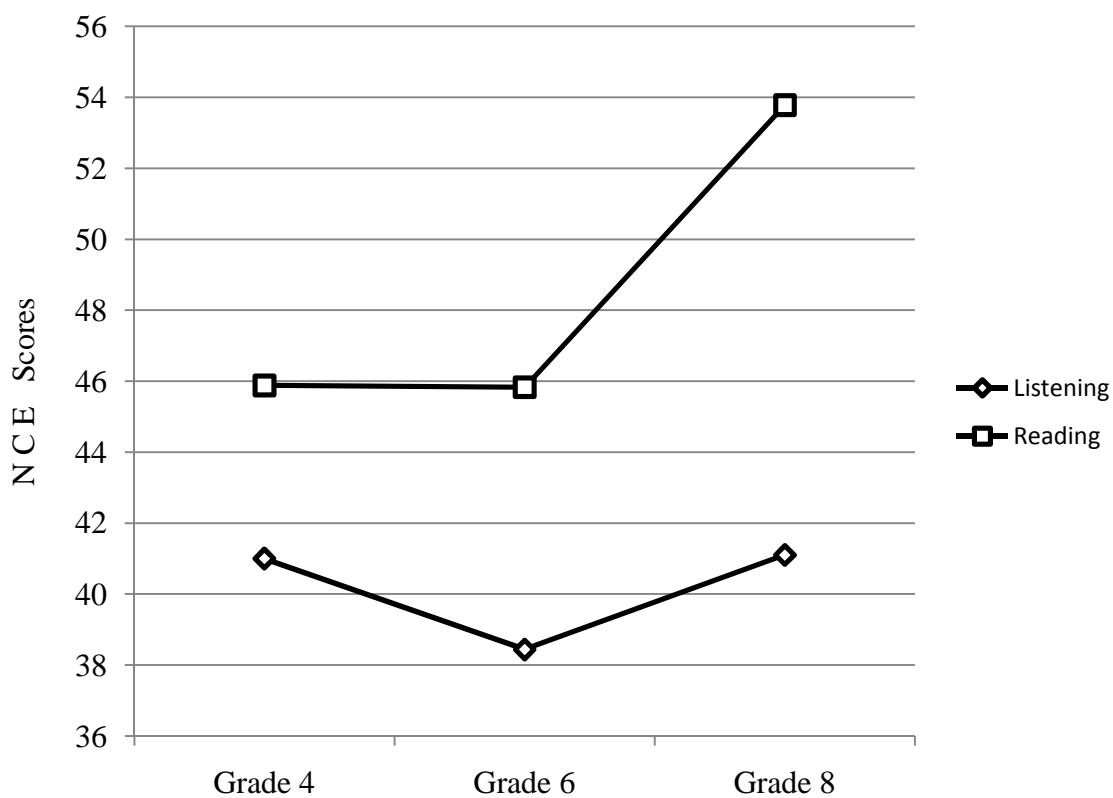
After the data had been collected, the researcher used multiple regression to test for the presence of order and form-bias effects. The researcher used a paired-samples *t*-test to compare scores of listening and reading comprehension on the GMRT-4. In addition, the researcher employed logistic regression and biserial correlation to evaluate the relationship between proficient reading, or reading at or above grade level, and demographic factors and/or listening comprehension.

Results

Question one: Do the *reading comprehension* scores and *listening comprehension* scores of fourth-, sixth-, and eighth-grade students indicate a change in the developmental relationship of these comprehension modalities as posited by Sticht (Sticht, et al., 1974)?

Sticht posited that the developmental relationship between listening and reading comprehension was as follows: listening comprehension tends to exceed reading comprehension up until about seventh grade, at which point comprehension ability in either modality tends to be equal; from approximately eighth grade on, reading comprehension begins to exceed listening comprehension. After administering a test of reading and listening comprehension to fourth, sixth, and eighth-grade students, this study found the following: (a) for fourth-grade students, mean reading comprehension scores significantly exceeded mean listening comprehension scores, $t(222) = 6.13, p < .001, d = 0.41$; (b) for sixth-grade students, mean reading comprehension scores also significantly exceeded mean listening comprehension scores $t(353) = 11.63, p < .001, d = 0.62$; and (c) for eighth-grade students, mean reading comprehension scores also significantly exceeded mean listening comprehension scores, $t(367) = 17.19, p < .001, d = 0.90$. Because reading comprehension exceeded listening comprehension at all the grade levels tested, these results tend to indicate that the developmental relationship between reading comprehension and listening comprehension may have changed from the one that was posited by Sticht (comparative results are displayed in Figure 1).

