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METALINGUISTIC AWARENESS AND ADULT LITERACY

by

CINDY GREENBERG

A dissertation submitted to the Graduate Faculty in Linguistics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, the City University of New York.

1987

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This manuscript has been read and accepted for the Graduate Faculty in Linguistics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

Metalinguistic Awareness and Adult Literacy

by

Cindy A. Greenberg

Adviser: Professor Charles E. Cairns

This study investigated several possible relationships between metalinguistic awareness (MLA) and adult literacy. A series of phonological and syntactic metalinguistic tasks was administered to four groups of adult readers (at low, mid, high and literate levels) in order to research differences among the groups in overall and specific metalinguistic awareness. The tasks included word, syllable and phoneme segmentation; sentential well-formedness and synonymy judgments; phonotactic judgments and oral comprehension. It was hypothesized that reading enhances MLA; thus, MLA would increase across reading levels. Further, we researched whether MLA enhances reading achievement via a longitudinal study of the lowest level readers. MLA and reading abilities were assessed before and after six months of reading instruction. It was predicted that subjects with above

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average MLA would have greater reading achievement than those with below average MLA. Finally, we investigated whether those low level readers who achieve above average reading gain also achieve above average metalinguistic gain.

The results revealed a significant overall difference in metalinguistic abilities among the four reading groups; MLA increased as reading level rose. More specifically, the best indicator of reading level was syllable segmentation ability. As with previous children studies, it was found that adults performed best at word segmentation skills followed by syllable and then phoneme segmentation skills; further, phonotactic judgments were significantly better than phoneme segmentation abilities at all reading levels. Moreover, syntactic skills were greater than phonological skills, though specific syntactic skills were significantly different between certain reading levels.

The longitudinal study revealed that more subjects with above average MLA achieved reading gains than their below average peers; further, the above average group achieved greater reading gain than the below average group. Finally, those subjects with above average reading improvement scores improved more in metalinguistic development than subjects with low reading improvement

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scores though the difference was not statistically significant.

It was concluded that some metalinguistic skills develop spontaneously (e.g., word segmentation) regardless of reading though others are influenced by literacy acquisition (e.g., syllable segmentation). Finally, it is argued that pedagogical applications of metalinguistic activities are needed for adult literacy learning.

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Chapter One

Introduction

There is interest among researchers in the relationship between metalinguistic awareness and reading ability. More specifically, the possible causal and correlational relationships between language awareness and reading among children have been investigated. The correlational studies have shown a positive relationship between language awareness and reading ability. The studies researching the causal relationship between language awareness and reading skills have sought to assess whether there is a direct impact of one skill onto the development of another. This research has enhanced our understanding of the reading process and how it may affect and be affected by the development of other linguistically related abilities.

One gap in the research has been the limited number of investigations on the correlational and causal relationships between metalinguistic awareness and reading ability among adults including those with limited literacy skills. It is unknown whether children and adults demonstrate the same relations between these skills since adults are linguistically different from children. For example, unlike children, adults have full linguistic competence. Therefore, the state of their grammar

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development is not a factor that needs to be controlled while investigating these questions (as it is for parallel children studies). Furthermore, adults may have sophisticated language awareness skills despite their lack of literacy abilities. If so, we would need to assess which language awareness skills are causally and correlationally related to reading abilities and which develop regardless of literacy. Thus, research on non-reading adults would provide further understanding of how language awareness and reading are related to one another.

This dissertation investigates the correlational and priority relationships between reading proficiency and metalinguistic awareness skills among nonliterate, semiliterate and literate adults. The correlational relationship is assessed via an analysis of the phonological and syntactic language awareness skills of the subjects. A longitudinal study of the reading and metalinguistic growth of the lowest level readers allowed us to test three hypotheses. One, metalinguistic awareness enhances the development of reading. Two, reading achievement enhances metalinguistic awareness. Three, both reading and metalinguistic awareness share a mutual relationship whereby each skill enhances the other.

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The purposes of this introduction are to 1) present the conceptual framework for this study, 2) to raise questions of the relationship between metalinguistic awareness and the reading process, 3) to define the non and semiliterate adult, 4) to present major models of the reading process and learning to read and 5) to introduce the concept of metalinguistic awareness. Finally, the need for this study will be discussed along with a summary of the general organization of the following chapters.

1. Metalinguistic Awareness And Its Relationship To Learning To Read

The key issue regarding metalinguistic awareness (MLA) that is still under debate is the relationship between metalinguistic awareness and reading acquisition. Let us briefly explore the possible relationships between MLA and reading acquisition as revealed by the research on children literature and see how these findings may be related to issues of adult literacy. We will postpone a full discussion of possible evidence of the causal relationship and hypotheses regarding MLA and reading until chapter two.

One possible relationship between the acquisition of reading and MLA is that the former enhances MLA. The

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process of learning to read entails bringing linguistic units to consciousness and matching them to their graphic representation. In a sense, reading, and especially learning to read is a metalinguistic activity, which in turn further develops metalinguistic awareness. Thus, it is argued that this explains the sudden increase in MLA at age six or first grade, the time in which children begin intensive reading instruction.

An alternative theory to the one proposed above is the position that metalinguistic awareness enhances learning to read. Longitudinal studies have shown that those children who begin the reading process with more sophisticated MLA than their peers obtain greater reading gains in a set period of time (Liberman et al. 1977; Bradley & Bryant, 1983).

One major perspective regarding MLA and the acquisition of reading is that the child must have the prerequisite capacity for MLA; further, many also believe that MLA and reading enjoy a mutual, feeding relationship (Ehri, 1979). This mutual relationship does not create a hierarchy between the two skills, but instead, places them as partners dependent upon one another.

In sum, we have seen that four possible relationships exist. One, reading enhances metalinguistic development.

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Two, metalinguistic awareness enhances reading ability. Three, one may be true without the other. And four, both positions may be true.

We may now raise some of the central questions of this study. First, what is the level of metalinguistic development of those non or semiliterate adults who had limited reading development as children? Has MLA developed given the absence or low levels of reading? Second, does success in the acquisition of reading skills correlate with an increase in MLA level? Finally, is there evidence for one or more of these possible relationships?

2. The Non And Semiliterate Adult Population : Reading Levels

Jonathan Kozol (1985) has noted that "sixty million U.S. adults cannot read newspapers, understand the antidote instructions on a can of kitchen lye, or read the warnings of the sedative effects of nonprescription drugs." He is speaking of an adult whose first language is English; this is not the foreign born who has a non-English, primary language. It is clear that a significant part of the United States adult population (one who is at least eighteen years old) has difficulty functioning in society because of lack of literacy skills.

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The sixty million adults that Kozol refers to may be subdivided into three groups. First, there are adults who cannot read at all or who have a very limited reading ability. They may know the letters of the alphabet, be able to write their names, recognize words such as "stop", "exit", "cat" and "milk" and associate letters with sounds. They are sometimes called "functionally illiterate" since they are unable to perform the daily activities (such as banking and reading forms) which are needed in a literate society. These adults are often called low level or 0-3rd grade readers. This classification is based on tests that are designed and normed for adults. They do, however, test those reading skills that are commonly acquired by children who are at or below the third grade.

The second group of adults has greater skills at matching letters with sounds, blending sounds, recognizing whole words and parts of words (such as prefixes and suffixes) and comprehending what they read. Because they are able to read and write enough words, sentences and paragraphs to accomplish daily tasks, they are classified as "semi-literate." These adults are categorized as mid level or 3-6th grade readers.

Finally, adults who have the literacy abilities needed to perform the required literacy tasks in their lives are

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usually called "functionally literate." They are still learning and practicing word attack, comprehension and writing skills; however, reading continues to be an arduous process. These adults may be classified as high level or 6-9th grade readers.

It is important to note that this is primarily a "normal" population which is trying to resume its basic education after a period of interruption. Some of the adults never learned to read because they were children who were not diagnosed as being dyslexic or having severe learning difficulties. However, as Kozol (1985) among many others has noted, social problems during childhood--such as teen-age pregnancy, prolonged illnesses, and financial need to work--often result in adult illiteracy.

3. The Reading Process And Learning To Read

Given this large group of non and semiliterate adults we may ask How does knowledge of the reading process relate to the teaching of adult literacy? and How can these adults learn to read? In answering the first question we see that there are several major models of reading which have been discussed in the literature. Each theory stresses a specific part of the reading process.

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For example, the "bottom-up" position emphasizes that reading is a serial-stage process whereby the output of processing at one level becomes the input for the next level of processing (Gough, 1976; LaBerge & Samuels, 1974). At the first level of processing, readers analyze print letter by letter. They then advance to the second level which entails word by word analysis in reading (Gough:1976:532). LaBerge & Samuels have a less conservative view of the bottom up process. They assert that reading is an automatic process which includes a serial relationship among the visual, phonological, and semantic reading subsystems. In addition to single letter and word decoding, they propose that readers also decode words into syllables and later groups of words. In sum, all proponents of this theory regard reading as a spiraling, building process in which small linguistic units are identified and combined in order to obtain meaning and reading fluency.

In contrast to the bottom-up model of reading is the framework advanced by the "top-down" theorists. This theory contends that comprehension is the essence of reading (Smith 1971, 1973; Goodman 1967; Kolers 1972). The reader is described as a guessor of word meaning; word context, semantic and syntactic clues, and world knowledge help the reader guess words that she sees in print. For example, the beginning reader who reads the sentence 'The

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man who lives in NYC has seven cats' will be able to guess that the word after 'seven' must be a noun, not a verb, adverb or pronoun. Previous sentences in the passage and world knowledge may also provide clues that the man has cats, not cows or coyotes. Thus, this theory stresses that the reader derives meaning through a combination of linguistic and nonlinguistic knowledge.

Some researchers have proposed that the reading process is a combination of the two processes presented above. This "interactionist" model advances that the reader utilizes semantic, visual, contextual, and phonological information concurrently; reading is not a succession of stages or levels of processing but instead a simultaneous combination of these active skills (Stanovich,1980; Rummelhart (1977)). Thus the reader uses a variety of language analysis strategies in order to decipher written language.

The second question, regarding how to teach adults to read, may be approached by three major methods of teaching reading; they are based on the theories of the reading process discussed above. First, many new readers are taught to crack the code or "decode" the orthography by associating single letters, combinations of letters and morphemes with the sounds of their language system. This view states that literacy is a building process which

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begins with letters and develops into meaningful words and sentences. This is based on the bottom-up theory of reading. Second, a global or "whole-word" approach (which is supported by the top-down theorists) emphasizes the teaching and learning of words as meaningful units; the discrete sounds and letters are not emphasized by teachers. Word meaning may be learned rotely or derived from context via syntactic, semantic and world knowledge clues. The final teaching theory is "eclectic" in nature; it contends that learning to read is a combination of "interactive" language analysis skills including decoding for sounds and obtaining word and sentence meaning from grammatical features of the language. This pedagogical technique stems from the principles of the interactionist's theory of reading. In sum, the decoding method emphasizes understanding of sounds, letters, and words in order to establish fluent sentential level literacy, whereas the whole-word method utilizes sentential knowledge in order to obtain single word literacy. The interactionist approach allows the reader to develop literacy by utilizing knowledge stemming from both the word and sentential levels.

We support the interactionist approach for two reasons. First, acquiring reading abilities is like any other learning activity in that the learner will utilize a bank of learning strategies, not one strategy. For

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example, readers will use contextual clues, world knowledge, phonic information and linguistic knowledge where needed. Second, as literacy abilities mature, the reader generally decreases her use of phonics strategies and instead becomes more of a "linguistic guessor". Thus, it is plausible that a variety of reading strategies are accessed during reading though their frequency of use may change as proficiency in reading rises.

4. Metalinguistic Awareness

It is our belief that metalinguistic awareness is a component in both the reading process and learning to read. Studies in metalinguistic awareness have addressed several questions which are germane to our understanding of learning to read and our present study of adult literacy acquisition. Let us begin by first defining the domains of MLA, then reviewing its development, and, finally, assessing those questions which remain unanswered.

The term 'metalinguistic awareness' will be used to refer to a person's conscious knowledge of her language. It includes the abilities to view language as an object and make judgments about its various subsystems. Let us consider several examples. Knowledge of our language's sound system allows us to say that 'pat' and 'bat' are

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rhyming words or that the sounds in the word 'tap' may be rearranged to create new words such as 'pat' and 'apt'. We can compare words in terms of length, and easily note that the word 'motorcycle' is longer than 'mow'. Because we also have knowledge of larger subunits of our language, we are able to state that a word such as 'carpenter' has three syllables. Finally, we can recognize sentences as a concatenation of discrete words; we therefore can count seven words in the sentence 'Sam is a white and orange cat'. All of these judgments involve metalinguistic awareness, because they require conscious reference to linguistic units defined in terms of linguistic theory.

Consider the following syntactic examples. When asked if the sentence 'Mary washed himself' is well-formed, the naive subject (one who is not a linguist) can not only say 'no', she may even be able to explain the anomalous nature of the sentence by attributing it to a lack of agreement between the pronoun and the subject. Furthermore, our metalinguistic abilities allow us to compare pairs of sentences for synonymous relationships. Given the two sentences 'John kissed Mary' and 'Mary was kissed by John', we are able to state that they have the same meanings.

There is evidence suggesting that the child's MLA begins developing at an early age and continues through

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middle childhood, approximately ages 4-8. For example, Gleitman et al. (1972) and DeVilliers & DeVilliers (1972) have shown that children under the age of three demonstrate some ability to identify well-formed and ill-formed sentences. Gleitman asked children ages 2-5 to judge the grammaticality of imperative sentences (e.g. Bring me the ball) and inverted imperative sentences (e.g. *Ball me the bring). They found that the very young children were markedly less competent at this task than the older children. However, since the younger children performed better than chance at labeling the well-formed imperatives, we see evidence of MLA at a very early age. DeVilliers and DeVilliers also found that children ranging in age from 28-45 months were able to tell if an imperative sentence was ungrammatical. The sampling of research discussed here seems to demonstrate the increase in syntactic MLA as the child matures.

In addition to the research of syntactic MLA development discussed above, research in the development of phonological MLA among children also shows a marked increase in MLA ability with age. For example, Liberman et al. (1974) researched the syllable and phoneme segmentation abilities of nursery, kindergarten and first grade children. They found that the nursery school children could not parse words into phonemes at all; the kindergarteners were better than the nursery school

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children and the first graders were significantly better than both groups. In addition, all three groups demonstrated greater abilities at syllable segmentation than phoneme segmentation. Subsequent research has also shown that children, especially preschoolers, have considerable difficulty segmenting words into phonemes though the syllable subunit is considerably easier to segment (Fox & Routh, 1976; Hakes, 1980). This research, like that of syntactic MLA development, suggests that phonological MLA develops with age. It also raises the question of whether reading acquisition plays a role in MLA development.

5. The Present Study

This study will investigate the relationship between metalinguistic skills and reading ability among four groups of adults who read at different levels of proficiency. It will help define the role (or roles) of metalinguistic awareness in the reading process. Finally, we will be able to suggest possible pedagogical applications of MLA training for both children and adults who are learning to read.

The domain of unanswered questions regarding MLA and reading is still quite large. Chapter two presents a fuller treatment of these questions and relevant

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literature on MLA and reading in both children and adults. It concludes with a fuller discussion of the rationale for this study.

Chapter three gives a description of the subjects and the reading programs in which they were enrolled. We also describe the research methodology and give a rationale for each language item that was tested. The task items, answer sheets and interview procedures are explained; samples of these materials are presented in Appendices A-S. Finally, the format and method of evaluation for each reading test is given.

Chapter four summarizes the results of the MLA tasks and the reading tests. Chapter five contains a concluding discussion of the results as they relate to the correlation and priority relationships between MLA and reading ability. This chapter will also present pedagogical implications which may be deduced from the findings.

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Chapter Two

Literature Discussion

This chapter is divided into three sections: the first discusses metalinguistic awareness among children; the second addresses metalinguistic awareness among adults; and the third presents the implications of previous research for this study.

Several issues are discussed in this chapter. We argue that the evidence gathered by prior studies indicate that metalinguistic skills develop in a hierarchical fashion whereby certain skills emerge before others. Further, reading appears to be a language-based activity that involves an awareness of matching strings of written symbols to both the phonological and syntactic aspects of internalized grammar. Finally, this chapter presents several possible relationships between reading acquisition and metalinguistic awareness in children and adults. It is concluded that metalinguistic awareness and reading acquisition may share a recipricol relationship. Moreover, metalinguistic awareness is correlated with reading and is also an enhancer of reading achievement.

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1. Metalinguistic Awareness and Children

The following sections will discuss research on phonological and syntactic metalinguistic development among children. We will address one methodological concern throughout this review. We question whether the children who were assumed to be preliterate in various studies were really without literacy skills. It is possible that they had some knowledge of reading (perhaps an understanding of the alphabet or the notion that print is our language written down). Studies showing correlations between MLA and reading may therefore be misleading.

2. Phonological Metalinguistic Development

2.1 Word Awareness

Research suggests that the child's understanding of the word unit is developmental in nature. For example, Papandropoulou & Sinclair (1974) asked children between the ages of 4.5 and 10.10 to characterize words. When asked 'to say a small word' the youngest children responded by saying a "primrose...because primroses are small". Thus, they are associating words with things and are not viewing them as linguistic units. The second age

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group (5-7 years) also linked the length of a word with the description of the object. When asked to state a long word they responded by saying "a cat that is taking a walk" or "a typewriter because there are lots of letters in it." At this stage, words not only represent something but also include a description. Subjects at ages 6.6 to 8 viewed words as linguistic items. Words such as 'girl' and 'cat' are believed to be short words since they contain a small number of syllables and/or sounds. Finally, children between the ages of 8 and 10 defined words in terms of their semantic and orthographic features. For example, one subject defined words as 'something that means something, it's written with letters'. Thus, the child develops an understanding of the word as a linguistic and orthographic unit. This demonstrates that the development of word awareness is related to literacy knowledge.

Downing (1969) found that young children have difficulty distinguishing words from other linguistic units and nonlinguistic utterances. He asked thirteen five year old children to listen to orally presented utterances and state whether they heard a word; utterances included single phonemes, syllables, words, phrases and non-human noises. None of the children responded by choosing only the word units that they heard. Instead, children at that age have a concept of the word unit which includes other language units (e.g. phonemes and syllables) and non-human

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sounds.

Downing & Oliver (1974) further explored children's ability to isolate individual words by revising Downing's 1969 experiment in two ways. First, they enlarged the subject pool to include children ranging in age from 4.5 to 8.0 years old. Second, since the Downing study revealed possible instruction problems for the subjects (the children may have responded 'yes' to phrases since they contained a word), the experimenters stressed in pretesting that the children should listen for 'single' words. They found that children's ability to identify words as linguistic units gets better as they mature with age, though confusion with smaller linguistic units such as the syllable and phoneme was still evident even among the oldest group. Johns (1979) subsequently duplicated the Downing and Oliver study using a group of subjects ranging in age from 5.6 to 9.5. He also found that metalinguistic awareness of orally presented words increases with age.

Bowey, Tunmer and Pratt (1984) questioned whether previous research had really tapped children's knowledge of words or whether the results are confounded with experimental design difficulties. They suggest that perhaps children have an understanding of the word concept but do not comprehend the metalinguistic term 'word', which is often used in experiments. They designed a study

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which tested preschool, first and second grade children, all of whom were divided into two groups: one group was given pretraining in distinguishing animal-nonanimal sounds and the other had training in distinguishing words from nonwords (e.g., 'ta'). After training, the groups were given a word-sound discrimination task in which they were to identify orally presented words. The data revealed that the experimental group which was trained in the word-sound distinction performed better than the group which had the animal-nonanimal sound distinction training (mean percent correct for experimental group = 89.03; mean percent correct for control group = 78.43). The authors conclude that previous studies (Downing and Oliver (1974) and Johns (1979)) did not give true insights into the child's knowledge of words since the child may not have understood the metalinguistic term 'word.' This study has clearly demonstrated the importance of task training in experiments of this nature.

It is interesting to note that the Bowey et al. study also revealed developmental stages in word and sound distinction abilities. The data showed a significant difference between the preschool group (mean percent correct = 66.29) and the first and second graders (89.50 and 95.48, respectively).

From the Bowey et al., Downing & Oliver and Johns

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studies we see an increase in word awareness in first and second grade, a time of intensive reading instruction. This again raises the question of whether reading enhances language awareness. Let us look at several segmentation studies which will give us a further understanding of the child's development of phonological knowledge and of the relationships between metalinguistic awareness and reading acquisition.

2.2 Word Segmentation

Karpova (1955) devised a study which revealed that children (ages 3-7) undergo three stages of segmentation abilities. For this study, he asked Russian children to repeat orally presented sentences, indicate the number of words in the sentence, and finally, state which was the first word, second word etc. He trained the children to use plastic counters (one for each word) in order to indicate the number of words in a sentence and their position relative to one another.

The stages of sentence segmentation show a change in attention to the semantic aspects of words. The youngest children segmented sentences by breaking them up semantically (e.g. Examiner: "Galya and Vova went walking". Child: "two words, Galya went walking and Vova

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went walking"); slightly older children will isolate single nouns as the main semantic parts of a sentence and correctly segment sentences into words; finally, the middle and older children were able to segment sentences into words successfully though some erroneously segmented words into syllables. Thus we see a development in word segmentation which involved semantic and syntactic knowledge. However, children ages 3-7 possess limited abilities to segment sentences into lexical items.

Holden & MacGinitie (1972) also found that young children have difficulty segmenting spoken sentences into words. Eighty-four kindergarten children were asked to segment orally presented target items by representing each word with a poker chip. The children repeated each sentence and then repeated it a second time while tapping a chip for each word in the sentence. Their results indicate that children at that age will segment sentences into phrases and often attach function words onto content words (e.g., 'have to' = 'haveto'). Some linguists (e.g. Kaisse (1985)) have suggested that function words may be clitics in English, and only the orthography treats them as words. Clearly, we again see that word segmentation is in its beginning stages.

Fox and Routh (1975) disputed the findings of Holden and MacGinitie by claiming that the children may have

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found the dual task of repeating words and indicating word boundaries too difficult. Like Bowey, Tunmer & Pratt, they question whether prior assessment of the child's metalinguistic awareness has been inaccurate as a result of experimental designs. They suggest that previous experiments may have contained either tasks which were too difficult or terminology which was unfamiliar to the subjects. They therefore asked children to listen to a sentence and repeat "a little bit of it". If the child responded with a phrase, the experimenter would repeat the phrase and again ask for "a little bit" of the phrase. Unlike Holden and MacGinitie, Fox and Routh found that 3-7 year olds do have an ability to segment sentences into words. The three year olds were the poorest at this task; the four year olds were significantly better than the three year olds. Moreover, with the exception of the three year olds, the children performed at near ceiling performance at this task. We see that children are acquiring word awareness earlier than six years old or when intensive reading instruction usually begins.

Although the Fox & Routh study suggests that children have awareness of the word unit prior to schooling and reading instruction, it does not address the relationship that reading enhances metalinguistic awareness. It is possible that some of these children were taught beginning aspects of reading at or before the ages being tested.

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They may have had a knowledge of reading which influenced their performance on these metalinguistic tasks.

From the research cited above, we have seen some evidence of the development of word awareness and segmentation abilities among children of various ages. A variety of tasks such as counting words, serially numbering words and representing words through motor activities, all show a growth in MLA. Finally, we have seen that very young children (for example, three year olds) have minimal language awareness, regardless of reading instruction.

We will now review research which suggests that children also possess a knowledge of the syllable and the phoneme. Again, we will focus on the development of that knowledge and its relationship to the acquisition of reading skills.

2.3 Syllable And Phoneme Segmentation

Since learning to read includes associating sounds with letters, researchers have analyzed the child's development of syllable and phoneme segmentation abilities and its connection to reading skills.

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Bruce (1964) investigated the phonemic segmentation skills of sixty-seven children who ranged in mental age from ages five through nine. He instructed the children to listen to a word and then say how the word would be said if a given sound were deleted. This elision task of 30 test items was presented individually and orally. The mean score for the seven year olds was 8.75 correct compared with means of 16.4 and 26.7 for the eight and nine year olds respectively. The results show that children below age 7 have little or no ability to segment and delete sounds from words. The author proposes that the 5-7 year olds may have done poorly because "...they were in the lower forms [grades]. Thus, they had not so much relevant teaching experience as the children from higher forms" (Bruce 1964:160). Bruce's belief that schooling may have an affect on MLA is rooted in his observation of differences among the subjects who were learning in different teaching environments. For example, he notes that students at age eight who were learning to read with a prominent phonics-based approach scored better than those learning to read in a program which "attempts to do phonics to the progress of the individual child" or one which attempts to avoid phonics. One may also argue (as noted by Allan (1982)) that the younger children needed more training than the older children.

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Liberman et al. (1974) researched the hierarchical relationship between the development of syllabic and phonemic metalinguistic skills among nursery school, kindergarten, and first graders. Using a tapping task in which the children were trained to tap out syllables and phonemes of words, they found that as the children got older, their abilities to segment phonemically and syllabically improved. The preschoolers could not segment phonemically at all, but 46% could segment syllabically. Of the kindergarteners, 17% could segment phonemes correctly and 48% could segment syllables correctly. Finally, 70% of the first grade children could segment phonemes and 90% could segment syllables. These percentages are based on reaching criterion of six consecutive errorless trials from a total of forty-two tokens. Thus, this study suggests that syllabic skills develop before phonemic metalinguistic skills.

A subsequent study by Fox & Routh (1975) corroborated the findings of Liberman et al.. They tested the sentence, word, syllable and phonemic segmentation skills of 50 children ages 3-7 years old. Using an oral repetition task which presented the instructions in a child-like manner, they also found that the effect of age was prominent in the children's segmentation abilities. The four, five and six year olds were comparable in their abilities to segment words into syllables easily and almost perfectly.

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However, their performance at phonemic segmentation tasks showed less homogeneity across the age groups. Given the task of segmenting syllables into individual phonemes, the three year olds could only segment approximately one quarter of the phonemes they heard; the four, five and six year olds demonstrated a significant increase in phoneme segmentation abilities over the three year olds. This ability leveled off at age six.

It appears from the above that starting at age four, children have nearly full competency in syllabic segmentation whereas phonemic segmentation abilities are still developing at approximately age six. Like the Liberman et al. study, we see a developmental process in metalinguistic awareness and a hierarchical relationship among the word, syllable and phoneme segmentation skills. However we may question whether the youngest children had any literacy skills which may have influenced their metalinguistic judgments.

Leong & Haines (1978) replicated the Liberman et al. phoneme and syllable segmentation tasks with older children in grades one, two and three. They used the same 42 test items but did not require subjects to reach criterion of six consecutive correct items. Instead, they simply scored the number of correct responses. Like the Liberman et al. study, subjects across the grades had

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greater difficulties with the phoneme segmentation task than the syllable task. Unlike the Liberman et al. study, there was no significant difference in performance in the phoneme segmentation task among the grade levels. However, there was a significant increase in syllable segmentation ability from grades one to two; grades two to three show a minimal change.

Both Hakes (1980) and Wankoff (1983) have also duplicated the phonemic segmentation task of Liberman et al. (1974) with comparable results. Using children ages 4-8, Hakes found that the "four and five year olds were, by and large, unable to analyze the syllables into their phonemic segments and to count these segments" (Hakes 1980:89). The 6-8 year olds were significantly better at the task. Wankoff's study also tested children of the kindergarten to third grade range. She found that the kindergarten children were significantly worse at phonemic segmentation than the first, second, and third graders. Moreover, the first, second and third graders did not possess significantly different phonemic segmentation skills from one another.

In sum, research suggests a metalinguistic awareness developmental process, though no concrete evidence regarding the relationship of reading to metalinguistic development. Since metalinguistic growth often increases

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significantly at approximately age six or grade one, we may be inclined to reason that the introduction of reading at that time enhances metalinguistic development. On the basis of the research discussed above, it is a logical possibility that there is simply a one-way relation between reading and metalinguistic awareness whereby reading influences our metalinguistic awareness. However, let us explore other research which demonstrate additional directions for this relationship.

3. Metalinguistic Awareness As A Predictor Of Literacy

There is growing evidence suggesting that MLA is a predictor of reading achievement and a needed prerequisite skill for reading. For example, Liberman et al. (1977) conducted a study which analyzed the reading scores of the children who participated in the 1974 study at the beginning of the next school year. These new data revealed that those children who scored high in the segmentation task in 1974 were found to be in the top 1/3 of their class in reading ability. In other words, the better readers had also been better at metalinguistic tasks than their peers prior to reading. They conclude that "the results therefore lend encouragement to the hypothesis that segmentation ability is a critical cognitive prerequisite to reading acquisition." (Liberman 1977:13).

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Again, we may question whether the children may have had reading readiness instruction at home.

Further, Helfgott (1976) researched the phonemic segmentation and blending skills for the 'CVC' syllable by 103 kindergarteners. Segmentation and blending skills were assessed via a modified Elkonian procedure:

> The subject is presented with a picture, the spoken name of the picture, a visual model of the word (i.e., a row of squares, one for each phoneme in the word) and some counters. The subject's task is to say the phonemes of the spoken word in order, moving a counter for each square of the visual model in left-to-right sequence as he says each phoneme (Helfgott 1976:161).

A rectangle and square were used for the C-VC and CV-C syllable shapes. For the blending task, the subject said each phoneme (or phoneme group) while placing the counters in the appropriate square or rectangle.

Helfgott instructed the subjects to segment and blend the syllable at different junctures (i.e., C-V-C, CV-C, C-VC) to see if one was easier than another. She measured the reading scores of the subjects (using the Wide Range Achievement Test = WRAT) one year later to see the effect of segmentation and blending skills on reading achievement. Subjects were not given a reading test at the onset of this experiment. The reader is left to assume that Helfgott believed that the kindergarteners were preliterate. As mentioned earlier, this may have been an

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erroneous assumption.

The results indicated that there was a clear correlation between kindergarten segmentation scores and first grade reading scores. Thus the author suggests that MLA is a prerequisite to reading. She concludes that "...since the ability to perform a complete phonemic segmentation is highly predictive of beginning reading acquisition, it seems that this is a useful readiness skill" (Helfgott 1976:167).

It is unfortunate that this study did not include an assessment of MLA at the end of the first grade since it would have addressed the question of whether there is a mutual relationship between metalinguistic and reading growth. As the study stands, it only researches one direction of the MLA and reading relationship.

Two additional studies, which used different metalinguistic awareness tasks, also corroborate the findings of Liberman et al. Olofsson & Wall (1980) investigated the metalinguistic abilities of 143 kindergarten children and their subsequent first grade spelling and reading scores. They found that the children's phonemic segmentation and phonemic reversal abilities were determining factors for reading and spelling achievement. Zifcak (1981) asked forty-nine first

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graders to participate in three tasks which measured phonological awareness: invented spellings, segmentation tasks (phoneme and syllable) and auditory analysis skills. The results showed that phonological awareness is strongly related to reading achievement. More specifically, the author states that "two measures of phonological awareness, invented spellings and phoneme segmentation, considered together provide the most reliable basis for predicating a child's ability to learn to read" (Zifcak 1981:122). Thus, those children who demonstrated better metalinguistic abilities than their peers scored higher than their peers on first grade reading and spelling tests.

Finally, research by Bradley and Bryant (1983) also suggests that reading achievement may be predicted by phonological awareness. This study consisted of a longitudinal and a training study of phonological awareness. The combined results of the two studies provide the best evidence of the MLA - reading causality relationship to date. The massive, longitudinal study consisted of two parts. First, the researchers assessed the sound categorization skills of 403, nonreading four and five year old children (as determined by the Schonell test) to see if this skill was indicative of reading achievement over a period of four years. The investigators orally presented 30 groups of three or four words (e.g.,

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hill, pig, pin; bud, bun, bus, rug); the children were asked to state which was the odd word. The authors conclude that "in every case categorizing sound accounted for a significant proportion of the variance in reading and spelling with...other factors controlled" (Bradley & Bryant (1983:419). Factors included intellectual level and memory abilities. Thus, a positive relationship between a child's phonemic awareness and reading achievement was demonstrated.

Bradley & Bryant also conducted a two year training program for 65 children (of the original 403 children) who were described as having poor phonemic awareness skills and who could not read when the training began. This subgroup was further divided into four groups : the first group was given intensive phonemic awareness training whereas the second group was also given additional training in the relationship between sounds and letters of the alphabet; the third group was a control group which was given the same series of words and pictures as groups one and two, but were asked to categorize the words into conceptual categories (e.g. animals, farm animals); the final group was also a control group which received no training. All four groups were tested for reading achievement at the end of the two year period. From an analysis of the post-training reading scores, it was revealed that the children who were trained in phonemic

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categorization (group one) were three to four months more advanced in reading achievement than the children who had only semantic categorization training (group three). Group two--whose training linked sound categorization to orthography--demonstrated greater achievement in reading and particularly spelling than group one. (There were no significant differences between groups three and four (the control groups.)) Given the fact that groups one and two had equal reading instruction, it is clear that the metalinguistic training influenced reading achievement. Thus the combination of a language awareness training and longitudinal study provide convincing evidence that phonological awareness is predictive of reading success.

Two conclusions may be drawn from this discussion of the child's phonological metalinguistic development. First, research has revealed a sequence in the development of phonological awareness which begins with the word unit and progresses to the syllable and phoneme units. Second, metalinguistic skills are not merely the consequence of reading instruction, but in addition, are also predictors of reading achievement.

Though research suggests that metalinguistic awareness is a predictor of reading achievement, no single study investigated the additional, reverse relationship that metalinguistic skills may be enhanced by reading

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achievement. It is possible that the development of each skill feeds the other. Given this gap in research concerning the MLA-reading relationships, the present study has examined both relationships.

4. MLA and Reading Skill Interaction

Ehri (1979) has presented an additional position that metalinguistic awareness and reading skills interact with one another. Goldstein (1976) investigated the reciprocal relationship between reading and the two cognitive skills, "sequential memory skills" (remembering items and their order of presentation) and "word analysis-synthesis skills" (phoneme and syllable segmentation) among four year old prereaders. Both skills have been reported to improve with age and be more developed among skilled readers. Goldstein's experimental group had explicit reading instruction through a phonics technique for 13 weeks whereas the control group was given basic language knowledge and stimulation (e.g., listening to stories and learning letter names) for the same period of time. The author found that the experimental group demonstrated reading training effectiveness as evidenced by the fact that they scored significantly higher on post-training reading tests than the control group (73.6% correct versus 3.3%, respectively). Furthermore, a regression analysis

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revealed that word analysis-synthesis skills (not sequential memory skills) are predictors of reading achievement. Goldstein has demonstrated that phonological awareness (not cognitive development) is a factor in attaining literacy.

In analyzing the effects of reading on the word-analysis skills, Goldstein found that reading instruction yielded syllable metalinguistic awareness improvement but not phoneme segmentation. Given the ages of the subjects (four years old) and previous research, we would not expect to see exceptional phoneme segmentation improvement. The author concludes that a reciprocal relationship between reading and language awareness exists which is skill specific and developmental.

In sum, research suggests that a mutual relationship between reading and metalinguistic awareness enables one skill to enhance the development of the other.

5. Syntactic Metalinguistic Development

5.1 Well-Formedness

Like phonological awareness, the child grows in her ability to objectify and analyze the syntactic properties of language. For example, DeVilliers and DeVilliers (1972)

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evaluated the judgments of eight two and three year olds, who gave grammaticality judgments of sentences which were either well-formed, reversed in word order, or had semantic anomalies. The results indicate that children at that young age possess very limited judgmental abilities. Though most of the subjects labeled the semantic anomalies as such, only the more linguistically mature children were able to detect the sentences containing improper word order. It appears that semantic information is the primary criterion used for sentence acceptability at that age.

Gleitman et al. (1972) also examined the judgment abilities of two year olds who were asked to say whether an imperative sentence was "silly" or "good". Though the children were able to recognize inverted imperatives (e.g., Bring me the ball/*Ball me the bring), they were less proficient at labelling ungrammatical telegraphic imperatives (e.g., *Bring ball.) as such. These findings further suggest that children this young are in an early stage of linguistic and metalinguistic development.

Investigations of slightly older children have shown a significant growth in syntactic language awareness skills. For example, Gleitman et al. have shown that children ages 5-8 are able to give near adult-like responses when asked to identify deviant sentences and also explain the reasons for the ungrammatical sentences. Bohannon (1976) also

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found that the child's ability to identify normal and scrambled sentences developed with age. More precisely, only 22% of the kindergarten children he tested were able to judge sentencehood correctly whereas 58% of the first graders and 78% of the second graders were accurate judges. Further, Scholl & Ryan (1980) found a difference between the abilities of 5 and 7 year olds to discriminate well and ill-formed interrogative and negative sentences. The older group was significantly better for both sentence types. Cromer (1970) has shown that children progress in stages of syntactic awareness whereby they will be able to detect the ungrammaticality of sentences at the first stage and subsequently be able to explain the ungrammaticality and/or be able to express the correct version. Finally, Hakes (1980) investigated the syntactic awareness abilities (i.e., synonymy and sentence acceptability judgments) of children ages 4-8. He, too, found that age was a strong factor in the child's ability to judge sentences. Furthermore, the effect for sentence type was also highly significant; the children were more likely to say that a deviant sentence was grammatical than the reverse.

5.2 Synonymy

Evidence from a variety of synonymy judgment tasks further portray the developmental nature of syntactic

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metalinguistic skills. For example, Hakes (1980) investigated the sentential synonymy judgments of his 4-8 year old subjects. He studied five sentence pair types: active-passives, existentials, temporal relations, spatial relations and size-amount. Like the research in well-formedness, Hakes found that age was a significant factor in synonymy judgments. Beilen (1975) has shown that children below seven are unable to judge synonymous relationships between sentences above a chance level. Furthermore, both Beilen and Hakes have noted that comprehension skills of sentences are developed earlier than the comparison skill needed for the synonymy task. Hakes (1980:72) states that it appears that the development of the ability to judge synonymy correctly is separate from, and emerges later than, the development of the ability to understand sentences themselves.

6. Syntactic Awareness and Reading

In addition to phonological language awareness, researchers have investigated the relationship between syntactic MLA and reading proficiency. Unfortunately, previous studies have analyzed only the correlational relationship between those skills. Research suggests that poor readers typically demonstrate syntactic problems on metalinguistic tasks. Yet, we do not know if poor reading is caused by poor syntactic MLA or whether poor syntactic

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MLA is caused by poor reading (which may in turn be caused by other factors such as poor phonological awareness). For example, Menyuk and Flood (1981) had adults, tenth, seventh and fourth graders detect and correct anomalous and nongrammatical sentences, judge and create paraphrases of sentences and both judge and clarify ambiguous sentences. By comparing the performance of both good and poor readers for each of the age groups, they found that all of the poorer readers performed worse at all of the metalinguistic tasks than all of the good readers. In summary, these findings simply suggest a correlation between syntactic MLA and reading.

Further research has suggested that there is a correlation between syntactic awareness and reading achievement. Ryan, McNamara and Kenney (1977) investigated the correlation of four metalinguistic abilities to reading proficiency. First and second grade children were asked to perform a word tapping task (tap a finger for each word in an orally presented sentence), a word discrimination task (distinguish between words and nonwords such as phonemes and syllables), a sentence comparison task (subjects listened to pairs of sentences which differed by one word and stated which word distinguished the two sentences) and a multigrammatical function task (subjects listened to a sentence with a lexical item which has several meanings, e.g.-'fly', and

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were asked to produce a sentence using a different meaning of the lexical item). The investigators found that the better readers showed greater metalinguistic knowledge on all tasks except the word tapping task than their peers who were less proficient readers. Most importantly, the better readers demonstrated superior abilities at the sentence comparison and multigrammatical function tasks than the poor readers.

Finally, additional research (using a variety of tasks and children of various ages) has revealed that children with poor reading abilities will demonstrate inferior syntactic language knowledge than their peers who are skilled readers (Vogel (1974); Hook & Johnson (1978); Killey & Willows (1980); Garson (1980)).