Figure 1. Reading and Listening NCE Scores by Grade Level



Question two: Is *reading at or above grade level* related to listening comprehension, gender, and/or SES?

This study found no clear relationship between listening comprehension and SES and/or gender that extended across grade levels, thus no conclusions regarding the relationship between these variables could be drawn. This study did find a significant correlation, however, between listening comprehension and *reading at or above grade level* across all grade levels tested: (a) at the fourth-grade level, there was a significant correlation between listening comprehension and *reading at or above grade level*, $r_b(201) = .69, p < .001$; (b) at the sixth-grade level, there was a significant correlation between listening comprehension and *reading at or above grade level*, $r_b(320) = .65, p < .001$; and (c) at the eighth-grade level, there was a significant correlation between listening comprehension and *reading at or above grade level*, $r_b(327) = .74, p < .001$.

Discussion

The developmental relationship between reading and listening comprehension.

The data collected by this study indicate that reading comprehension exceeds listening comprehension at all of the grade levels that were tested. At the fourth-grade level, the mean difference in NCE scores between reading comprehension (45.88) and listening comprehension (41.00) translates into a difference of approximately six months in grade equivalency (GE); in other words, the average GE for reading was approximately 4.4 and the average GE for listening was approximately 3.8.

The gap between reading comprehension and listening comprehension was larger at the sixth-grade level than it was at the fourth-grade level. Because an order effect was

detected in the reading test, the researcher conducted two analyses of the data (see Chapter Four). After analyzing the sixth-grade cohort, the researcher was able to confirm that of those classes that were administered the reading portion of the test first, the proportion designated as “advanced” English classes was larger than the proportion of “advanced” English classes that were administered the listening portion of the test first. An analysis of the data including only those participants administered the reading portion of the test first confirmed that not only were the mean reading scores slightly higher than were those of the overall sixth-grade cohort, but the mean listening scores were also slightly higher than those of the overall cohort; in other words, the group of better readers ended up being better listeners, which confirms earlier research demonstrating a significant correlation between listening comprehension and reading comprehension (Curtis, 1980; Hoover & Gough, 1990; Singer & Crouse, 1981; Stanovich, et al., 1984; Sticht, et al., 1974).

Because the analyses of both the full sixth-grade data and the “reading first” subset of the data indicated a similar score range between the mean reading comprehension scores and mean listening comprehension scores – a difference in the ranges of less than one NCE point (see Table 7) – the researcher decided it was appropriate to use the overall data for the purposes of discussion. The mean difference in NCE scores between reading comprehension (45.83) and listening comprehension (38.44) translated into a difference of approximately 12 months in grade equivalency (GE); in other words, the average GE for reading was approximately 6.1 and the average GE for listening was approximately 5.1.

At the eighth-grade level, the gap between reading and listening scores widened

further still. Because an order effect was detected for both the reading and the listening test, the researcher conducted three analyses of the data (see Chapter 4). Similar to the case with the sixth-grade data, after analyzing the eighth-grade cohort, the researcher was able to confirm that of those classes that were administered the listening portion of the test first, the proportion designated as “advanced” English classes was larger than the proportion of “advanced” English classes that were administered the reading portion of the test first. An analysis of the data including only those participants administered the listening portion of the test first confirmed that not only were listening scores higher than were those of the overall eighth-grade cohort, but that reading scores were also higher than those of the overall cohort. The converse was true of those who were administered the reading portion of the test first; both their reading scores and listening scores were lower than those of the entire cohort, thus confirming the relationship between listening comprehension and reading comprehension that has been established by previous research.