In conclusion, research suggests that reading is a process which accesses both phonological and syntactic language knowledge. Moreover, research has demonstrated a correlational relationship between syntactic MLA and reading. However, convincing evidence regarding the causal relationships between reading achievement and specific syntactic metalinguistic skills is still not available.

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7. Metalinguistic Awareness and Adults

Given this wealth of research in child metalinguistic development and reading, it is surprising that comparable research with adults is so impoverished. Studies of nonliterate adults will allow us to see if metalinguistic skills develop naturally through means other than literacy. For example, Ferguson (1981) investigated the levels of phonological segmentation awareness among adult subjects at 2.7 (basic), 5.8 (intermediate) and 9.0 (advanced) reading levels. Ferguson reports three phonological tasks which were administered. Subjects counted the number of words in a phrase, stated the first, second or third word in a sentence and repeated sentences one word at a time. Ferguson found that the basic level group had a significantly lower level of achievement on all tasks than the intermediate and higher level groups. Barton & Hamilton (1982) report on the findings of Ferguson (1981) as well as a syllable segmentation task that was administered to the same subjects used in the Ferguson (1981) study. They, too, found that the poorer readers were less proficient at segmental awareness tasks than their higher reading level classmates. Moreover, the tasks which required the isolation of a unit within a unit (e.g., words in sentences and phonemes in words) were most difficult for all subjects. Finally, Read & Ruyter (1985) also found that adults with low literacy levels have great

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difficulties with phoneme segmentation. This research suggests a correlation of specific language awareness abilities to reading abilities. Moreover, it suggests that adults do possess MLA despite their limited literacy skills.

Several recent studies have attempted to analyze not only the metalinguistic capacities of reading-disabled adults but also the relationships between those capacities and reading. As noted by Byrne & Ledez (1983:186) below, research of adult nonreaders will also help give insights into this complex issue:

> If illiterate but otherwise normal adults have substantial levels of phonemic awareness then the case for it being a precursor of reading is strengthened - it arises spontaneously, in the absence of reading instruction. Hence its emergence in childhood may well be independent of instruction, and failures of emergence may undermine reading acquisition.

In order to test this premise, Byrne & Ledez administered a series of metalinguistic tasks to a control literate group and two groups of poor readers where one group was slightly more proficient in reading than the other. Unfortunately, the results do not show conclusive proof for their premise because the task results were not homogenous. For example, the positive affect of reading instruction on MLA is suggested by the results of the phoneme reversal task (i.e., 'tim' changes to 'mit') which showed a significant difference among the two experimental

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groups and the literate, control group (mean correct =2.3, 6.7 and 13.9 respectively). However, the two groups of poor readers did not differ significantly in their abilities to perform a continuous word recognition task in which key words were matched semantically and phonically with other words (e.g., 'home/house' and 'home/comb'). An error analysis of the task indicated that more of the errors of the poor readers were based on semantic rather than phonic knowledge.

From the Byrne & Ledez study, it appears that the poorer readers have less phonic knowledge than the control group readers. Yet, it may be possible that they have phonic knowledge but do not demonstrate it with this task. A continuous item recognition - nonword task (which was a replica of the continuous word recognition task but with nonsense words) suggested that the poor readers could use phonic knowledge when the task demanded it. Since all three groups had comparable means for phonetic false positives, we see that the poor readers have the capacity for phonetic coding when semantic factors are unavailable. Thus, the various tasks suggest that the poor readers have limited phonemic metalinguistic skills. The investigators conclude that :

> ...we do not know whether these particular subjects "naturally" have these metalinguistic deficiencies and hence became disabled readers or failed to learn to read well from other causes and hence failed to achieve metalinguistic sophistication. But the

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> non-independence of reading skill on the metalinguistic process tested here is confirmed.

Morais, Cary, Alegria and Bertelson (1983) report on research which investigated the phonemic awareness capabilities of thirty illiterate Portuguese adults. They surmised that if MLA is instilled simply from cognitive growth--and not reading--then illiterate adults should perform as well as literate adults on phoneme awareness tasks.

Their investigation showed that illiterate adults perform significantly poorer on phoneme deletion and addition MLA tasks than literate adults. The authors state that this particular phonemic knowledge does not emerge spontaneously. Furthermore, they conclude that the important issue is not isolating which skill--reading or language awareness--influences which. Nor can we simply conclude that reading instruction, as a language awareness activity, creates such knowledge. Instead, they note that reading instruction gives the child or adult the foundation that is needed for this specific metalinguistic awareness development. However, the beginning reader must possess the cognitive capacity for this awareness before it can be developed in a relationship with reading.

It should be noted that this study is not without flaws. As suggested by Cairns (1986), the study assumes a

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linear organization of phonemes in phonological representation; however, current phonological theory strongly suggests that the syllable is the primary linguistic unit. Thus Cairns argues that "there is no reason to expect this specific ability to develop spontaneously, since no purely linguistic level is represented as a string of phonemes" (Cairns 1986:10).

In summary, research on non- and semiliterate adults suggests that metalinguistic and reading skills may share a mutual relationship. Low reading adults do possess some awareness of language which must have arisen spontaneously from knowledge of the spoken language; however, specific language awarenesses may be more developed than others. Reading will feed the limited, existing metalinguistic knowledge and promote its development.

8. The Present Study

As we have seen, there has been much more research on children metalinguistic awareness than on adults and metalinguistic awareness. By studying the ABE population, and particularly low level readers, we are able to investigate whether certain metalinguistic abilities are acquired "spontaneously" (to use Morais et al.'s terms) through general language knowledge (despite a lack of

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literacy skills) and others are not. Therefore, the present study investigated the MLA skills of non and semiliterate adults in order to determine which skills are acquired regardless of literacy and which are correlated to reading level. In addition, we addressed the question of the MLA - reading priority relationships by measuring both reading and MLA gain among the low level readers after six months of intensive reading instruction.

Hence, this study sought to investigate the following four hypotheses:

(1) There is a correlation between reading level and both general and specific language awareness skills.

(2) Metalinguistic awareness enhances reading achievement.

(3) Reading acquisition enhances metalinguistic development.

(4) There is a hierarchical arrangement of phonological awareness skills.

We have devised seven tasks which include word, syllable and phoneme segmentation tasks similar to the Liberman et al. (1974) tapping task. Two reasons lead us

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to suspect that phoneme segmentation is not a natural ability. First, speech perception research has shown (e.g., Liberman, A.M., Cooper, Shankweiler & Studdert Kennedy, 1967; Stevens, 1972) that a direct correlation between acoustic segmentation and phonemic level segmentation does not exist. Liberman (1977:9) states that "the phonemic segments are encoded or merged at the acoustic level into essentially unitary sounds of approximately syllabic dimensions." Therefore the continuous acoustic stream makes it difficult for nonreaders to access the phonemic level of word representation. Second, recent phonological research (Liberman & Prince, 1977; McCarthy, 1979; Halle, 1978; Selkirk, 1982) has presented convincing evidence that words are not represented as a phonemic string , but instead, are hierarchically organized by syllables. Therefore, we would not expect to find phonemic segmentation to be a natural ability.

Unlike Liberman et al. (1974) and other phonological MLA studies, the present investigation included a phonotactic task which measured the ability of adult literacy students to recognize permissible and nonpermissible sequences of sounds. Research with literate children and adolescents has shown that phonotactic judgments are easy to make and improves as the child matures (Pertz & Bever, 1975; Greenberg & Jenkins, 1964).

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Therefore, this study sought to determine if there is a correlation between phonotactic skills and reading, held plausible since reading focuses on sounds and sequences of sounds as represented in a written form. Furthermore, we were interested in the relationship between phonemic segmentation and phonotactic knowledge since they both entail evaluating the concatenation of phonemes.

In addition to a need to analyze phonological metalinguistic skills of adult nonreaders, it is crucial to include a group of syntactic tasks. As the reader may recall, we have seen evidence from research with children and adolescents that poorer readers have both phonological and syntactic language difficulties which far exceed those of good readers. Therefore, we have included sentential synonymy and well-formedness tasks in our battery in order to investigate the relationships between syntactic MLA and reading ability.

Finally, we have included an oral comprehension task in order to assess normal language development. It was assumed that subjects should have proficiency in comprehending language despite their literacy skills. Thus, any subject who performed poorly at this task (below the mean) was considered suspect of being learning disabled and was subsequently eliminated from this study. We will postpone a full discussion of the subject

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selection process until chapter four - Methodology.

In sum, the following seven tasks represent a comprehensive evaluation of language skills and language awareness. They were administered to three groups of adult literacy students, ranging from low, to mid, to high levels of reading. They were also given to a group of literate adults in order to test the hypotheses along a continuum of literacy levels.

1) word segmentation
2) syllable segmentation
3) phoneme segmentation
4) phonotactic judgments
5) sentential well-formedness judgments
6) sentential synonymy judgments
7) oral comprehension

Two standardized reading tests were administered to the adult literacy students. One assessed phonics skills; the other tested phonics and reading comprehension skills. The literate adults were given the phonics skills test in order to assess their literacy level.

In addition to evaluating the correlation of metalinguistic awareness to reading skills among adult literacy students, this study included a longitudinal

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study of the MLA and reading skills gain of the lowest level readers. By analyzing metalinguistic abilities at the first testing period, we hypothesize that those adults who have better than average MLA, will become better readers at the second testing period (approximately 6 months later) than the adults who demonstrate below average metalinguistic abilities. Moreover, in order to test the hypothesis that reading achievement enhances MLA development, we also investigated the MLA gain of the low level readers during the same time period. Thus, this longitudinal part of the study addresses the priority relationship between MLA and reading acquisition. It is proposed that the correlational and longitudinal components of this study, combined together, will lead to a greater understanding of the relationships between adult reading acquisition and MLA.

This methodology will also investigate the following details regarding literacy and metalinguistic awareness:

1) Are the reading tests correlated and testing comparable aspects of literacy?
2) Are the metalinguistic skills correlated to one another?
3) Are the reading tests correlated to the metalinguistic tasks?
4) What is the relationship between phoneme and phonotactic abilities?

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5) Do subjects gain metalinguistic skills after six months of literacy instruction? If yes, which specific skills develop?

6) Does one literacy group have distinctively different literacy skills than the others?

In conclusion, this investigation sought to present evidence of the relationship between metalinguistic skills and reading ability. As we turn to chapter 3, we see that each of the seven tasks include specific subcategories which are also evaluated.

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Chapter Three

Methodology

1. Subjects: Literacy Students

The subjects for this study consisted of 90 nonliterate and semiliterate adults who were learning English literacy skills at free classes given by the NYC Board of Education-Adult Basic Education Division. All subjects attended day classes, three hours per day, for five days a week. They were learning to read with a phonics based approach. Classes were held in centers located in Brooklyn and The Bronx, New York City.

The subjects ranged in age from 18 to 70 with an average age of 34.6 years. Both females and males participated, with females constituting 66% of the total subjects and males being the remaining 34%.

Despite the fact that all of the subjects were learning English literacy (EL) and not English as a Second Language (ESL), it is not surprising that many people spoke a language in addition to English. Since it would have been virtually impossible to test a sizeable sample of monolingual English speaking adults, a set of language

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eligibility criteria was created. First, since Adult Basic Education in New York City is divided into two major components, ESL and EL, the fact that these people were not in an ESL class strongly suggested that English was their dominant language or that they were balanced bilinguals. Second, each subject was given an interview (described below), during which the experimenter was able to make an informal assessment of English syntactic, lexical, and phonological language abilities. If the experimenter had any doubts about the subject's language abilities, s/he was not included in the study. Third, bilingual subjects were asked if they felt comfortable speaking and listening in English; if they expressed any reservations about English, they were not accepted as a subject. Finally, each classroom teacher was asked whether any student had demonstrated any English language difficulties; such students were not eligible for this study.

Given these eligibility criteria, 56% were monolingual English speakers (born in the USA), 34% were balanced bilingual English-Spanish speakers, and 10% were balanced bilingual Caribbean English-Standard English speakers.

Four subject screening procedures were utilized in order to exclude learning disabled subjects. We asked the classroom teachers (prior to administering the battery)

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whether they thought any student was learning disabled or intolerable of testing situations; such students were not given the battery. The second screening procedure took place after the battery had been administered. We reviewed the oral comprehension scores of all of the subjects and excluded those subjects who performed below average. Again, it was assumed that this task provided a simple measure of learning disabilities. The third screening procedure occurred during the testing. We carefully observed subjects as they performed the tasks and looked for those subjects who were frustrated or confused by the tasks. For example, if a subject could not understand how to use an answer packet or seemed aggravated by the testing, we did not include her as a subject. The final screening procedure was the interview. The interview assessed the language abilities, behavior history and literacy history for each subject (see Appendix A). Questions such as "What was your last grade of school?, Did you have any gaps in your schooling?, Were you ever very sick and could not go to school?, and Why do you think you have a reading difficulty today?" provided valuable insights into understanding each subject's literacy situation.

As a result of the interview and the language and behavior eligibility criteria, a total of 90 subjects were selected out of 173 that were tested. The 90 subjects were

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placed into three reading level groups: low level (30 subjects), mid level (30 subjects), and high level (30 subjects). Although subjects were already in reading classes that were defined according to those reading levels, additional reading tests were given to verify their classification (see "Assessment" below). It is important to note that we initially selected 60 subjects for the lowest level group in order to be assured of a sizeable sample for a post-test six months later. Of the 60 low level readers, we were able to retest 30 subjects. They, then, became the low level group for both the correlational and longitudinal parts of this study.

2. Subjects: Literate

In order to compare the metalinguistic abilities of non- and semiliterate adults to those of literate adults, a matched, literate group was needed. Subjects were selected from two English 11 writing composition classes at Bronx Community College, CUNY, in The Bronx, New York City. Students in these classes, like all CUNY students, are given the CUNY placement tests in English, reading and math. In English, the students' essays are scored as follows: a score of 1 or 2 places students in English 01, the first level remedial writing class; a score of 3 places students in English 02, the second level remedial writing class; and a score of 4 or more places students in

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English 11, written composition, which is the first credit bearing English course. In order to verify the students' literacy abilities, the teacher was interviewed and asked to identify any students who did not demonstrate average, literate reading and writing abilities. In addition, all subjects were given the WRAT test to further assess their reading abilities; more detailed information regarding that test will be given below.

A total of 30 literate adults were used for this study. They matched the non- and semiliterate groups in language, sex, age and social background.

3. Assessment Instruments

All students in adult basic education classes in NYC are routinely given the Test of Adult Basic Education (TABE) upon entering the program. Therefore, each reading group was given the appropriate reading level version of the TABE subtest at the beginning of this study; the low level readers used Level E (Easy), the mid level readers used Level M (Medium) and the high level readers used Level D (Difficult). The TABE test was administered in a group setting by trained personnel at each testing site. Though the tests consists of several parts, only the "Vocabulary" and "Comprehension" sections were analyzed.

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Despite the fact that the Level E vocabulary section is categorized as a single unit, it actually consists of two distinct parts. The first part requires the student to listen to a word and choose which word from a written list of four corresponds to the word that was heard. These lists have phonetically similar items such as "trail, train, trial, and trifle" as the selection set for the target word "trail." We will call this the "lexical portion" of the TABE test. The second part does not test phonics skills but instead tests lexical synonymy abilities and whole word knowledge. It consists of a series of phrases, each with a word in bold print. The students are to choose which word from a written corresponding list is "the best meaning for the word in darker type." For example, the phrase "rush to the airport" is followed by the four words 'get', 'hurry', 'ride', and 'roll.' The subject chooses 'hurry' as the synonym for the word 'rush.' We will call this the "phrasal section" of the TABE test. In analyzing the reading abilities of the lowest level readers, we assessed the scores in Vocabulary as one single score and also as two distinct raw scores. They are clearly tapping different reading and language abilities.

The Comprehension section also consists of two parts. The first part requires the subject to read a test word and choose which word from a subsequent list of four words

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follows the test word in alphabetical order. For example, the following sample item is given during practice: "air: apple boat field jet." Since we felt that this section was not really testing reading comprehension abilities (but, instead, letter sequencing skills) we did not include it as part of the reading comprehension subscore. The second subpart tests reading comprehension skills by requiring subjects to read small passages and/or tables and answer corresponding questions; a multiple choice answer is provided. For example, the following passage and question is given to the testee during the practice session:

> Ned wanted to learn more about horses. He looked in the table of contents of his book. He found a chapter called "Farm Animals" that told all about horses.
>
> To find out more about horses, Ned looked in the
>
> 1) desk
> 2) index
> 3) spelling book
> 4) table of contents

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The Level M test, which was administered to the mid level readers, and the Level D test, which was given to the high level readers, do not have a lexical section in their Vocabulary sections. Instead, it only contains the phrasal section. The comprehension section consists of a series of small passages or tables, each followed by comprehension questions; there are no questions that assess alphabetizing skills.

One flaw that we noted with the TABE test was that it tested phonic skills with a limited number of test items in the Level E version and not at all in the Level M and D level versions. We felt that there were two reasons to further assess phonics skills. First, the development of phonics skills is not usually completed by the end of the lowest reading level that we tested; this skill is still being developed along with other reading strategies even at the highest reading level that was tested. Therefore, we wanted to assess the phonic abilities of all subjects. Second, since we wanted to investigate whether segmentation skills are correlated with reading level and particular reading skills (including phonics), we needed a more precise measurement of phonic abilities at all reading levels. Thus, we administered the Reading section of the Wide Range Achievement Test (WRAT) to each subject individually. This test consists of a series of words which the student reads outloud while the tester records

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what the student says. Both child version and adult versions were administered; they differ only in lexical items and norming scales.

In sum, the standardized tests (TABE & WRAT) and the classroom placement allowed us to place the subjects into one of the three reading groups: low, mid or high level. The tests were compared in terms of raw scores, grade-level equivalent and proportion scores. Proportion scores for each subtest and a total reading score were obtained by calculating the total number correct test items out of the total number of test items. All subjects in the literate group were given the WRAT test as a check for literacy. All subjects scored above a 9th grade reading level.

Below is a list summarizing the subsections of the WRAT and TABE tests:

1) WRAT - (1) adult version
(2) children version

2) TABE Level E - (1) lexical section
(2) phrasal section
(3) modified comprehension section

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3) TABE Levels M & D - (1) phrasal section
(2) modified comprehension section

4. Metalinquistic Battery

The entire battery--including training trials--was presented on tape in order to guarantee that all subjects heard the stimuli read with the same pronunciation, at the same speed, and in the same order (which is presented below). A Uher SG 562 Royal reel to reel tape machine was used at a 4.7 cm/s tape speed with 1/4" Ampex audio tape. The battery was recorded in a sound deadened recording room at Queens College, CUNY with the same male voice throughout. Each task was preceded by training and accompanied by a separate answer packet which did not require any literacy skills (see Appendices P-S). Appendix P was used for the word, syllable and phoneme segmentation tasks. Appendix Q represents the answer packet for both the well-formedness and synonymy tasks. Appendix R was used for the comprehension task. Finally, Appendix S is a sample answer packet for the phonotactics task; it differs from Appendix Q in number of training trials. The packets were colored coded such that the practice pages were yellow followed by the actual test items on white paper.

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The metalinguistic battery contained seven tasks: four phonological, two syntactic and one testing oral comprehension. Each task had twenty-four test items with four subcategories. There were six tokens of each subcategory, for a total of twenty-four items. The six tokens of each subcategory were randomly arranged into a twenty-four item list. The tasks and their subcategories will be described below.

4.1 Word Segmentation

For the word segmentation task, students listened to sentences and indicated the number of words in a sentence with a check mark, one for each word. The answer packet provided seven circles for each sentence. Therefore, if the sentence contained three words, the subjects made three checks-one in the first circle, one in the second circle and one in the third circle.

The twenty-four test items contained sentences which were either two, three, four or five words in length. They were randomized for sentence length and syntactic structure. Each test item was read twice; there was an eight second interval between test items (see Appendices B, C and P).

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The training session gave the students an opportunity to become familiar with the answer packet as well as counting the words in each sentence. The experimenter discussed with the students the correct responses to the training sentences. Students were advised to count the words on their fingers or tap them out with their pencils.

4.2 Syllable Segmentation

For this task, students listen to words and indicate the number of syllables in each word with check marks, one for each syllable. During the training with twelve practice words, the students were familiarized with the term "syllable"; they were encouraged to tap their feet, pencils or hands to feel the rhythm or beats of each word.

Since we wanted to avoid any possible interference from the orthography or familiarity of words on their judgments of syllables, we used nonsense words for this task. However, during training, half of the words were nonsense and half were actual words. This eased the subjects into hearing new words while becoming familiar with the task. Each test item was repeated twice with an eight second pause before each item. All twenty-four test items were nonsense words which ranged in length from one to four syllables. They abided by the phonotactic constraints of English and differed in stress patterns

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(see Appendices D, E and P).

4.3 Phoneme Segmentation

The phoneme segmentation task required subjects to listen to twenty-four nonsense words, and indicate the number of phonemes with the check mark procedure. Monosyllabic words with the following syllable shapes were used: VC, CVC, CCVC, CCCVC; they did not violate English phonotactic rules. These syllable shapes were chosen because they do not contain final consonant clusters; such clusters may be reduced by subjects who use a nonstandard dialect of English. Also note, that in order to insure correct perception of the test nonsense words, we mostly used word final fricatives and stops that were clearly released. The twenty-four test items were randomized but with the condition that no more than two syllable shapes be adjacent to one another (see Appendices F and G). Each test word was repeated twice with an eight second pause before each item.

Training for this task included twelve test items on the tape with an additional repetition of each word by the experimenter. Each word was repeated with a slight pause between each phoneme in order to train the subjects to listen for individual sounds, not syllables. For example, the word 'bat' was repeated as 'buh-aa-t'. The

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experimenter represented each phoneme with a finger as she said the training words. Subjects were encouraged to do the same for each word or to try and tap-out the individual sounds with their feet or pencils. Like the previous task, training had both real and nonsense words though the actual task consisted of all nonsense words (see appendices F,G and P).

4.4 Sentential Well-formedness Judgments

Subjects were required to listen to sentences and decide if they were grammatically correct. The subjects listened to twenty four sentences which included twelve grammatically correct and twelve incorrect sentences. Each sentence was repeated twice to help the students with their grammaticality judgments. There was an eight second delay before each of the twenty-four test items. Because some of the students had zero level literacy we could not have them place a check mark on response words such as 'yes' and 'no' on the answer sheets; instead, we used smiling and sad faces to represent the same concepts.

The following four syntactic subtypes were presented. Grammatically correct and incorrect examples for each subtype are given below:

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(1) tag-question agreement sentences

e.g., *Susan is fat, isn't he?

The man fell down, didn't he?

(2) reflexive agreement sentences

e.g., *The man said that Mary hates himself.

The crazy man talks to himself.

(3) filled-gap sentences

e.g., *John loved the dress that I made it.

John ate the bread that I baked.

(4) word order sentences (simple declaratives)

e.g., *The is big house.

She will eat at six o'clock.

We tested these syntactic constructions because they are fundamental aspects of grammar; we were confident that this adult population used and comprehended the grammatical versions of these syntactic structures. Previous research has shown that both children and Broca Aphasic adults correctly judge the grammaticality of these sentences (Hakes (1980); Lineberger, Schwartz, and Saffran (1983)).

Appendices H and I give the order of sentence presentation; ungrammatical sentences for both the

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practice and test items are indicated with an asterisk. The answer packet is represented in Appendix Q.

During training, subjects were instructed to listen to sentences and determine whether they were grammatically correct; they were told not to judge the sentences as being true, false or possible statements about the real world. In doing the practice sentences the experimenter gave the correct response to each sentence and a brief explanation of the correct answer. Pilot studies revealed that this task only required eight practice sentences representing a sampling of the subcategories given above.

4.5 Sentential Synonymy Judgments

Like the well-formedness task, this task demanded an evaluation of sentences by the subjects. However, for this task, they listened to twenty-four pairs of sentences and decided whether they had the same meaning. Twelve pairs were synonymous in meaning and twelve were not.

Each pair of sentences was repeated twice with a five second break between each repetition; there was a six second gap before each of the twenty-four test items. The following pairs of constructions were presented in random order. Examples of both synonymous and nonsynonymous pairs are given below:

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(1) particle movement sentences

e.g.: The old man put on his sweater.

The old man put his sweater on.

*John looked up the street.

John walked up the street.

(2) active/passive sentences

e.g.: The cat licked the kitten.

The kitten was licked by the cat.

*The priest greeted the nuns.

The priest was greeted by the nuns.

(3) indirect object switch sentences

e.g.: The teacher asked the class a question

The teacher asked a question to the class

John gave Sally a present.

*Sally gave John a present.

(4) "there" sentences

e.g.: There are many coats in the closet.

The closet has many coats in it.

*There is a book under the newspaper.

There is a newspaper under the book.

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As with the well-formedness task, we chose these constructions because they are basic syntactic structures that are acquired during childhood and have been studied extensively (Hakes (1980); Bever (1970); DeVilliers and DeVilliers (1972); Beilen (1975)).

Using the same answer sheets as in the well-formedness task, subjects checked the smiling face if the sentences were synonymous or the sad faces if they were not. Appendices J and K present the training and test sentences which were randomized for sentence subtype and synonymy status (i.e., synonymous and nonsynonymous pairs). Appendix Q represents the answer packet.

Subjects were trained to listen for equivalent meanings between each pair of sentences, not whether they had the same grammar pattern. Subjects were told to think about what's happening in the first sentence (e.g., who's doing what to whom) and see if the same thing is happening in the second sentence. As with the well-formedness task, this task demanded only eight sentences for practice; they represented a sampling of the task subcategories.

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4.6 Oral Comprehension

Although an oral comprehension task is not a test of language awareness we decided to include it in our language battery as a screening device for those subjects who may have severe language impairment. It was assumed that despite literacy level and language awareness abilities, subjects should have normal oral language comprehension since they are fluent speakers of English. Any student who scored below the group average on this task or who demonstrated frustration and/or anxiety during the administration of this task (e.g., giving up, or asking for additional repetitions of sentences) was not counted as a subject.

In this task, subjects listened to a sentence followed by a question about the sentence. They then chose one of two pictures on their answer sheets which represented the answer to the corresponding question. Again, since we could not assume any literacy, we had to use a pictorial representation for the question response rather than a multiple choice with words (see Appendix R).

There was an eight second pause before each test item; each sentence and accompanying question was repeated twice. Sentence types were randomized (see Appendices L and M).

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Subjects received eight training trials which were intended to familiarize them with the picture selection procedure. The twenty-four test items consisted of the following four subcategories:

(1) simple declarative sentences

e.g., The boy kissed the girl on the cheek.

Who got kissed? The boy, the girl

(2) temporal judgment sentences

e.g., The girl kissed the boy before leaving the car.

Who left the car? The girl, the boy

(3) passive sentences

e.g., The bird was bitten by the squirrel.

Who got bitten? The bird, the squirrel

(4) relative clause sentences

e.g., The cat who the dog chased jumped over the fence.

Who got chased? The cat, the dog

For this task, we purposely used difficult constructions in order to test for high levels of comprehension. For example, we used reversible passives in our testing because research has shown that children comprehend them later than irreversible passives (e.g.,

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"The car was driven by the woman") (Bever (1970)). Similarly, it has been demonstrated that sentences which contain relativized NPs which are equal to the subject NP in the matrix sentence (see example #4 above) are more difficult for children to comprehend than sentences which contain relativize NPs that are equal to the object NP in the matrix sentence (e.g., "The man kissed the woman who left the room") (Sheldon (1974), cited in Cairns & Cairns (1975)). Thus we constructed a comprehension task that demanded sophisticated linguistic competence.

4.7 Phonotactic Judgments

For this task, subjects listen to twenty-four monosyllabic nonsense words and indicate whether it could be a new or possible word for the English language. The test items contained four different syllable shapes; half of the items violated English phonotactic constraints and half did not. They were randomized for syllable structure and phonotactic constraint status (see Appendices N, O and S).

Below is list of the four syllable shapes and examples which do and do not violate English phonotactic constraints:

(1) CVCC

e.g., tarm

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*sešg

(2) CCVC

e.g., grəs

*tkal

(3) CCCVC

e.g., skrat

*blnog

(4) CCVCC

e.g., blənd

skæfč

5. Testing Administration

For the first testing, subjects were individually interviewed and given the WRAT test during the first hour. After a fifteen minute break, the battery was subsequently administered with a single break, generally between the fourth and fifth task. The entire battery, interview and WRAT test took approximately three hours. The TABE test had been administered approximately one week prior to the experimental tests.

The literate group received the same battery as did the nonliterates; however, they were given the WRAT test and a brief interview including questions about age, sex

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and language background subsequent to the battery on the same day as the battery.

For the post testing, the low level grade readers were again given the battery in a group setting with comparable break time. Retesting of the WRAT was given individually after the battery was administered. The TABE was administered approximately one week prior to the experimental tests.

Finally, it should be noted that though the instructions state that subjects should "place dots in circles" or "circle the smiling face", we quickly realized that subjects were more comfortable with using checks. Therefore the tape remained as is presented in the appendices but the experimenter presented the option of using checks to the subjects.

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Chapter Four

Results

This chapter presents the results of a comparison of reading level and language task abilities, MLA abilities among the groups, language task differences among groups, and subtasks within the seven tasks. In addition, we present the results of correlation procedures for the reading scores, language tasks, and reading scores to language tasks. Finally, this chapter presents the results of the longitudinal study which researched the relationship between reading and MLA gain among the low level readers.

The reader is reminded that this study consists of seven tasks, each containing four subtasks of six test items. These tasks were administered to four groups: low, mid, high and literate level reading adults. Finally, three reading tests (TABE, WRAT I, & WRATII) were administered to the mid, low and high level readers. The literate level group was given the WRAT tests only. Chapter three presents the differences among these tests and the subparts that were administered to each group.

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1. Comparison Of Reading Levels And Language Tasks

In table 1 the results of a Sheffe multiple-means comparison procedure for tasks and reading level are given. The results are indicated with an asterisk which represents a $p < .05$ for significant differences between neighboring items.

The hypothesis that metalinguistic skills differ across levels of reading ability was tested by a two way Analysis of Variance, with reading level as a between groups variable and metalinguistic skill as a repeated measures variable. The ANOVA revealed a significant effect of reading level ($F(3,143) = 299.53$, $p < .001$) as well as metalinguistic skills ($F(6,143) = 285.36$, $p < .001$). Moreover, there was a significant interaction of reading level and metalinguistic skills ($F(18,143) = 9.60$, $p < .001$). Thus, reading levels varied differentially across the metalinguistic skills.

A series of one-way ANOVAs were computed in order to test the hypothesis that the four reading groups would perform differently on the individual language tasks. Table 2 indicates that this hypothesis was supported for all of the tasks. Furthermore, we tested the hypothesis

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that each of the four reading groups would differ in language abilities. As can be seen from Table 3, the results of a series of one-way ANOVAs support this hypothesis.

2. Reading Level Differences

The data represented in Table 1 support the prediction that the groups would differ in language abilities. The reading level means indicate significant differences in language abilities between neighboring reading groups. Moreover, different types of awarenesses achieve success at different reading levels. For example, word segmentation abilities are basically fully developed once a person is a high level reader. Syllable segmentation abilities, however, continue to develop beyond the high level. As expected from previous research on children, phoneme segmentation abilities do not increase significantly until the literate level of reading; furthermore, scores were significantly lower than scores of other tasks. Phonotactic judgment abilities rise significantly after the mid reading level. Well-formedness and synonymy judgment abilities are significantly better for the literate group than the other groups.

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3. Language Task Differences

As can also be seen in Table 1, the task means indicate significant differences among the word, syllable, phoneme and phonotactic segmentation tasks. These findings support our hypothesis that the adults in this study would demonstrate a hierarchy of difficulty among the phonological tasks in a similar fashion to that of the children studies reviewed earlier (e.g. Liberman et al. (1974), Fox & Routh (1975)). The overall task means indicate that word segmentation abilities were the highest, followed by syllable segmentation abilities, followed by phonotactic judgments, followed by phoneme segmentation abilities. A parallel hierarchy of difficulty was found for each of the reading groups; however, the low and mid levels did not demonstrate a significant difference in syllable and phonotactic judgment abilities. Moreover, the literate level group did not show significant differences in word and syllable segmentation abilities. It should be noted that phoneme segmentation abilities were the poorest for all of the groups. These findings corroborate those of Read & Ruyter (1985) who also found that adults of low literacy (approximately fifth grade readers) have great difficulties with phoneme segmentation.

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The task means also suggest that phonotactic judgment abilities are in general greater than phoneme segmentation abilities. Each reading group was significantly better at phonotactic judgments than phoneme segmentation. It is plausible to suggest that phonotactic judgment and phoneme segmentation abilities involve a common substratum of skills; however, the phoneme segmentation task requires additional skills. For example, both tasks minimally require the ability to analyze these words as syllables which contain onsets, rhymes and codas. The phonotactic task demands the subject to judge the permissibility of the consonant cluster in the onset and/or coda; the cluster may be analyzed as a single unit. However, the phoneme segmentation task additionally requires subjects to discriminate between each of the consonants in the onset and/or coda.

The results also demonstrate interesting findings regarding syntactic metalinguistic abilities. First, the overall task means show no significant differences between the well-formedness and synonymy judgment tasks though each increases with reading level. Second, each reading level performed uniformly on the two syntactic tasks; there was no significant difference between their well-formedness and synonymy judgment abilities.

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4. Correlation Of Reading Scores

In order to insure that both reading tests--the TABE and the WRAT--were tapping similar aspects of reading, we computed a Pearson product moment correlation between the scores on the two tests. Table 4 represents the proportionalized mean subtest and total reading scores for each reading level. Table 5 shows the correlation of the subparts of the TABE and the two versions of the WRAT. Reading test correlations were performed on groups 1-3 only since group 4 did not take the TABE test. The results indicate significant positive correlations between the tests, particularly those parts which tested similar reading skills. It is interesting to note that the four negative correlations are between the Lexical part of the TABE and some other reading test or subtest. It is likely that this portion of the TABE is measuring a different aspect of reading than are the other subtests and thus showing a negative correlation with other reading tests.

5. Correlation of Language Scores

Table 6 shows the results of a Pearson product moment correlation which was computed on the seven language task scores that were summarized in Table 1. It was predicted that there would be a correlation among the tasks, thus showing that the tasks covary; there is uniformity of

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difficulty among the tasks. The results indicate a significant correlation among all seven tasks for all four groups.

6. Correlation Of Reading Scores To Language Tasks

A positive correlation was predicted between the reading scores and the metalinguistic tasks. As seen in Table 7, the results of a Pearson correlation of coefficients support this prediction. This test did not include the literate level group because they did not take the TABE test. Significant overall correlations among all of the metalinguistic tasks and the WRAT tests, several parts of the TABE test, and the overall reading scores indicate that there is a relationship between reading and metalinguistic awareness.

It is important to note that the seven significant negative correlations are between the Lexical subpart of the TABE and other language skills. These negative correlations parallel those of the reading subtest correlations discussed above, which also only contained negative correlations between the Lexical-TABE and some other reading test (see Table 5). Thus, these data support our suggestion that the Lexical portion of the TABE is measuring a different aspect of reading.

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7. Comparison Of Subcategories Within The Seven Tasks: Among Groups And Within Groups

Tables 8-14 represent mean comparison tests that were computed on the sub-categories within each language task. Significant differences among groups and within groups were determined via Sheffe multiple mean comparison tests. An asterisk represents a $p < .05$ for significance differences between neighboring items. Recall that each task consists of 24 test items comprised of four subtasks, each containing six test items. Thus, the maximum score for each subcategory is six. These means are related to those on Table 1 which represent the total task means. The results of the mean comparison tests revealed a general pattern of language awareness in which the number correct on a subcategory increased as reading level rose, but we will see that in many cases patterns of difficulty differed among reading levels.

7.1 Word Segmentation

The results of the comparison of group and subtask means for the Word segmentation task are indicated on Table 8. The ANOVA carried out to test differences in subtasks among the four groups revealed significant main

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effects of reading level ($F(3,116) = 44.78$, $p < .001$) and subtask ($F(3,348) = 16.21$, $p < .001$) as well as group X subtask interaction ($F(9,348) = 7.66$, $p < .001$). The interaction indicates that the four reading groups have different patterns of word segmentation abilities.

The overall reading level means indicate that the low, mid, and high level readers are significantly different from one another in word segmentation abilities. That is, the results suggest that readers achieve success at this ability once they become high level readers. The overall subtask means demonstrate a significant difference between the two and three word sentences versus the four and five word sentences. Thus, this bifurcation between the task sub-categories indicates a significant decrease in word segmentation abilities when a sentence contains four or five words. It should be noted that this pattern only holds true for the low level readers. Thus, the main effect of subtask is attributable solely to the low level readers.

These subtasks, like others we will see, clearly demonstrate the difference between the lowest reading group and the others. They have significantly poorer two, three and four word segmentation abilities than the other groups. Furthermore, they are poorer at four and five word segmentation than two and three word segmentation. The

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reading level mean (4.52) also reveals how much poorer this group is from the others.

Also note that the mid level readers demonstrate significantly poorer 4 and 5 word segmentation skills than the high and literate level readers. Thus, it is suggested that "literate-like" word segmentation skills develop fully only at the high reading level.

7.2 Syllable Segmentation

Table 9 presents the multiple means comparison of reading level and subtask for the Syllable segmentation task. Significant main effects of group ($F(3,116) = 33.55$, $p < .001$) and subtask ($F(3,348) = 33.43$, $p < .001$) as well as a significant group X subtask interaction ($F(9,348) = 10.40$, $p < .001$) again indicate differences among the four reading groups in segmentation abilities.

It is interesting to note that this is the only task in which the overall reading level means indicate significant differences for all four groups and the overall subtask means indicate significant differences for all four subtasks. As expected, the reading level means show an increase from the low to literate levels in syllable segmentation abilities. Thus, these adults, like the children in studies reviewed in Chapter 2, demonstrate an increase in syllable segmentation abilities as reading

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level increases.

It is generally assumed that the greater the number of syllables, the harder the segmentation task. Yet, this assumption holds only partially true for these subjects. For example, the overall means for subtask do not demonstrate a decrease in syllable segmentation abilities as the number of syllables in a word increase. In fact, one syllable words are more difficult than two and three syllable words. The mid and high level readers performed significantly better at the 2 syllable segmentation than the 1 syllable segmentation test items. A plausible explanation for this unexpected result is that many of the subjects were dividing the one syllable words as follows: 'blit' = b-lit or bl-it. Therefore, interference from prior phonics teaching methodologies may have influenced syllable segmentation judgments.

The results of this task provides additional support for the proposition that the low level readers have significantly different language awareness skills than the other groups. For example, they have the lowest score of all the groups on the four syllable word segmentation task.

A final observation regarding syllable segmentation abilities is that distinctions between two pairs of

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neighboring reading level groups may be attributed to different subtask skills differences. For example, the low level readers were significantly poorer at the four syllable segmentation subtask than were the mid level readers, whereas the mid level readers demonstrated significantly poorer one and three syllable word segmentation abilities than did the high level readers. Hence, reading level groups differ from one another in overall and specific syllable segmentation skills.

7.3 Phoneme Segmentation

The group and subtask means comparisons for Phoneme segmentation are presented on Table 10. A two-way ANOVA indicated significant main effects of group ($F(3,116) = 75.95$, $p < .001$) and task ($F(3,348) = 49.95$, $p < .001$) as well as group X subtask interaction ($F(9,348) = 3.59$, $p < 001$).

The subtask means reveal a significant decrease in segmentation ability as the number of phonemes in a word increase. Segmentation of two and three phoneme words is significantly easier than four and five phoneme words.

The reading level means show a significant difference in segmentation abilities among the four reading groups. The phoneme segmentation abilities of the literate level

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group is significantly greater than the remaining three groups. Moreover, all four groups demonstrated greater difficulties with this phonological task than with any other metalinguistic task. Finally, these findings support those found in research with children, which showed greater difficulties in phoneme segmentation abilities than other phonological abilities (i.e., word and syllable segmentation). The results suggest that phoneme segmentation abilities increase with reading level and perhaps other factors discussed earlier in chapter two (e.g., word acoustics and syllable structure).