Analyses of the full eighth-grade data, the “listening first” subset of the data, and the “reading first” subset of the data indicated a consistently similar score range between the mean reading comprehension scores and mean listening comprehension scores for each of these sets of data – a difference in the ranges of less than 1.4 NCE points (see Table 8). Therefore, the researcher decided it was appropriate to use the overall data for the purposes of discussion. The mean difference in NCE scores between reading comprehension (53.78) and listening comprehension (41.1) translated into a difference of approximately 28 months in grade equivalency (GE); in other words, the average GE for reading was approximately 9.6 and the average GE for listening was approximately 7.2.

Because reading comprehension exceeded listening comprehension at each of the grade levels tested in this study, the developmental relationship between reading comprehension and listening comprehension may no longer be the same as the one posited by Sticht (Sticht, et al., 1974). According to Sticht, listening comprehension should have: (a) exceeded reading comprehension at the fourth-grade level, (b) begun to approach equalization to reading comprehension at sixth/seventh grade with listening comprehension still slightly superior to reading comprehension, and (c) been equal to or slightly behind reading comprehension at the eighth-grade level. So although the relative trajectories of listening and reading comprehension seem to follow those predicted by Sticht (i.e., reading comprehension will eventually exceed listening comprehension), this may be occurring at a much earlier age than the one at which Sticht theorized this would happen.

Two possible explanations present themselves for this apparent change in the relationship between reading comprehension and listening comprehension: either reading comprehension has improved or listening comprehension has declined. The first of these explanations can be explored by looking at national reading data spanning the time period from when Sticht published his research to the present day and comparing it to data that were used by Sticht in his analysis. The NAEP long-term trend assessments (NCES, 2008) have tracked student reading performance since 1971. The most current data included in Sticht's research came from approximately the start of this time range (Brassard, 1970). Brassard's data did not include eighth-grade students, but it indicated that listening comprehension exceeded reading comprehension in both fourth and sixth-grade students. Although the most current of the studies Sticht analyzed in the eighth-

grade range (seventh through ninth grade) was published in 1952, all of the studies of this age-range indicated that listening comprehension was either equal to or exceeded reading comprehension.

Data from the NAEP long-term trend assessment indicate an overall improvement in reading comprehension at the fourth-grade level and a smaller improvement at the eighth-grade level between 1971 and the present. Comparing scores between different tests such as the NAEP and the GMRT-4 is problematic at best (e.g. different scales, question types, norming samples, and so forth). Nonetheless, the increase in reading scores reported by the NAEP long-term trend assessment does not appear to adequately account for the difference between reading comprehension and listening comprehension found by the current study. Sticht's research, published at about the time that the NAEP long-term trend assessment began to measure reading, indicated that fourth-grade students, on average, comprehended better via listening than reading. Due to the significant correlation that exists between listening comprehension and reading comprehension, one could reasonably expect that improvements in reading comprehension scores since 1971 would have likely been accompanied by a similar improvement in listening comprehension. The present study found, however, that reading comprehension at the fourth-grade level significantly exceeded listening comprehension. Moreover, while reading scores of eighth-grade students measured by the NAEP long-term trend assessment increased even less than those of the fourth-grade students, this study found that of the three grades tested, the difference between reading and listening comprehension was largest at the eighth-grade level. In other words, if improvements in reading ability since 1971 were the only explanation for the differences between reading

and listening comprehension found in the current study, one would have expected those differences to be smaller at the eighth-grade level than at the fourth-grade level.

Another possible explanation for the apparent change in the relationship between listening comprehension and reading comprehension is that listening comprehension has declined since the time of the research studies that Sticht used to inform his developmental hypothesis. Perhaps the most easily identifiable cause for this decline would be environmental factors, specifically the media environment. The vast majority of the studies analyzed by Sticht were conducted prior to the 1960s, with over half of the studies conducted prior to 1942, well before the advent of television when the dominant form of broadcast media was radio. Because studies have indicated that listening comprehension can be improved by training (Pearson & Fielding, 1983; Sticht, et al., 1974), the case can be made that an environment dominated by a listening-oriented broadcast media such as radio, would likely contribute to the development of listening comprehension in the general population. Consequently, it is probable that listening comprehension may have been more developed in the population that provided the participants for the majority of the research studies Sticht reviewed.

In contrast to what could be described as the listening-oriented media environment predominant during the of the first half of the twentieth century, a much more visually oriented media environment, ushered in by the advent of television and the computer age, has been dominant from the latter half of the twentieth century through the present time. The visual support provided by the current media environment has reduced the almost complete reliance on listening comprehension once required by the listening-oriented media environment that existed during the age of radio. Moreover, students in

the age ranges tested by this study consume on average at least eight hours of electronic media per day; excessive consumption of electronic media has been linked to negative effects on cognitive processes such as memory and attention, both of which play a significant role in comprehension acquisition and development. It is, therefore, not unreasonable to conclude that the present day media environment may be contributing to a decline in listening comprehension abilities. This situation is highlighted by the fact that not only do students coming from economically disadvantaged and minority backgrounds consume electronic media at an even higher rate than their non-minority and non-economically disadvantaged peers, but their comprehension achievement is also lower (NAEP, 2011) than their more affluent, non-minority counterparts.

The relationship between proficient reading and listening comprehension, gender, and/or SES.

The U.S. has used the NAEP to monitor the nation's progress in both reading and mathematics achievement since the 1970s, with one of the NAEP's key measures being the percentage of students who demonstrate proficiency in these subjects. Indeed, initiatives such as NCLB highlight the importance that the U.S. has placed on attempting to ensure that students are able to read proficiently. In addition to examining the possible relationship between proficient reading (termed *reading at or above grade level* by this study) and listening comprehension, this study also examined demographic data including gender and SES to cast further light on factors that may be related to reading at or above grade level. Data from this study (see Table 10) indicate that participants reading at or above grade level have a listening grade equivalency that is equal to their grade level at fourth and eighth grades (4.8 and 8.8, respectively) and within 5 months of

grade level at sixth grade (6.3). Conversely, participants reading below grade level have listening grade equivalencies that range from one year and three months below grade level at fourth grade (3.5), to over three years below grade level at eighth grade (5.6). In addition, reading at or above grade level was highly correlated with listening comprehension at all of the grade levels tested.

This study's findings for a relationship between reading at or above grade level and gender and/or SES were not consistent across grade levels. The most recent data from both the NAEP (NCES, 2011) and the 2006 PIRLS indicate that females are outperforming males in reading comprehension at the grade levels tested by this study. However, this study only found gender to be significantly related to reading at or above grade level at the sixth grade. Although a significantly greater number of females read at or above grade level in sixth grade, the mean score for those males reading at or above grade level was slightly higher than the mean score for females reading at or above grade level. This may be explained by studies indicating a wider distribution of reading scores in males, whereas female scores tend to be more closely clustered (Hawke, Olson, Willcut, Wadsworth, & DeFries, 2009; Machin & Pekkarinen, 2008). It should be noted that the mean listening scores for fourth-grade males in this study were significantly higher than mean listening scores for fourth-grade females, which seems to confirm the findings in Brimer's (1969) study. Mean reading comprehension scores for fourth grade males were also slightly, but not significantly higher, than fourth grade females, which seems to be at odds with results found by the most recent NAEP and PIRLS data. Although no immediate explanation presents itself for the fourth-grade reading results, it is possible that sampling methods may have been a contributing factor.

The latest data from the NAEP (NCES, 2011) show a significant difference in reading achievement between students classified as having a lower SES based on qualification for a free or reduced-price lunch through the National School Lunch Program and those that do not qualify, with the latter significantly out-performing the former. This study was only able to confirm the NAEP results at the eighth grade: not only did higher SES students have higher reading and listening scores than students from a lower SES, SES was also significantly related to reading at or above grade level. Two reasons may explain why SES was not found to be a contributing factor at grades 4 and 6. First, sampling methods may have been a contributing factor, with a higher percentage of fourth- and sixth- grade students qualifying for free or reduced-priced lunch than the percentage of eighth-grade students. Second, in times of economic upheaval such as the present, qualification for free or reduced-price lunch may be a transient phenomenon and not necessarily a reliable indicator of SES. For example, a family with a parent between jobs or one with several children and a stay-at-home spouse may qualify for free or reduced-price lunch, but not necessarily manifest some of the characteristics that have been associated with long-term economic disadvantage.

Theoretical implications.