These data also suggest that a change in specific phoneme segmentation abilities occurs across reading levels. These abilities are reflected in differences in the accurate segmentation of longer strings of phonemes. For example, the lowest and mid level readers demonstrate less difficulty with two and three phoneme words than four and five phoneme words; however, their segmentation abilities decrease dramatically once four and five phoneme words are given. In contrast, the phoneme segmentation abilities of the high level readers decrease significantly only with five phoneme words. Finally, the literate group had equal abilities for all of the test items.

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7.4 Well-formedness Judgments

Table 11 presents a comparison of the group and subtask means for the Well-formedness judgment task. Significant differences among the groups were revealed on the ANOVA, with main effects of group ($F(3,116) = 37.47$, $p < .001$) and task ($F(3,348) = 29.00$, $p < .05$) as well as a group X subtask interaction ($F(9,348) = 2.78$, $p < .001$).

The overall means indicate that the ability to make syntactic judgments increases significantly until a high level of reading is achieved. Notice that as with the word segmentation task, this task also revealed significant differences between the low level readers and all other groups. More specifically, the low level readers demonstrated significantly poorer judgment abilities of word-order, reflexive and tag-question sentences than did the other groups.

The overall subtask means reveal that the tag question and reflexive subtasks were significantly more difficult than the word-order and gap sentences. However, this pattern holds only partially true for each reading level group. For example, the lowest level readers did not demonstrate significant differences between their ability to judge word order and tag questions and the mid level readers did not have significantly different abilities at

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gap and tag sentences. The high level group only demonstrated significantly different abilities between word order and reflexives as well as between word order and tag sentences. Finally, the literate group judged word order and tag sentences significantly differently from one another as well as tag and gap sentences. Thus increasing literacy is related to overall and specific syntactic awarenesses.

In analyzing the well-formedness judgments we also evaluated the kinds of errors that each group made. More specifically, we assessed the distribution of erroneous 'yes' responses to an ill-formed sentence (henceforth, 'false positives') and the erroneous 'no' responses to a well-formed sentence (henceforth, 'false negatives'); this analysis was performed on each group across subtasks. The data show no reading level group used the same error pattern for all four subtasks. For example, the low level group gave more false positive responses than false negative responses on the word order (72 % vs. 28%)) and gap (83% vs. 17%) sentence types. However, they were basically split in error pattern for the reflexive (52% vs. 48%) and tag question (57% vs. 43%) sentences. Furthermore, we compared the kinds of errors that the low level and mid level readers made since they had significantly different means on three of the four tasks. The results indicate that in contrast to the low level readers, the mid level readers used each error type

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basically equally for each of the subtasks with the exception of the gap sentences: word order (53% vs. 47%), reflexives (48% vs. 52%), tag questions (49% vs. 51%), and gaps (31% vs. 69%). Thus, the different syntactic awarenesses among reading levels is correlated with differences in the ability to discriminate between the well and ill-formed versions of a sentence type.

7.5 Synonymy Judgments

The group and subtask means comparison results for the Synonymy judgments are indicated on Table 12. The two-way ANOVA for the synonymy task revealed a significant main effect for group ($F(3,116) = 29.01$ $p < .001$) and task ($F(3,348) = 8.13$, $p < .001$); however, no interaction between group and task was found ($F(9,348) = 1.33$. Therefore, the four reading level groups had the same pattern of responses for each subtask.

The overall subtask means showed significant differences between the active/passive and indirect-object switch sentences as well as the indirect-object switch and There sentences. The overall reading means demonstrate a significant increase in synonymy judgment abilities once high and literate level reading is achieved.

As with the well-formedness task, an item analysis of

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the types of errors was performed. The overall analysis revealed that for each task, the majority of the errors were false positives as opposed to false negatives (i.e., Active/passive= 66% vs. 34%, There sentences=80% vs. 20%, Indirect-Object Switch sentences= 63% vs. 37%, and Particle Movement sentences=71% vs. 29%). This pattern holds true for the low and mid level readers. However, the high level readers, who performed significantly differently from the low and mid level readers on the synonymy task, demonstrated a different pattern of error types. They responded with more false negatives on all of the subtasks with the exception of the There sentences subtask. These data again support the view that the differences in synonymy judgment abilities across reading levels may be due to changes in consciousness of specific aspects of sentential synonymy relations.

7.6 Phonotactics

The results of group and subtask means comparisons for the Phonotactic judgment subtasks are indicated in Table 13. A two-way ANOVA revealed a significant main effect for reading level ($F(3,116) = 24.55$, $p < .001$) and subtask ($F(3,348) = 38.65$, $p < .001$). Of greatest interest is the finding that there was no interaction of reading level and tasks ($F(3,348) = 1.76$). Hence, all of the reading groups had the same pattern of responses across the subtasks.

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As seen on Table 13, there are significant differences between the literate and high level readers' reading means and those of the other groups. More specifically, the phonotactic judgment abilities of the literate level group are significantly different from those of the other groups on two of the four syllable types. The data suggest that phonotactic judgment abilities increase as reading level increases; this progress parallels that of the phoneme segmentation task among others.

It is interesting to note that the overall subtask means for the CCCVC syllable was significantly higher than the other subtask means. Moreover, the low, mid and high level readers performed significantly better on the CCCVC judgment subtask than all the other subtasks. The literate group had significantly greater judgment abilities between the CCCVC syllable than the CCVC syllable. Since the CCCVC syllable shape is highly marked, it is possible that subjects judged it more easily than the other syllable shapes. An error analysis of the total number of false negatives responses given to each of the syllable shapes revealed that the subjects made the fewest amount of false negative errors on the CCCVC syllable than any other syllable shape: CCCVC = 45, CVCC = 108, CCVC = 140, CCVCC = 135. It is plausible that subjects were able to judge accurately the CCCVC syllable shape since they easily recognized the nonpermissible clusters in the syllable

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onset. The saliency of this highly marked syllable shape is intensified when produced with phonotactic violations.

7.7 Oral Comprehension

Table 14 presents the comparison of group and subtask means for the Comprehension subtasks. A two-way ANOVA indicates significant main effects for group ($F(3,116) = 15.00$, $p < .001$) and subtask ($F(3,348) = 3.36$, $p < .05$), as well as a group X subtask interaction ($F(9, 348) = 5.07$, $p < .001$). The hypothesis that oral language comprehension abilities are highly developed regardless of literacy was supported by the data, showing very high comprehension means for each group, which did not differ significantly. Given the high scores overall, it would be incorrect to conclude that any group has poorer oral comprehension scores than any other.

The overall subtask means indicate that the subjects' performance on the temporal complement task was significantly worse than on the other tasks. Moreover, the low level readers performed significantly differently on this subtask than on the simple declarative subtask while the mid level readers performed significantly differently on the temporal complement subtask than on the active/passive and simple declarative tasks. These data suggest that temporal complement structures are generally

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perceived as having subject control though some adults in this study apparently interpret them as being object controlled. Hsu, Cairns & Fiengo (1986) and Goodluck (1981) found that children go through a stage in which they choose the object of the main sentence to be the subject of the embedded sentence (i.e., object control).

8. Longitudinal Analysis

The second part of this study tested the hypothesis that those subjects with higher than average metalinguistic scores (at T1) would have greater gains in reading (at T2) than their below average peers. In addition, it tested the hypothesis that those subjects with greater reading gains (from T1 to T2) would also have greater metalinguistic gain. Of the 60 subjects tested at time one (September 1985), 30 were available for retesting at time two (March 1986); we readministered the reading tests and the metalinguistic battery to them at time two.

8.1 Subjects

As the reader may recall, the low level readers that were retested at T2 were not mentally retarded or severly learning disabled. Social issues appear to be the dominant reasons for lack of literacy. Nine subjects left school when they were children to work outside the home; seven

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subjects left school or had sporadic schooling as children because they had to help with the family. Some went to school two days a week and worked the remaining days. Nine subjects had gaps in their childhood schooling because of illnesses (meningitis, pneumonia, asthma, heart trouble, scarlet fever, rheumatic fever, polio and tuberculosis). Only two subjects stated they had special help with schooling in the form of special education classes. One was definitely mistracked as a child with retarded mental development (she was a mother of two children who had worked for fifteen years in a well paying job as a jeweler's assistant.)

Further evidence that these subjects are not severly learning disabled may be seen from their oral language comprehension scores. Subjects averaged a raw score of 21 (out of 24) on this task; the two "special education" subjects scored 22 and 24. Thus, the comprehension scores and the social issues described above support the view that these low level readers were not learning disabled.

8.2 Reading Gain

We tested the hypothesis that high metalinguistic abilities lead to higher than average reading gain by first calculating the mean metalinguistic score at T1 and then dividing the subjects into two groups: (1) High MLA -

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those above the overall mean metalinguistic score at T1 (N=16) and (2) Low MLA - those below the overall mean metalinguistic score at T2 (N=14). Table 15 reveals the results of a T-test on the significant differences between these two groups for each metalinguistic task; levels of significance and task means are indicated. The results show that with the exception of the Phonotactics task, the groups demonstrated significantly different specific metalinguistic abilities; the difference in phonotactic abilities between the two groups was near significance. As can be seen on Table 16, a comparison of these two groups show that 95% of those subjects with higher than average T1 MLA improved in reading whereas only 65% of those with lower than average MLA improved in reading. Thus, our hypothesis is supported.

In order to control tightly for initial reading level as a factor relating to T1 MLA, we redivided the subjects into three groups of readers: (1) high readers - those who had the top 1/3 reading scores at T1 (N=10); (2) mid readers - those who had the middle range reading scores (N=10); and (3) low readers - those who had the low 1/3 reading scores (N=10). We then divided each group of readers into two subgroups: those with high and low metalinguistic skills (i.e., those above and below the mean).

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Table 16 reveals that in the low reading group, 100% of the people with high metalinguistic skills improved in reading whereas only 71% of those people with low metalinguistic skills improved in reading. The mid group revealed a reverse pattern. Slightly more of the the subjects with low metalinguistic abilities improved in reading than the subjects with high MLA. Finally, the high level readers again showed that more of the subjects with better metalinguistic skills improved in reading than their peers with poor metalinguistic skills. These results combined with the overall analysis demonstrate a positive trend in reading improvement as dependent on initial metalinguistic abilities.

Since these data suggest that metalinguistic skills enhance reading achievement, we may now ask whether the reading gain of those subjects with high metalinguistic abilities was significantly greater than those with low metalinguistic abilities. Table 17 represents the results of a T-test which analyzed this question; the overall average reading improvement for those subjects with high metalinguistic abilities was 3.7% whereas those subjects with low metalinguistic abilities only demonstrated a .7% improvement rate. It is important to note that the initial reading scores of those groups were not significantly different (see Table 18.) Thus we can conclude that more of the subjects with high metalinguistic abilities

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improved in reading and they improved more than those with low metalinguistic abilities.

8.3 Metalinguistic Gain

In order to evaluate the hypothesis that reading gain is associated with an increase in metalinguistic abilities, we first used a T-test to calculate significant differences between the T1 and T2 metalinguistic task scores. Table 19 presents the results of the T-test with levels of significance along with the mean T1 and T2 scores for each task and the total language battery.

The results show a significant total metalinguistic awareness change. In addition, if we compare the results of the longitudinal change of metalinguistic skills with the reading level-language awareness correlational portion of this study (discussed earlier and summarized in Table 1), we see that with the exception of the phonotactics task, there is a one to one correspondence between those skills which improved significantly in six months and those which showed a significant difference between low level readers and mid level readers. For example, it is not surprising that there is a nonsignificant gain in phoneme segmentation abilities in six months since we have found earlier that a significant increase in this ability does not occur until a person has much higher literacy

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skills. We therefore see a general development of metalinguistic skills after six months as well as the development of specific language awareness skills.

Given the fact that subjects improved in MLA after six months of instruction, we tested the hypothesis that those subjects with high reading improvement scores (HRI) would also improve more in metalinguistic development than those with low reading improvement scores (LRI). The HRI and LRI groups were defined as those who scored above or below the mean reading improvement score.

A calculation of the mean metalinguistic gain of the two groups indicates a difference in means; the HRI group gained 10.30 points in metalinguistic development whereas the LRI group gained 7.88 points. However, as may be seen in Table 20, the results of a one-tailed T-test indicates that there is no significant differerce between the two groups in overall metalinguistic gain.[1]

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NOTES

[1] These results may be statistically deceiving. It was hypothesized that any unusual outlying scores may have produced an inaccurate T-test score. Scores ranged from -8 to +25. Thus, we performed a univariate analysis in order to check for normal range and distribution of the metalinguistic scores. In essence, it tested the hypothesis that the scores are a random sample from a normal population. The results indicate that these scores are not evenly distributed ($T = .97$, $p < .696$). Perhaps, research with a larger population sample would close in the gaps in the range and provide a more accurate analysis.

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Chapter Five

Conclusions

1. Hypotheses Reviewed

Four major hypotheses were presented in Chapter two. The first stated that there is a correlation between reading ability and both specific and general metalinguistic awarenesses. The second and third hypotheses addressed the priority of the relationships between metalinguistic awareness and reading. The second hypothesis was that metalinguistic awareness enhances reading achievement. The third hypothesis was that reading achievement enhances metalinguistic awareness. Finally, the fourth hypothesis stated that there are hierarchical relationships among phonological awareness skills. These hypotheses were tested through the administration of a series of seven language skill tasks and three reading tests to low, mid, and high reading ability, as well as to a fully literate group.

The first hypothesis was supported in a variety of ways. Statistical analyses confirmed that each reading group has significantly different overall language abilities. Thus higher MLA scores are correlated to higher reading level scores. Furthermore, the significant

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interaction of the group and task main effects revealed differential patterns of responses across the seven tasks for the reading groups. Thus, each reading group differed from the others (in terms of language awareness abilities) in a different way. In addition, we found that each reading group has significantly different responses to the subtasks within each task. The correlation analyses revealed that the individual metalinguistic tasks as well as the subparts of the reading tasks covary. Furthermore, the correlation analyses demonstrated that the MLA tasks and the reading tests covary with one another. Thus, it is clear that reading ability is not only correlated with general MLA abilities, but in addition, specific language awarenesses and subcategories within them.

It is important to note that these results only demonstrate a positive relationship between metalinguistic awareness and reading. We still do not know if these relationships may be attributed to MLA abilities enhancing reading (and thus promoting literacy achievement) or whether reading promotes MLA growth. Thus, hypothesis two and three attempt to address this priority issue.

Hypothesis two was also supported. More of the subjects with better MLA abilities at the beginning of the testing period achieved reading gains at the end of the testing period than the subjects who demonstrated lower

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than average metalinguistic abilities at the beginning of the testing period. As the reader may recall, we controlled for initial reading level.

Equally important, we found that metalinguistic ability also enhances the degree of reading gain. Those subjects with above average metalinguistic abilities at the beginning of the testing period subsequently achieved greater reading gains than those with below average language skills. These results suggest that reading achievement is underlain by language awareness skills.

It should be noted that despite that fact that we have shown that metalinguistic awareness enhances reading achievement, we do not have firm confirmation of a causal relationship. As suggested by Liberman & Shankweiler (1985:11), "it is possible, in principle at least, that the measured relationship [between MLA and reading] occurred because both abilities are highly correlated with a third ability and that this unidentified third ability is the controlling factor."

As the reader may recall, hypothesis three was tested in order to investigate whether MLA gain is related to reading achievement. The results of the longitudinal study did not support this hypothesis entirely. Subjects demonstrated a positive relationship between reading and

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MLA gain after six months of instruction. More specifically, they demonstrated significant increases in their awareness of word segmentation, syllable segmentation, well-formedness judgments and phonotactic judgments. However, statistical procedures did not reveal a significant difference in metalinguistic awareness gain between those subjects who achieved above average reading gain and those with below average reading gain. Thus, we cannot conclude from this portion of this study that there is a direct relationship between amount of reading gain and amount of increased metalinguistic awareness. Future research on this relationship is therefore needed. Thus, given these results, the question of whether MLA and reading share a causal relationship remains unanswered. One direction of the relationship has been shown, yet the other is still questionable.

Finally, hypothesis four was clearly supported by the overall and group analyses comparing the means of the phonological tasks. The adults in this study demonstrated the same hierarchy of difficulty for word, syllable, and phoneme segmentation as the children that participated in studies reviewed in Chapter two. Moreover, we have shown the hierarchical relationship between phoneme segmentation abilities and phonotactic judgment abilities.

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2. Awareness Despite Literacy : Suggestions For MLA Training

The results of this study also suggest answers to the question of whether adults acquire language awareness despite non-literacy. If we review the overall task and subtask means for the lowest level readers we will note strikingly high means. For example, it was not the case that these readers demonstrated no or very little proficiency at any one task. On the contrary, with the exception of the phoneme segmentation task (which was difficult for all reading groups), the task means ranged from 15.6-20.8.

The low scores on the phonological task is consistent with the findings of Morais, Cary, Alegria and Bertelson (1979), who researched the degree of phonemic awareness among nonliterate adults. As the reader may recall, they concluded that phonemic awareness does not arise spontaneously without literacy. The present study supports their conclusion but also maintains that other language awarenesses are developed regardless of lack of literacy (i.e., word segmentation, well-formedness and synonymy judgment abilities). Therefore, it should be stressed that we cannot conclude from a phonemic awareness task alone that language awareness does not develop in the absence of literacy skills. We contend that certain awarenesses

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develop spontaneously without the knowledge of literacy and others change significantly with literacy instruction.

These findings suggest that metalinguistic training of certain skills will help promote reading achievement. Researchers have already demonstrated with children that language awareness training is a viable reading readiness activity (Williams (1980); Olofsson & Lundberg (1983); Bradley & Bryant (1983)). Since we have found that given a limited knowledge of literacy (mid level reading abilities), certain language skills become significantly more developed (i.e., word segmentation, syllable segmentation and well-formedness), it is suggested that those language awarenesses be practiced in the literacy classroom.

3. Final Conclusions : Future Research

In conclusion, this research has demonstrated the specific phonological and syntactic metalinguistic abilities of adults ranging in reading level from non- to complete literacy. Correlations have been found among many of the MLA skills and reading level. Furthermore, the data are also suggestive of the causal relationships between MLA and reading.

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It is suggested that three issues be addressed by future research. First, as argued above, it is important for theoretical and pedagogical reasons that research be performed on other language awareness abilities (e.g., words containing longer strings of syllables or well-formedness of negated sentences). We have shown that research on the relationship between MLA and reading achievement is most revealing when specific awarenesses are analyzed.

Second, future research should review the effects of specific modes of reading instruction on language awareness. Since this study concentrated on subjects who were learning literacy through an instructional program that included phonics instruction, it would be important to see if parallel results would be found with subjects learning literacy exclusively with a whole-word approach. For example, would such subjects have less development in syllable segmentation abilities since their reading activities do not include these types of reading-metalinguistic activities?

Third, in order to best explore the causality issue of MLA and reading, it is suggested that a combination longitudinal and training study (i.e., Bradley & Bryant (1983)) on a battery of language awareness skills be undertaken. This type of study would also address the

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question of which language awarenesses are acquired spontaneously without literacy. The results of this type of study will certainly have pedogogical implications that could help future adult literacy students acquire basic language awareness and literacy skills.