The results of this study provide mixed support for theoretical perspectives on the relationship between listening comprehension and reading comprehension. On one hand, the high correlation found between listening and reading comprehension at each of the grade levels tested lends some support to theories suggesting a unitary nature to the cognitive processes controlling these comprehension modalities. In addition, an even higher correlation between reading at or above grade level and listening comprehension

provides further support for unitary processing theories by suggesting that better readers are also better listeners and that poorer readers are poorer listeners. Furthermore, according to Sticht's theory, reading comprehension should become better than listening comprehension as students advance in age and grade, which is confirmed by this study's data – the difference between mean reading comprehension and mean listening comprehension was greater at successive grade levels.

On the other hand, there are aspects of this study's data that call into question some of the assumptions underlying Sticht's theory for a unitary process governing listening and reading comprehension. According to Sticht's theory, students will listen better than they read until reading proficiency has been adequately developed. Indeed Sticht's research suggested that listening comprehension achievement should exceed reading comprehension achievement until approximately the seventh-grade, with listening comprehension exceeding reading comprehension at the fourth-grade level. The results from this study, however, indicated that in this study's participants, reading comprehension already exceeded listening comprehension by a significant amount at grade 4 (a grade equivalency of approximately one half of a year), and by even larger amounts at grades 6 and 8. Had the fourth-grade participants in this study all been exceptional readers, this may have explained these findings in terms of Sticht's theory. According to the results from the reading portion of the GMRT-4, however, only 35 percent of the fourth-grade participants were reading at or above grade level, with the other 65 percent reading below grade level. These findings are difficult to explain from a perspective informed by Sticht's hypothesis for a developmental relationship between listening and reading comprehension. So while some of this study's findings lend support

to the unitary processing perspective forwarded by Sticht's work, other findings are at odds with some of Sticht's conclusions.

Practical implications.

Results from the NAEP indicated that seniors today are reading below the level of seniors in 1992. It is interesting to note that the seniors in 1992 (assuming an age of 18) would have been born around 1974, thus spending much of their early lives before the widespread availability of cable television. This same cohort would also have reached adulthood well before personal computers, the Internet, and cellular telephones had become commonplace. Although correlative, there seems to be a parallel between the proliferation of electronic media and what appears to be a decline in the overall reading ability of high school seniors. Because the results of this study confirm those of earlier studies that found that reading comprehension and listening comprehension are highly correlated, if listening ability has indeed declined in the overall population (possibly as a result of increased media consumption), this could be having an effect on the development of reading ability.

Moreover, the results of this study indicate that there seems to be an even higher correlation between proficient reading (reading at or above grade level) and listening comprehension. Those students who are proficient readers will have listening comprehension scores that are at or nearly at grade level on a comparable measure of reading comprehension, while students who are struggling readers will have listening comprehension scores that are significantly below grade level. These findings suggest that the educational community may need to pay closer attention to students' listening comprehension abilities, especially at lower grade levels when the gap between the

listening abilities of proficient and struggling readers is smaller than it is at higher grade levels.

Limitations

Among the limitations of this study are the sampling method, the listening comprehension measurement instrument, and the administration procedures. This study employed convenience sampling to enlist participants for the study. Although the researcher attempted to enlist schools that were demographically representative of the overall population of the community, random selection was not employed. The lack of random selection may have contributed to cohort effects on test outcomes at the sixth- and eighth-grade levels.

The instrument used to assess listening comprehension was another potential limiting factor in this study. The researcher created the listening comprehension instrument verbatim from a nationally norm-referenced and validated test, the GMRT-4, and no form-bias effects were detected at any of the grade levels being tested (the listening test forms created from the reading test forms appeared to be statistically equivalent). The listening instrument itself, however, was not normed or validated. In addition, because the researcher did not employ a professional speaker to record the audio for the listening assessment, the quality of the recordings may have been a limiting factor.

Two aspects of the test administration procedures posed other potential limitations: the presentation conditions and the testing schedule. Although the research design attempted to control for order and form-bias effects, participants were not evenly divided among each of the presentation conditions. For example, at some of the grade levels, more participants were presented the listening portion of the assessment first than

were presented the reading portion first. In addition, there was not enough control over dividing *types* of classes evenly among presentation conditions. At the eighth-grade level in particular, this resulted in a larger proportion of advanced students receiving the listening portion of the assessment first than would otherwise have occurred if the assignment to a presentation condition had been more precisely controlled. As noted previously in this chapter, however, these discrepancies in the assignment to a presentation order did not appear to affect the overall distribution of the data.

The presentation rate of the listening portion of the assessment and the respective times allotted for the reading and listening portions of the assessment are also among the presentation conditions that may have influenced score outcomes. Although the researcher derived a presentation rate for the listening portion of the test that was supported by available research studies, the presentation rates used may not have been optimal. In addition, the reading portion of the assessment was completed in 35 minutes (per the GMRT-4 administration procedures), whereas the listening portion of the assessment was completed in approximately 24 to 27 minutes, depending on the grade level. Thus, participants had a longer period of time in which to complete the reading portion of the assessment than the listening portion. Because many participants completed the reading portion in less than the allotted 35 minutes, it is not clear to what extent the difference in exposure time affected overall scores.

The testing schedule is the second aspect of the administration procedures that may also be a limiting factor in this study. Scheduling constraints imposed by working in public school classrooms caused the researcher to have to administer both the reading and listening portions of the test in one administration. The entire administration of both

portions of the assessment took approximately one hour. Although students in Texas from the third grade on routinely take state-wide NCLB-mandated exams that can last for several hours, it is possible that some of the participants may have grown tired or distracted, especially during the administration of the second portion of the assessment.

The Significance of the Study

The findings of this study indicate that the relationship between listening and reading comprehension may not follow the developmental timeline posited by Sticht and that environmental factors may influence the relationship between listening comprehension and reading comprehension to a greater extent than was previously believed. In addition, it is quite possible that the listening comprehension abilities of students may have declined over the last half century. Moreover, this study demonstrated the high correlation between reading at or above grade level (or proficient reading) and listening comprehension abilities – table 10 depicts the stark differences in mean listening comprehension between those students who read at or above grade level and those who do not.

These findings are significant for the following reasons. First, because listening comprehension is highly correlated with reading comprehension, a decline in overall listening comprehension abilities may be related to problems with reading comprehension acquisition in the general population. Indeed, although reading scores for fourth-grade students and, to a lesser extent, eighth-grade students have shown some increase since 1971, the NAEP long-term assessment shows that there has been no significant increase in reading achievement for high school seniors during this same time period (NCES, 2008). Second, the strong relationship between reading at or above grade level and

listening comprehension argues for reinvigorating the investigation into the role of listening comprehension in reading acquisition. Finally, because studies have indicated that training in listening comprehension can significantly improve reading comprehension, the findings of this study echo earlier calls for research into the development of listening comprehension curriculum:

“For too long we have neglected listening as part of our language arts curriculum. Listening is too important a language function to leave to the whims of circumstance; we ought to grant it its rightful place as we plan, implement, and teach the total language arts curriculum.” (Pearson & Fielding, 1983; p. 18)

Recommendations for Future Research

The researcher believes that the findings of this study could be expanded upon by further research in several areas including but not limited to:

- Developing norm-referenced, reliable, and valid listening comprehension instruments that are equated with accompanying reading comprehension instruments.
- Expanding comparisons of reading and listening comprehension to include a larger range of grade levels.
- Refining testing procedures to employ randomized selection and assignment.
- Drawing from populations that allow for a more thorough examination of subgroup performance in both of these modalities.
- Developing listening comprehension curriculum.
- Testing listening comprehension curriculum for effects on reading

comprehension.

- Evaluating the effects of text type (e.g. narrative vs. expository) on reading and listening comprehension achievement
- Investigating the relative contributions of cognitive processes such as short-term memory, working memory, and attention to each comprehension modality to further refine comprehension processing models.

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Appendix A

Standard Directions for the Audio Version of the GMRT-4

“You will listen to some stories and paragraphs and then answer questions about them.

Listen carefully to each story or paragraph that is read to you. You may take notes on your scratch paper if you want to. Then listen carefully to each question about the story or paragraph. Listen and read along in your booklet while each answer choice is read.

Listen to all of the answer choices before choosing your answer. You may use your notes to help you.

Appendix B

Standard Instructions for Each Passage of the Audio Recording of the GMRT-4

“The following passage gives information to answer questions (question #) through (question #). Please listen carefully to all answer choices before marking your answer.”