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TABLES

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Table 1

Language Tasks by Reading Level:

Mean Number Correct and Standard Deviations

(Maximum Score=24)

Task:	Low level		Mid level		High level		Lit. level	Task means
word segmentation	18.0	*	21.2	*	23.3		23.8	21.6
	3.0		3.0		1.0		.4	
	*		*		*			*
syllable segmentation	15.6	*	18.7	*	21.1	*	23.4	19.7
	3.6		4.5		2.4		1.0	
					*		*	*
phonotactic judgments	16.5		17.0	*	18.7	*	21.3	18.4
	2.5		2.4		2.8		1.5	
	*		*		*		*	*
phoneme segmentation	8.2		9.7		11.1	*	18.7	12.0
	3.0		3.2		3.3		2.4	
well-formedness judgments	18.2	*	20.5	*	22.1		23.3	21.0
	2.8		2.2		1.6		1.0	
synonymy judgments	19.4		19.5	*	22.5		23.7	21.3
	3.0		2.8		1.3		.5	
comprehension	20.8		21.5		22.7		23.7	22.2
	2.6		2.0		1.5		.7	
Reading Means	16.48	*	18.01	*	20.21	*	22.60	

*$p < .05$

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Table 2

One-way Analysis of Variance

Effect of Level for each Task

Task	Analysis
Word segmentation	$F(3,116) = 44.26$***
Syllable segmentation	$F(3,116) = 33.55$***
Phoneme segmentation	$F(3,116) = 75.95$***
Well-formedness judgments	$F(3,116) = 36.26$***
Synonymy judgments	$F(3,116) = 30.84$***
Comprehension	$F(3,116) = 14.19$***
Phonotactic judgments	$F(3,116) = 25.04$***

***$p < .001$

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Table 3

One-way Analysis of Variance

Effect of Tasks at each Reading Level

Group	Analysis
Level 1	$F(35,174) = 88.01$***
Level 2	$F(35,174) = 58.92$***
Level 3	$F(35,174) = 138.39$***
Level 4	$F(35,174) = 73.39$***

***$p < .001$

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Table 4

Proportionalized Reading Scores by Level

Low Level

WRAT 1	WRAT 2	TABE Lexical	TABE Phrase	TABE Comp	TOTAL READING
.40	.23	.66	.16	.38	.35

Mid Level

WRAT 1	WRAT 2	TABE Phrase	TABE Comp	TOTAL READING
.58	.32	.49	.51	.47

High Level

WRAT 1	WRAT 2	TABE Phrase	TABE Comp	TOTAL READING
.81	.59	.60	.61	.67

Literate Level

WRAT 1	WRAT 2	TOTAL READING
.97	.94	.96

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Table 5

Correlation of Reading Subtests

TEST	TEST	r
Wrat-1	Wrat-2	.89***
Wrat-1	Lexical-TABE	-.65***
Wrat-1	Phrase-TABE	.80***
Wrat-1	Comp-TABE	.59***
Wrat-2	Lexical-TABE	-.50***
Wrat-2	Phrase-TABE	.67***
Wrat-2	Comp-TABE	.46***
Lexical-TABE	Phrase-TABE	-.72***
Lexical-TABE	Comp-TABE	-.39***
Phrase-TABE	Comp-TABE	.66***

***$p < .001$

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Table 6

Correlation of Language Tasks

TASK	TASK	r
word	syllable	.61***
word	phoneme	.45***
word	well-formedness	.59***
word	synonymy	.45***
word	comprehension	.42***
word	phonotactics	.50***
syllable	phoneme	.57***
syllable	well-formedness	.50***
syllable	synonymy	.51***
syllable	comprehension	.50***
syllable	phonotactics	.45***
phoneme	well-formedness	.54***
phoneme	synonymy	.50***
phoneme	comprehension	.47***
phoneme	phonotactics	.59***
well-formedness	synonymy	.66***
well-formedness	comprehension	.57***
well-formedness	phonotactics	.47***
synonymy	comprehension	.55***
synonymy	phonotactics	.50***
comprehension	phonotactics	.45***

***$p < .001$

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Table 7

Correlation of Reading Tests to Language Tasks

Reading Test	MLA Test	r
Wrat-1	word	.59***
Wrat-1	syllable	.49***
Wrat-1	phoneme	.40***
Wrat-1	well-formedness	.46***
Wrat-1	synonymy	.38***
Wrat-1	comprehension	.31***
Wrat-1	phonotactics	.32***
Wrat-2	word	.48***
Wrat-2	syllable	.41***
Wrat-2	phoneme	.39***
Wrat-2	well-formedness	.34***
Wrat-2	synonymy	.38***
Wrat-2	comprehension	.25***
Wrat-2	phonotactics	.28***
Lexical-TABE	word	-.54***
Lexical-TABE	syllable	-.44***
Lexical-TABE	phoneme	-.25***
Lexical-TABE	well-formedness	-.49***
Lexical-TABE	synonymy	-.21***
Lexical-TABE	comprehension	-.23***
Lexical-TABE	phonotactics	-.19***
Phrasal-TABE	word	.58***
Phrasal-TABE	syllable	.44***
Phrasal-TABE	phoneme	.32***
Phrasal-TABE	well-formedness	.45***
Phrasal-TABE	synonymy	.34***
Phrasal-TABE	comprehension	.37***
Phrasal-TABE	phonotactics	.27***
Comp-TABE	word	.46***
Comp-TABE	syllable	.40***
Comp-TABE	phoneme	.17***
Comp-TABE	well-formedness	.47***
Comp-TABE	synonymy	.45***
Comp-TABE	comprehension	.36***
Comp-TABE	phonotactics	.29***
Total-reading	word	.57***
Total-reading	syllable	.47***
Total-reading	phoneme	.39***
Total-reading	well-formedness	.44***
Total-reading	synonymy	.43***
Total-reading	comprehension	.34***
Total-reading	phonotactics	.33***

***$p < .001$

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Table 8

Word Segmentation Subtasks

Group and Subtask Means Comparison

(Maximum Score = 6)

Task	Low level	Mid level	High level	Literate level	Subtask Means
2 word sentence	5.07	* 5.57	5.73	5.93	5.58
3 word sentence	5.07	* 5.53	5.90	6.00	5.63
	*				*
4 word sentence	3.60	* 5.06	* 5.83	5.90	5.10
5 word sentence	4.33	5.00	* 5.87	5.97	5.29
Reading means	4.52	* 5.29	* 5.83	5.95	5.40

*$p < .05$

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Table 9

Syllable Segmentation Subtasks

Group and Subtask Means Comparison

(Maximum Score = 6)

Task	Low level		Mid level		High level		Literate level	Subtask Means
1 syll. word	4.30		4.13		4.67		5.77	4.71
			*		*			*
2 syll. word	5.20		5.60		5.60		5.97	5.59
								*
3 syll. word	4.10		4.83	*	5.80		5.90	5.16
	*				*			*
4 syll. word	2.00	*	4.13		5.03		5.80	4.24
Reading Means	3.90	*	4.68	*	5.28	*	5.86	4.93

*$p < .05$

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Table 10

Phoneme Segmentation Subtasks

Group and Subtask Mean Comparisons

(Maximum Score = 6)

Task	Low level	Mid level	High level	Literate level	Subtask Means
2 phon. word	3.07	3.10	3.17	* 4.77	3.53
3 phon. word	3.00	3.63	3.70	* 4.93	3.82
	*	*			*
4 phon. word	1.67	1.73	* 2.83	* 4.90	2.78
	*		*		*
5 phon. word	0.53	1.23	1.43	* 4.13	1.83
Reading Means	2.07	2.43	2.78	* 4.68	2.99

*p < .05

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Table 11

Well-formedness Judgments Subtasks

Group and Subtask Means Comparison

(Maximum Score = 6)

Task	Low level		Mid level		High level	Literate level	Subtask Means
Gaps	5.17		5.50		5.63	5.93	5.56
Word Order	4.80	*	5.43		5.87	5.97	5.52
					*	*	*
Tags	4.20	*	4.87		5.37	5.60	5.00
Reflexives	3.97	*	4.70		5.20	5.80	4.92
Reading Means	4.53	*	5.13	*	5.52	5.83	5.25

*$p < .05$

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Table 12

Synonymy Judgments Subtasks

Group and Subtask Means Comparison

(Maximum Score = 6)

Task	Low level	Mid level	High level	Literate level	Subtask Means
Indirect object switch	5.03	5.47	5.80	6.00	5.58
Particle movement	4.83	5.00	* 5.83	5.97	5.40
There sent.	4.83	4.67	* 5.43	5.90	5.20
Active/ passives	4.67	4.87	5.40	5.83	5.19
Reading Means	4.84	5.00	* 5.62	5.93	5.35

*p < .05

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Table 13

Phonotactic Judgments Subtasks

Group and Subtask Means Comparison

(Maximum = 6)

Task	Low level	Mid level	High level	Literate level	Subtask Means
CCCVC syll.	5.03	5.17	5.40	5.73	5.33
	*	*	*		*
CVCC syll.	4.00	4.13	4.50	* 5.27	4.48
CCVCC syll.	4.03	4.00	4.30	* 5.40	4.43
CCVC syll.	3.43	3.67	* 4.50	4.90	4.13
Reading Means	4.13	4.24	* 4.68	* 5.33	4.59

*$p < .05$

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Table 14

Oral Comprehension Subtasks

Group and Subtask Means Comparison

(Maximum Score = 6)

Task	Low level	Mid level	High level	Literate level	Subtask Means
Simple declar-atives	5.47	5.53	5.83	5.90	5.68
Active/ passives	5.37	5.53	5.80	6.00	5.68
Relative clauses	5.13	5.50	5.63	5.97	5.56
Temp-oral compl.	4.87	4.87	5.40	5.83	5.23*
Reading Means	5.20	5.36	5.67	5.93	5.54

*p < .05

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Table 15

Metalinguistic Task Means Comparison:

Subjects with High and Low

Metalinguistic Awareness

Task	Subjects with High MLA	Subjects with Low MLA	T
word	19.06	16.86	2.15*
syllable	17.13	13.86	2.74*
phoneme	9.69	6.64	3.59*
well-formedness	19.63	16.57	3.50*
synonymy	21.13	17.36	4.27*
phonotactics	17.63	15.79	1.97

*$p < .05$

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Table 16

Reading Improvement of Lowest Level Readers

Overall and by Subgroups

Overall

MLA Group	Number of Subjects	% Improved
Subjects with High MLA	N = 16	95%
Subjects with Low MLA	N = 14	65%

Subgroups

Reading Group	MLA Group	Improved In Reading	% Improved
Low Readers	Hi (N = 3)	N = 3	100%
	Low (N = 7)	N = 5	71%
Mid Readers	Hi (N = 7)	N = 6	86%
	Low (N = 3)	N = 3	100%
High Readers	Hi (N = 6)	N = 6	100%
	Low (N = 4)	N = 1	25%

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Table 17

Improved Reading Scores

Means and Standard Deviations

Group	#	Mean	SD	t-test
Subjects with High MLA	N=16	.037	.038	2.07*
Subjects with Low MLA	N=14	.007	.040	

t-test (1 Tailed) : * $p < .05$

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Table 18

Initial Reading Scores

Means and Standard Deviations

Group	#	Mean	SD	t-test
Subjects with High MLA	N=16	.376	.086	
				1.93
Subjects with Low MLA	N=14	.341	.094	

t-test (1 Tailed) : p = .299

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Table 19

Metalinguistic Change of Low Level Readers

Means and T-tests

Task	Time 1 Mean	Time 2 Mean	Mean Differ-erences	T
word	18.03	19.66	1.63	2.52*
syllable	15.06	18.63	3.03	5.36***
phoneme	8.26	8.76	.50	.75
well-formedness	18.20	20.16	2.03	4.64***
synonymy	19.36	19.90	.53	1.05
comprehen-sion	20.80	21.26	.47	1.01
phonotac-tics	16.50	18.86	2.37	4.23***
Total Battery	116.93	125.76	8.93	8.93***

*p < .05
***p < .001

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Table 20

Overall Metalinguistic Gain by Subjects with

High and Low Reading Improvement

Low Level Readers

Means, Standard Deviations, and T-test Analysis

Group	#	Mean	SD	t-test
Subjects with High Reading Improvement	N=13	10.31	9.59	
				.75
Subjects with Low Reading Improvement	N=17	7.88	8.13	

t-test (1 Tailed) : p = .459

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APPENDICES

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Appendix A

Student Interview - C. Greenberg

1) Student name: ______________________

   Teacher: ______________________

   Class/site: ______________________

   Age: ______________________

   Sex: ______________________

   Other Languages: ______________________

2) What schools did you attend?

3) Did you ever have gaps in your schooling? From when to when?

4) Have you even had extra help with your schooling?

5) What was your last grade of school?

6) Is this your first time learning to read?

7) What do you think was the cause of your reading difficulties?

8) Did you ever have an illness which kept you from going to school? How long did it last?

9) Did you ever stay out of school for a long period of time? If yes, why?

10) What kinds of jobs have you had?

11) What are your strengths and weaknesses?

12) What are your goals?

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Appendix B

Word Segmentation Directions

You will hear 24 sentences on the following tape. Listen for the number of words in each sentence. Each sentence will be said twice to help you decide how many words there are in the sentence. Once you decide, put one dot for each word in each circle. So, if there are two words put two dots in the first two circles, one dot in the first circle and one in the second circle. If there are five words, put five dots in the first five circles. Now let's do twelve practice sentences.

1. John is very tall.
2. She left.
3. I love you.
4. The man is funny.
5. I like to eat pizza.
6. He is fat.
7. John is a teacher.
8. John fell.
9. Houses in Queens are expensive.
10. I love cats.
11. Go away.
12. Mary wants a new coat.

Now that we've practiced, let's do the main sentences.Ready?

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Appendix C

Word Segmentation

1. Flowers are nice.
2. I like to eat chili.
3. Dogs can be dangerous.
4. Have some.
5. My mother works at Macy's.
6. Throw it away.
7. Mary woke up Bill.
8. John cried.
9. Mary saw Bill.
10. Cold water is refreshing.
11. Mary died.
12. The coat was very old.
13. The big dog died.
14. Sally loves dogs.
15. Run away.
16. The big, old cat slept.
17. The cat ran away.
18. Close it.
19. She is pretty.
20. Mike watched the children play.
21. Plants grow.
22. Throw the garbage out.
23. The horse ran.
24. Send Frank to the doctor.

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Appendix D

Syllable Segmentation Directions

This time you're going to hear 24 words and listen for how many parts there are in a word. These parts are sometimes called syllables. Each word will be said twice to help you make a decision. You will decide how many parts there are in the word and then put that many dots in the circles. If there are two parts, you put one dot in the first circle and one dot in the second circle. Some of the words you are going to hear are not real English words. But you will be able to listen to them and hear how many parts they have. Listen to the rhythm of the words; it will help you count the parts. Let's do some practice words:

1. tell
2. [faylIk]
3. butter
4. [zɚnIpælIk]
5. [mɔrk]
6. telling
7. [šInpuwknIš]
8. but
9. lollipop
10. [šInpuwk]

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11. manipulate

12. [kruwt]

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Appendix E

Syllable Segmentation

1. str ɔ g
2. rǽd ək
3. y̌ ə̆klɛ́ n ə̆ p ə̆
4. p ə̆tǽlə̆
5. d ɔ́f ə̆ l ə̆ bæ̀š
6. fɪ́lbə̀ rn
7. č ə̆ zúwlə
8. f æsk
9. blówf ə̆ m ə̆
10. r ə̆túwp
11. kr ɛ č
12. k ə̆mpǽt ə̆rèyn
13. rúwf ə̆ nt
14. b ə̆ l ə̆šúp
15. sl ə̆ p ɛ́ n ə̆ k ə̆
16. t ə̆bǽndò
17. zad
18. fìybǽl ə̆ šæ̀k
19. f ə̆ léyn
20. θæz
21. græ̀féŋk ə̆
22. mæ̀f ə̆ sówm ə̆
23. blɪt
24. bæ̀šíyn

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Appendix F

Phoneme Segmentation Directions

On this tape you will again hear 24 words that are not in English. This time you should listen for and count the number of small parts or individual sounds in each word. Put one dot in each circle for each sound. So if there are three sounds, put one dot in the first circle, one dot in the second circle, and one dot in the third circle. Let's try 12 practice words. For this practice some will be English words and some will be made up words. Listen and count the number of sounds. Ready?

1. bat
2. stick
3. [friš]
4. of
5. [fim]
6. split
7. [sprIn]
8. tall
9. [ʤʊp]
10. flap
11. [tɛp]
12. [slʌp]

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Appendix G

Phoneme Segmentation

1. bIv
2. ɛš
3. spræč
4. grəs
5. čɔf
6. æf
7. smɔn
8. skrIl
9. tUz
10. Ip
11. blɛf
12. strɔč
13. Ut
14. θæg
15. spUs
16. spləǯ
17. ɔš
18. stæs
19. ləs
20. sprɛt
21. ʌf
22. prIθ
23. kɛz
24. skrUǰ

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Appendix H

Well-Formedness Directions

On this tape you will hear 24 sentences. Some of these sentences may be said to be right but some may be said to be wrong. The wrong sentences may sound silly. You should listen to the sentences and decide if they're right or wrong. If it's right, circle the smiling face; if it's wrong, circle the sad face. Let's try eight examples:

1. The woman walked to the store.
2. *David is fat, isn't she?
3. The man was scratching himself.
4. The boy ate the sandwich.
5. *After running ten blocks, Mary listened to himself breathe.
6. She is funny, isn't she?
7. *Book the old is.
8. *She lifted.

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Appendix I

Well-Formedness

1. Mary made the cake for John.
2. *Susan is fat, isn't he?
3. *John loved the dress that I made it.
4. Jack saw the cat washing itself.
5. *The is big house.
6. John ate the bread that I baked.
7. *The man said that Mary hates himself.
8. The city could be cleaner, couldn't it?
9. *The house is in the woods pretty.
10. *The boy dressed themselves.
11. The man fell down, didn't he?
12. *The boy threw.
13. She will eat at six o'clock.
14. The crazy man talks to himself.
15. *Who did you think would invite?
16. He came to my house at six o'clock.
17. *The weather was awful yesterday, didn't it?
18. The father thinks that his daughter cries herself to sleep every night.
19. *The car the ball ran over.
20. *The two girls seemed to like the beach, did they?
21. Frank was expected to get the job.
22. Her shoes got all wet.

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23. *The mother did not want the son to drive herself to the store.
24. Firemen should be careful of fire and smoke, shouldn't they?

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Appendix J

Synonymy Directions

This tape contains 24 pairs of sentences. I would like you to listen to each pair of sentences and tell me if they mean the same thing. Just think about what's happening in the first sentence and see if the same thing is happening in the second sentence. Each pair will be repeated twice to help you decide. If you think they mean the same thing then circle the smiling face. If they do not mean the same thing circle the sad face. Let's try eight practice pairs.

1. John loved Sally.
   Sally was loved by John.
2. The dog picked up the bone.
   The dog picked the bone up.
3. The man put out the garbage.
   *The man put out the cat.
4. There is a book on the desk.
   The desk has a book on it.
5. Mary gave the book to John.
   *Mary gave the bag to John.
6. Joan smiled at the boy.
   *The boy smiled at Joan.
7. Jack gave the pen to Mary.

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Jack gave Mary the pen.

8. There is a bat on the floor.

*There is a a book on the floor.

Now that we've practiced, let's listen to the main sentences. Ready?

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Appendix K

Synonymy

1. The cold man put on his sweater.

   The cold man put his sweater on.

2. There was a cat on the roof.

   *There was a cat on the rug.

3. Sally wished a Merry Christmas to Bob.

   Sally wished Bob a Merry Christmas.

4. The girl kissed the boy.

   The boy was kissed by the girl.

5. The man brought in the cat.

   *The man brought out the cat.

6. John gave Sally a present.

   *Sally gave John a present.

7. There was an apple on the table.

   The table had an apple on it.

8. The car ran over the squirrel.

   The car ran the squirrel over.

9. John gave the book to Mary.

   *John gave the newspaper to Mary.

10. There are many coats in the closet.

    The closet has many coats in it.

11. Jack persuaded John to stop drinking.

    *Jack persuaded John to stop driving.

12. The hungry man ate up the food.

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The hungry man ate the food up.

13. The man mailed a letter to the woman.

    *The woman mailed a letter to the man.

14. There was a cat on a blanket.

    *A cat had a blanket on it.

15. The cat licked the kitten.

    The kitten was licked by the cat.

16. The teacher asked a question to the class.

    The teacher asked the class a question.

17. There is a book under the newspaper.

    *There is a newspaper under the book.

18. John saw Mary.

    Mary was seen by John.

19. The mother woke up the child.

    *The child woke up the mother.

20. The man hailed a cab for the woman.

    The man hailed a woman a cab.

21. The priest greeted the nuns.

    *The priest was greeted by the nuns.

22. John looked up the street.

    *John walked up the street.

23. There is a big hole in his sock.

    His sock has a big hole in it.

24. The chef prepared a dinner for the President.

    *The chef prepared a dinner for the people.

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Appendix L

Comprehension Directions

This time you will hear 24 sentences each followed by a question about the sentence. You are to circle the picture on the answer sheet which best represents the answer to the question. Let's try some practice sentences.

1. The boy telephoned the girl after watching the movie.
   Who watched the movie? The boy, the girl
2. The man was killed by the woman.
   Who got killed? The man, the woman
3. The boy who the girl loved moved away.
   Who moved away? The boy, the girl
4. The girl pushed the boy into the pool.
   Who was pushed? The girl, the boy
5. The judge was questioned by the reporters.
   Who was questioned? The judge, the reporters
6. Jack talked to Mary before going to the movies.
   Who went to the movies? Jack, Mary
7. The boy helped the woman cross the street.
   Who was helped? The boy, the woman
8. John greeted the woman who arrived from Africa.

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Who arrived from Africa? John, the woman

Now that we've practiced, let's listen to the main sentences. Ready?

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Appendix M

Comprehension

1. The boy kissed the girl on the cheek.

   Who got kissed?

   The boy, the girl

2. The cat pushed the kitten in order to eat the food.

   Who ate the food?

   The cat, the kitten

3. The cat who the dog chased jumped over the fence.

   Who got chased?

   The cat, the dog

4. The beautiful woman smiled at the young man.

   Who smiled at someone?

   The woman, the young man

5. The man smiled at the woman who entered the elevator.

   Who entered the elevator?

   The man, the woman

6. The girl kissed the boy before leaving the car.

   Who left the car?

   The girl, the boy

7. The bird was bitten by the squirrel.

   Who got bitten?

   The bird, the squirrel

8. The little boy really loves his mother dearly.

   Who is loved?

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The boy, the mother

9. The boy was kissed by the girl.

   Who got kissed?

   The boy, the girl

10. The cow kicked the pig after jumping over the fence.

    Who jumped over the fence?

    The cow, the pig

11. The little monkey quickly jumped on the tiger.

    Who jumped on something?

    The monkey, the tiger

12. The kitten was licked by the cat.

    Who got licked?

    The kitten, the cat

13. The horse that the cow kicked ran away.

    Who got kicked?

    The horse, the cow

14. The little mean boy hit the pretty girl.

    Who hit someone?

    The boy, the girl

15. The woman saw the man who ran down the street.

    Who ran down the street?

    The woman, the man

16. John winked at Sally while eating the ice cream.

    Who was eating?

    John, Sally

17. The dog was scared by the cat.

    Who got scared?

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The dog, the cat

18. The man saw the woman when leaving the movie theater.

    Who was leaving?

    The man, the woman

19. The nuns were greeted by the priest.

    Who got greeted?

    The nuns, the priest

20. The bird that the squirel bit flew away.

    Who got bit?

    The bird, the squirrel

21. Frank danced with Mary until feeling tired.

    Who got tired?

    Frank, Mary

22. The bird chased the squirrel on the rooftop.

    Who got chased?

    The bird, the squirrel

23. Sally talked with Bob who smokes a lot.

    Who smokes a lot?

    Sally, Bob

24. The woman was given a present by the man.

    Who got a present?

    The woman, the man

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Appendix N

Phonotactic Directions

This time you will not listen and count parts of words. I will again give you words that are not in English. Suppose we decided we wanted to add some new words to the English language. Which words would be good and which would not be good English words? If you think a word could be an English word, then circle the smiling face. If a word sounds like it could not be an English word, then circle the sad face. Let's try 12 examples.

1. splIk
2. bok
3. snbIk
4. bat
5. dlIp
6. ron
7. fzIkt
8. sknlebǰ
9. krad
10. lɛfp
11. hIš
12. rIzv

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Okay, now that we've practiced, let's listen to the main words. Are you ready?

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Appendix O

Phonotactic Judgments

1. blIk
2. tarm
3. psIk
4. šbzæf
5. spɛlk
6. mItk
7. splIk
8. kəlb
9. skæfč
10. slad
11. blnog
12. spIšv
13. strop
14. sɛšg
15. grəs
16. prIsk
17. skčɛv
18. bɛlf
19. stUbǰ
20. tkal
21. skrat
22. kɛsf
23. blənd
24. dlɛk

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Appendix P

Practice - Word, Syllable and Phoneme Segmentation Task

1. 0 0 0 0 0 0 0

---

2. 0 0 0 0 0 0 0

---

3. 0 0 0 0 0 0 0

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4. 0 0 0 0 0 0 0

---

5. 0 0 0 0 0 0 0

---

6. 0 0 0 0 0 0 0

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Appendix P

Practice - Word, Syllable and Phoneme
Segmentation Task

7. 0 0 0 0 0 0 0

---

8. 0 0 0 0 0 0 0

---

9. 0 0 0 0 0 0 0

---

10. 0 0 0 0 0 0 0

---

11. 0 0 0 0 0 0 0

---

12. 0 0 0 0 0 0 0

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1. 0 0 0 0 0 0 0

---

2. 0 0 0 0 0 0 0

---

3. 0 0 0 0 0 0 0

---

4. 0 0 0 0 0 0 0

---

5. 0 0 0 0 0 0 0

---

6. 0 0 0 0 0 0 0

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7. 0 0 0 0 0 0 0

---

8. 0 0 0 0 0 0 0

---

9. 0 0 0 0 0 0 0

---

10. 0 0 0 0 0 0 0

---

11. 0 0 0 0 0 0 0

---

12. 0 0 0 0 0 0 0

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13. 0 0 0 0 0 0 0

---

14. 0 0 0 0 0 0 0

---

15. 0 0 0 0 0 0 0

---

16. 0 0 0 0 0 0 0

---

17. 0 0 0 0 0 0 0

---

18. 0 0 0 0 0 0 0

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19. 0 0 0 0 0 0 0

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20. 0 0 0 0 0 0 0

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21. 0 0 0 0 0 0 0

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22. 0 0 0 0 0 0 0

---

23. 0 0 0 0 0 0 0

---

24. 0 0 0 0 0 0 0

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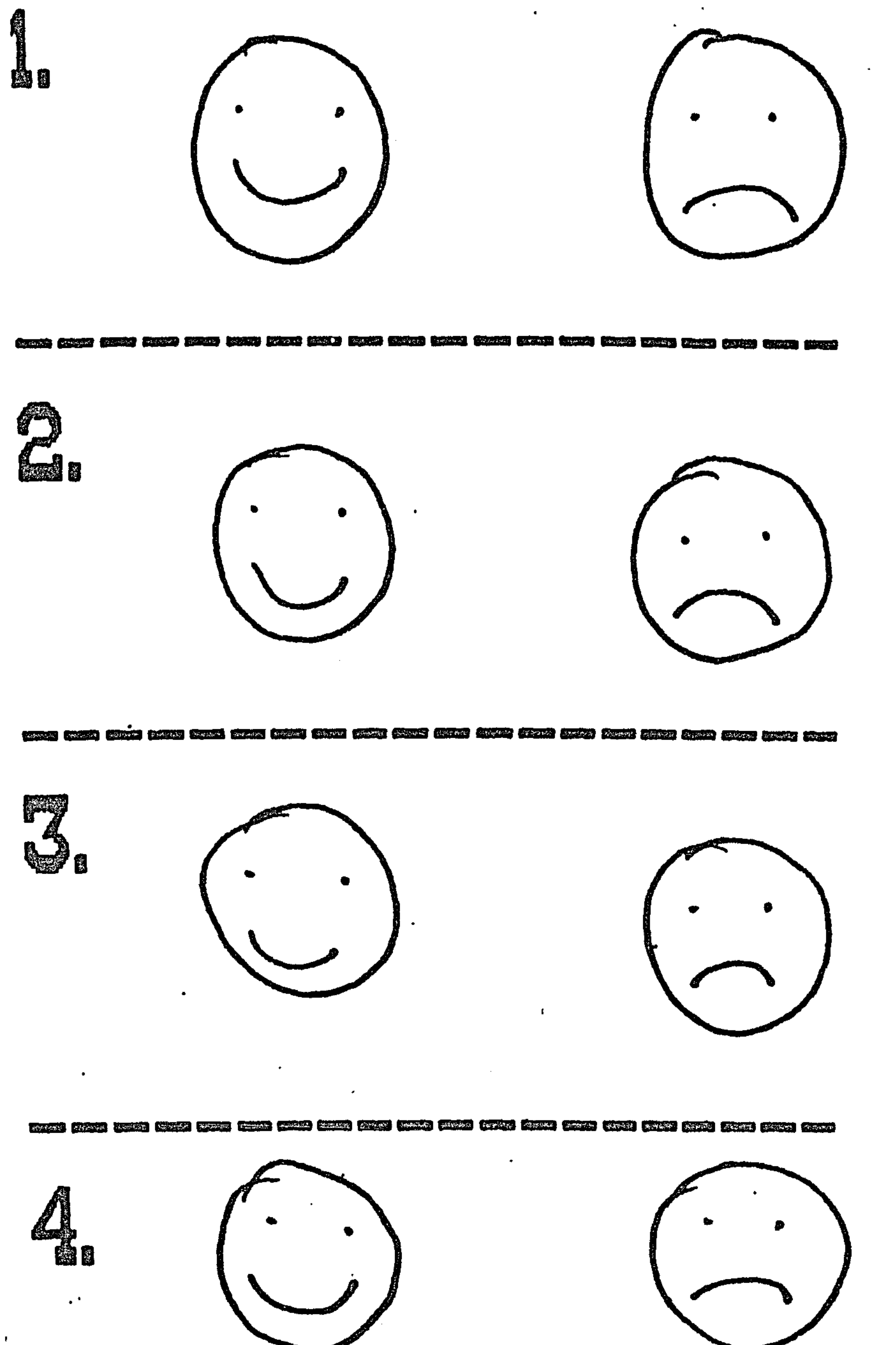
Appendix Q

Practice - Well-formedness & Synonymy Tasks



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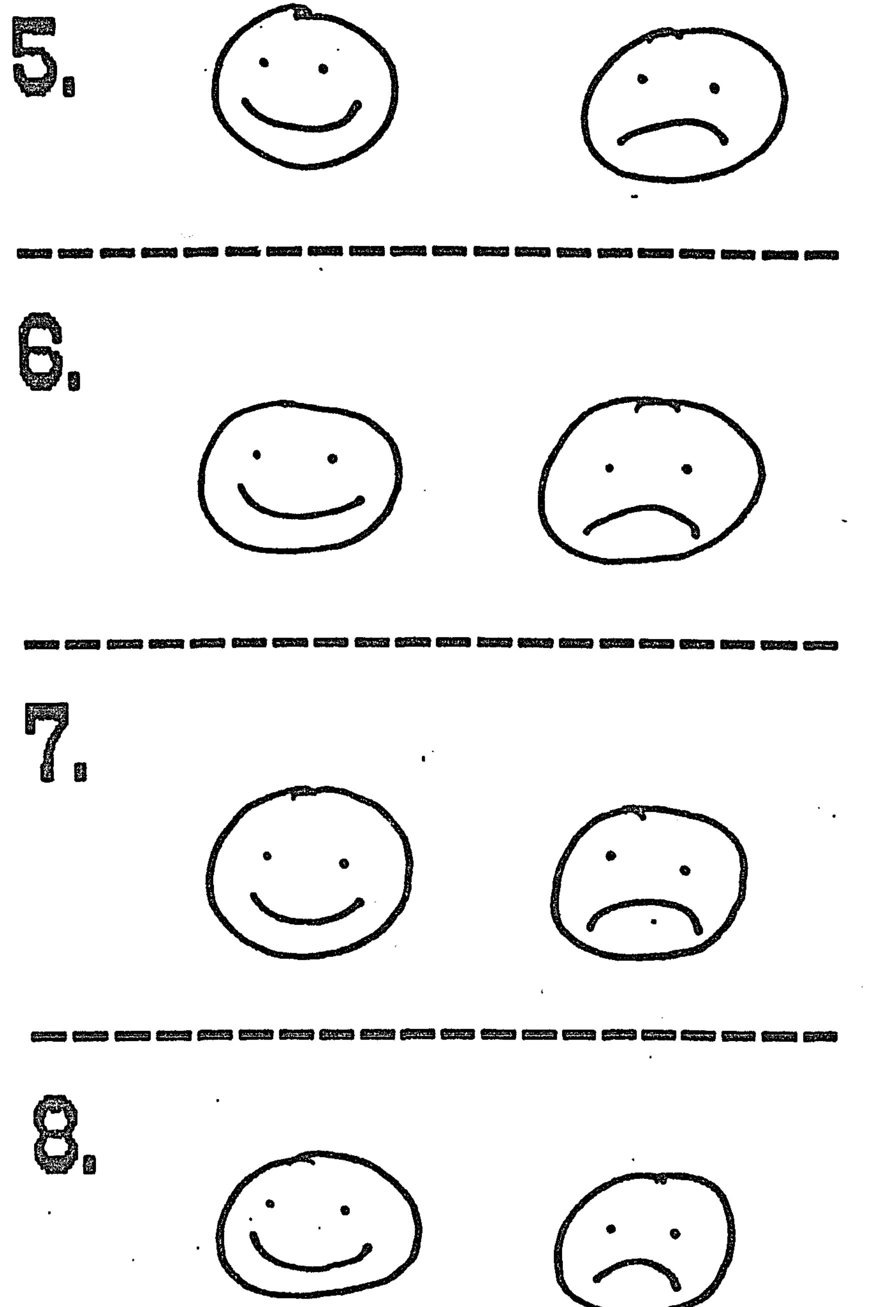
Appendix Q

Practice - Well-formedness & Synonymy Tasks



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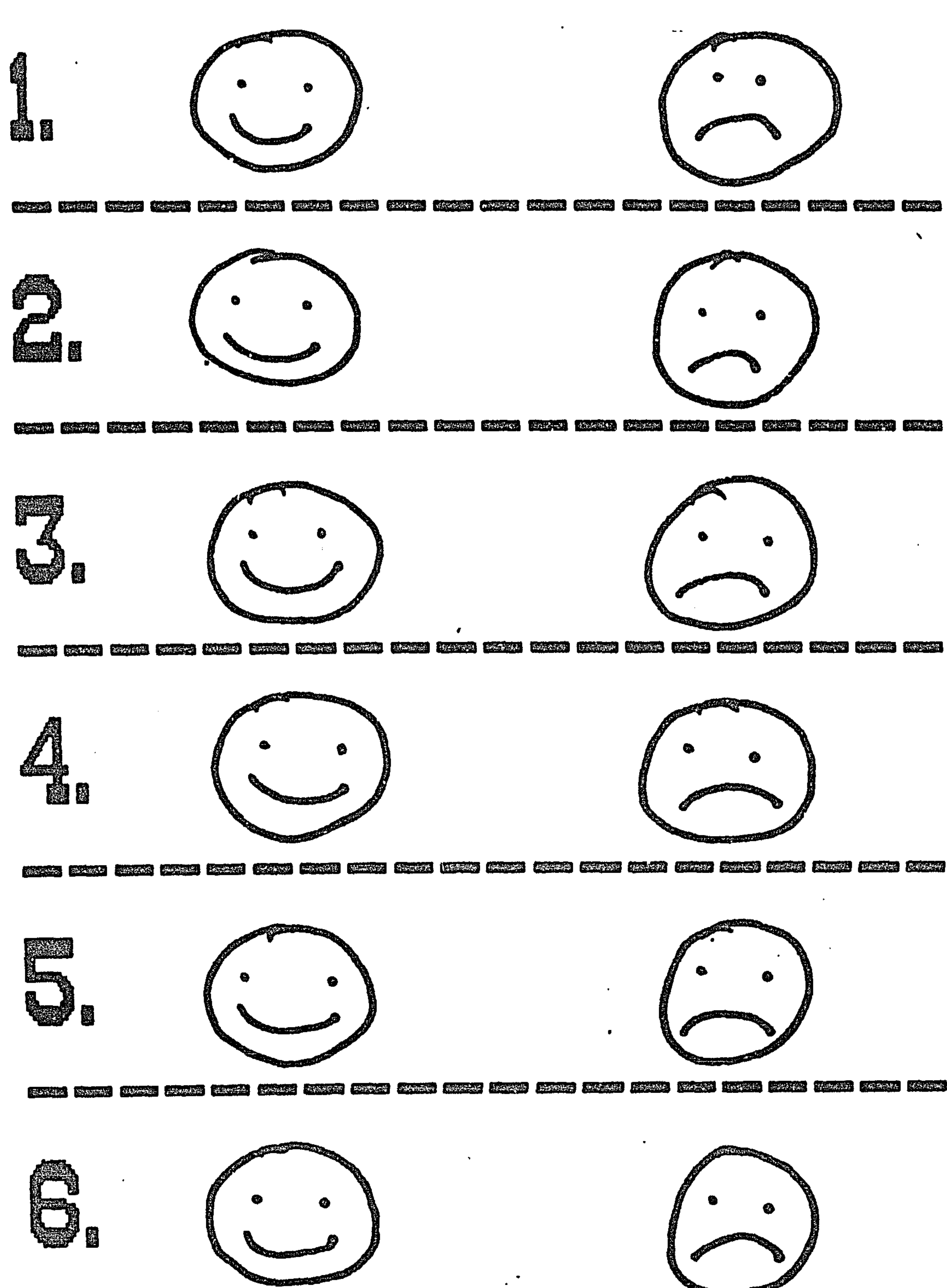

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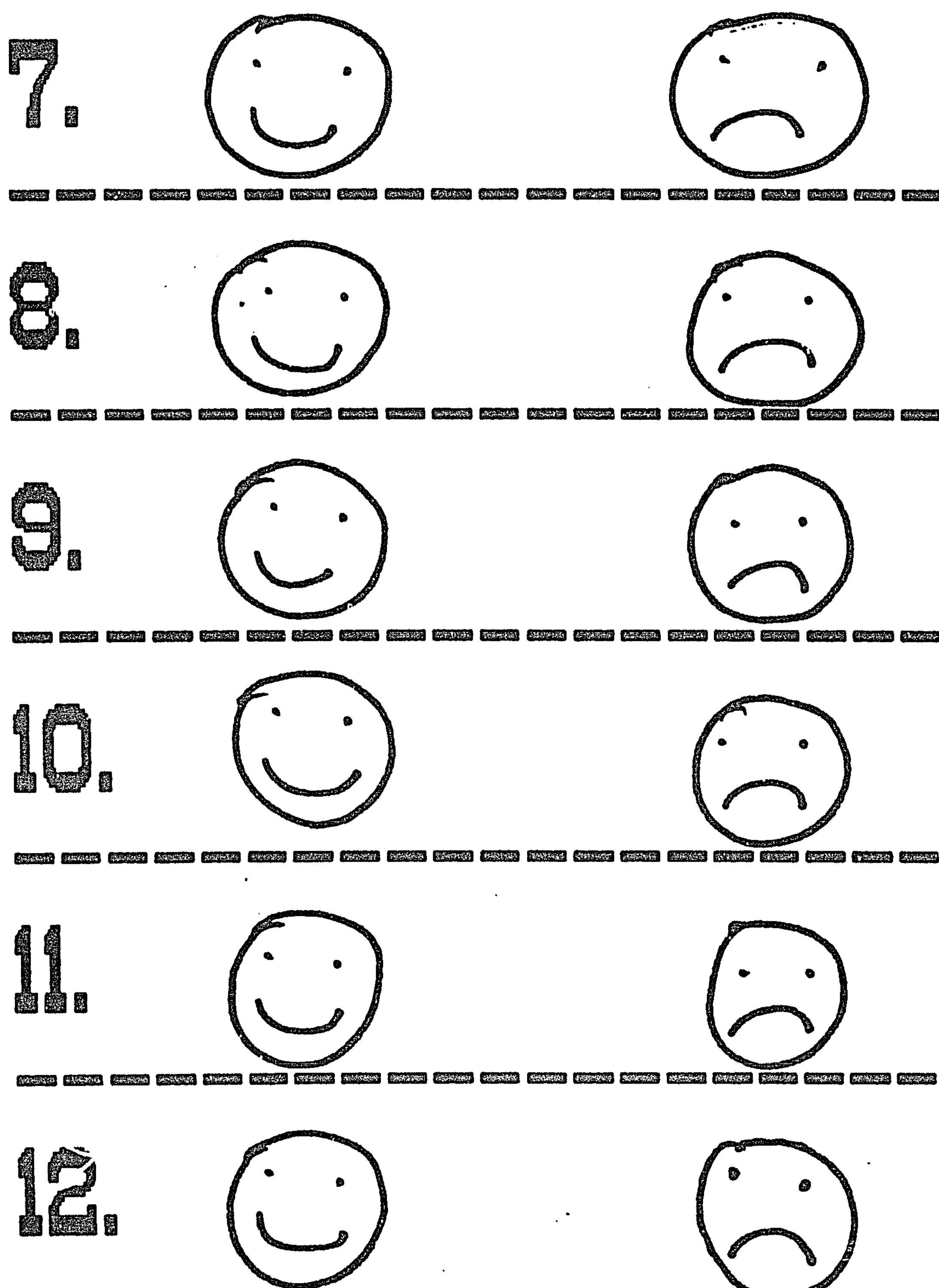

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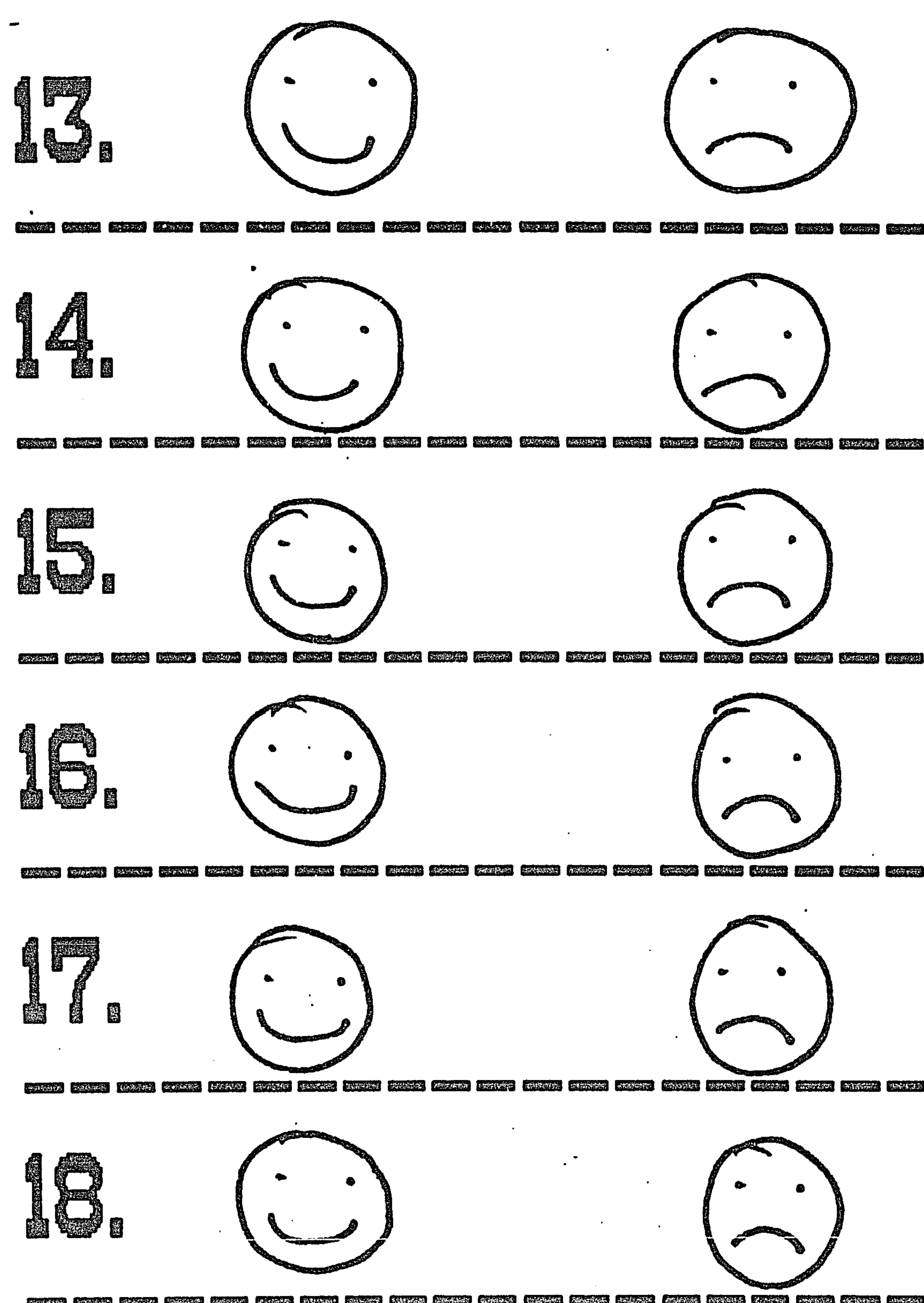

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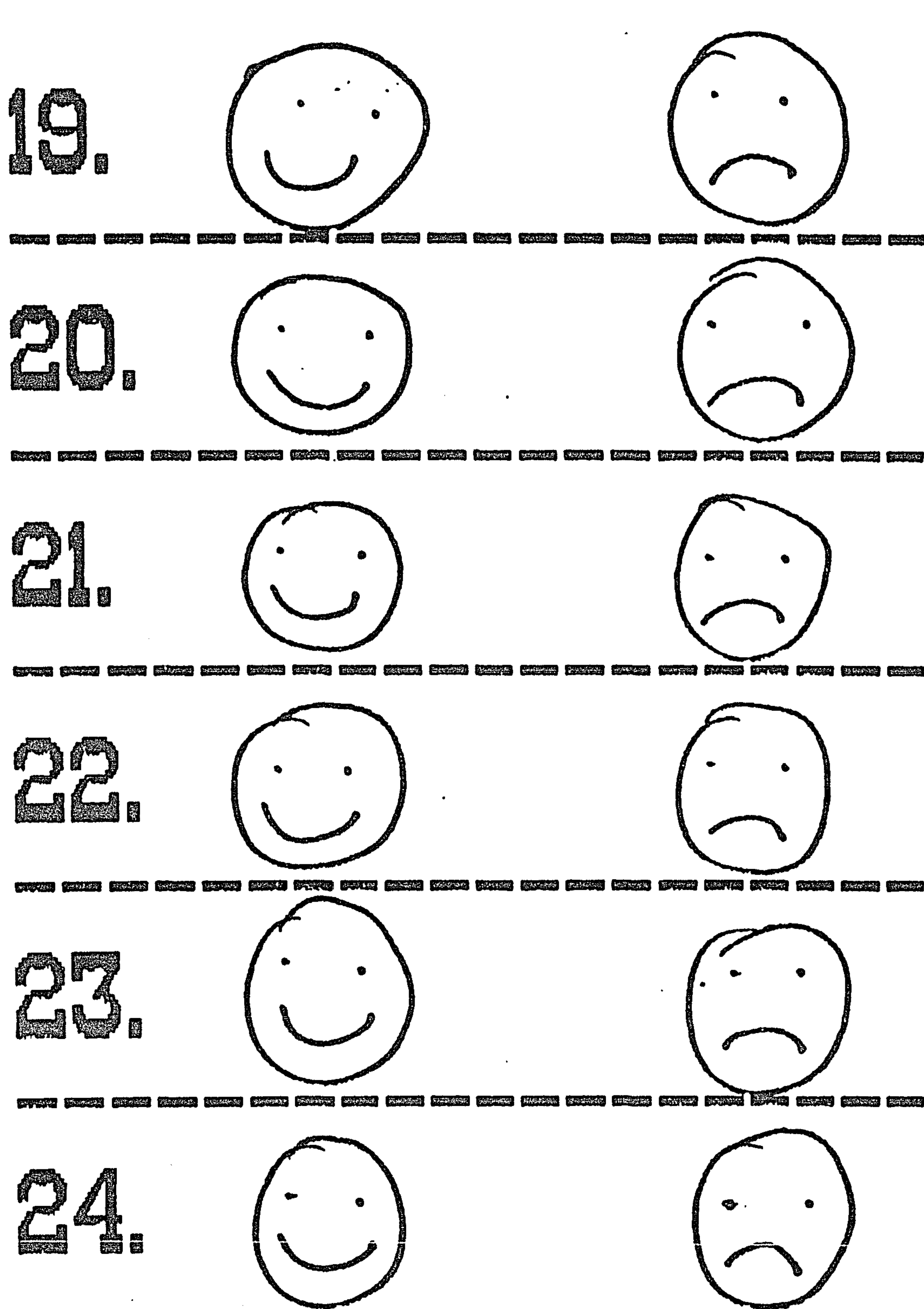

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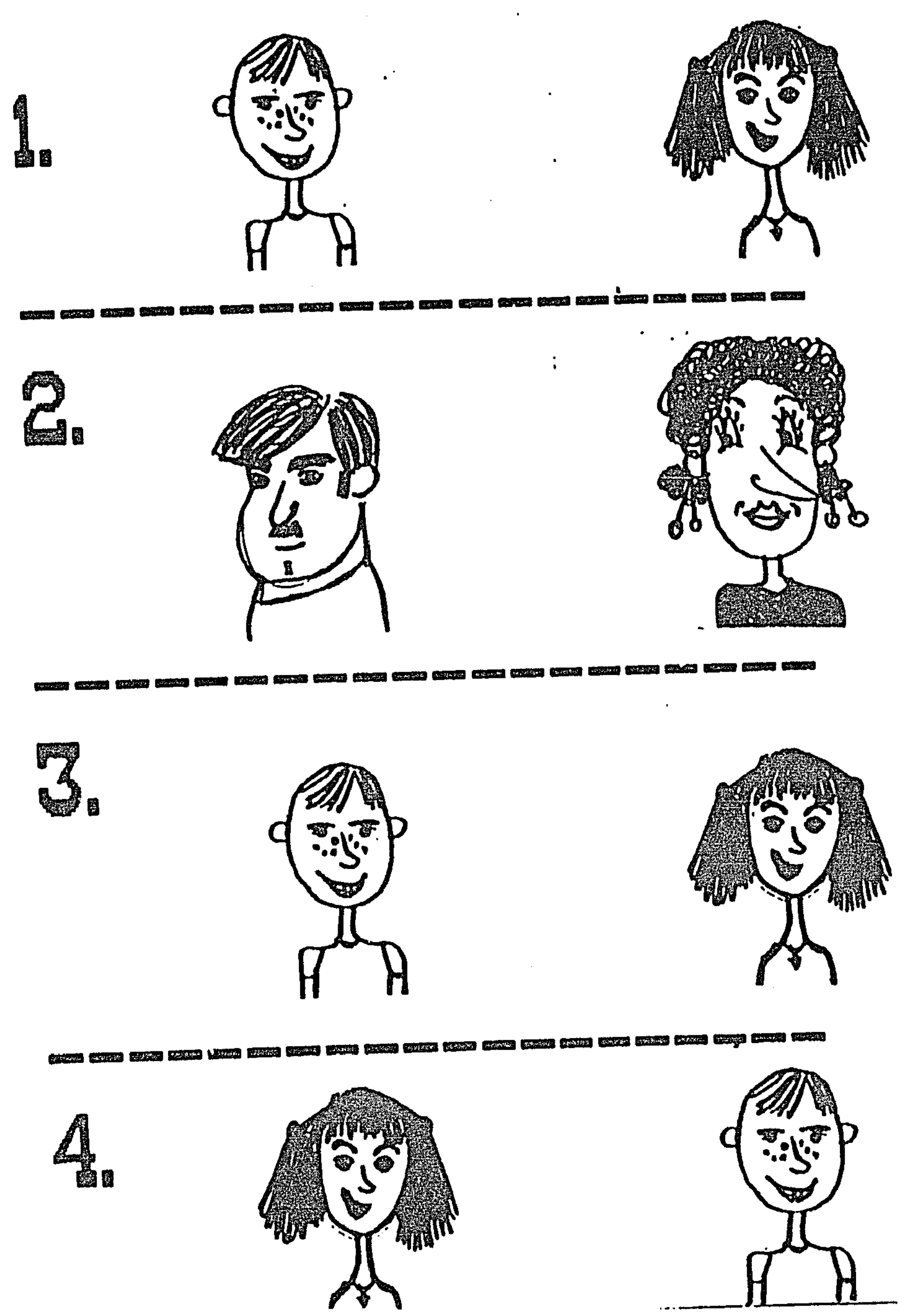
Appendix R

Practice - Comprehension Task



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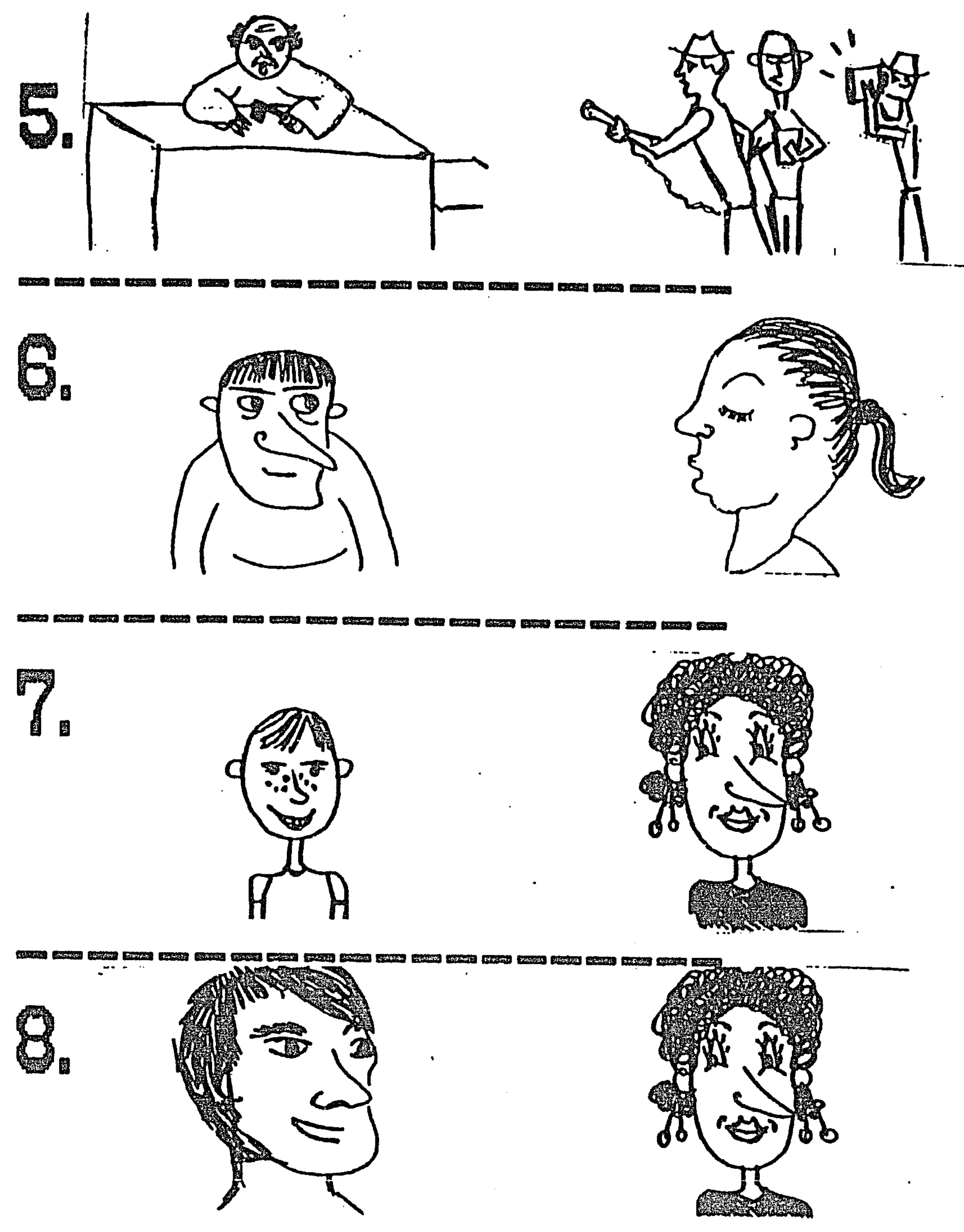
Appendix R

Practice - Comprehension Task



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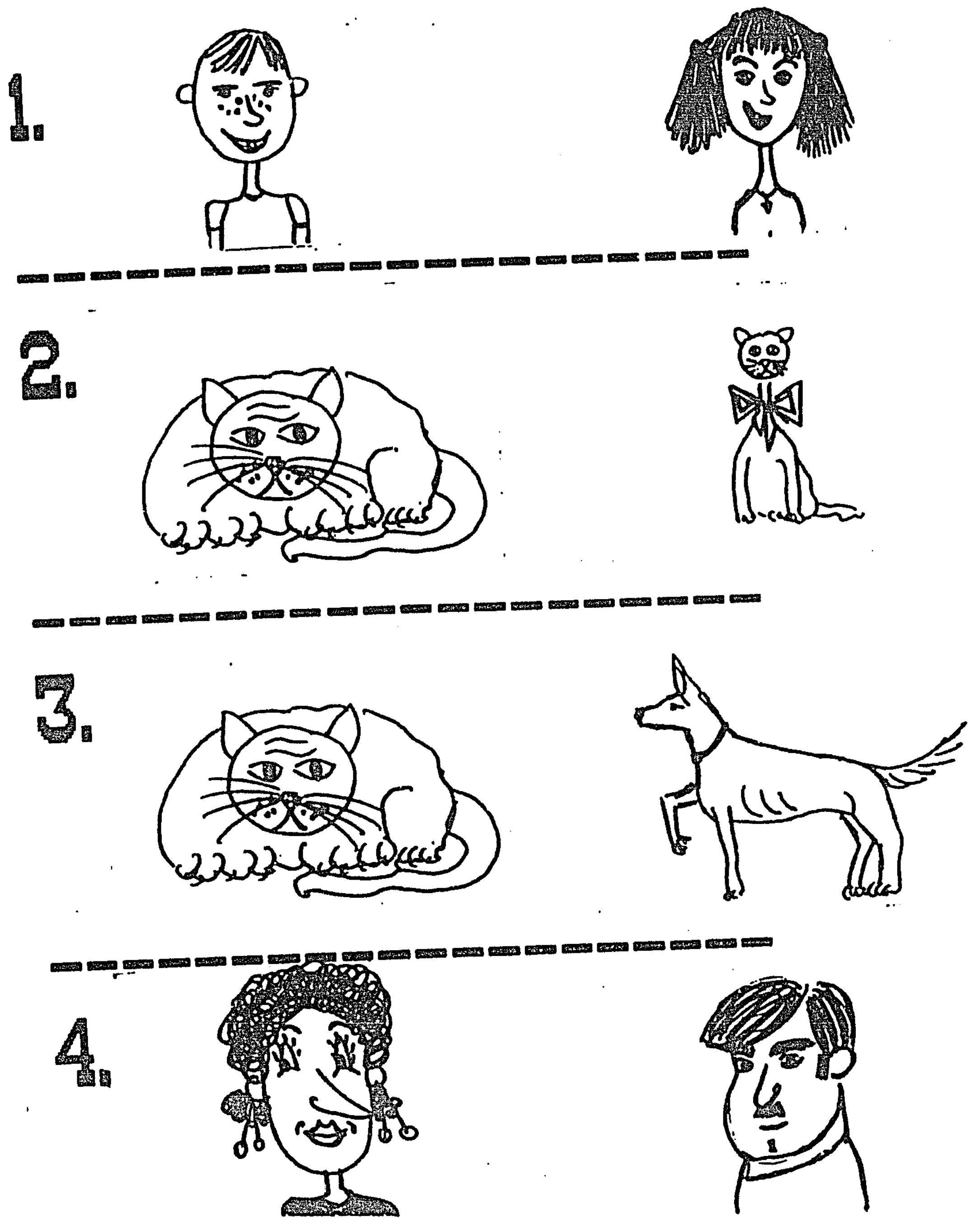

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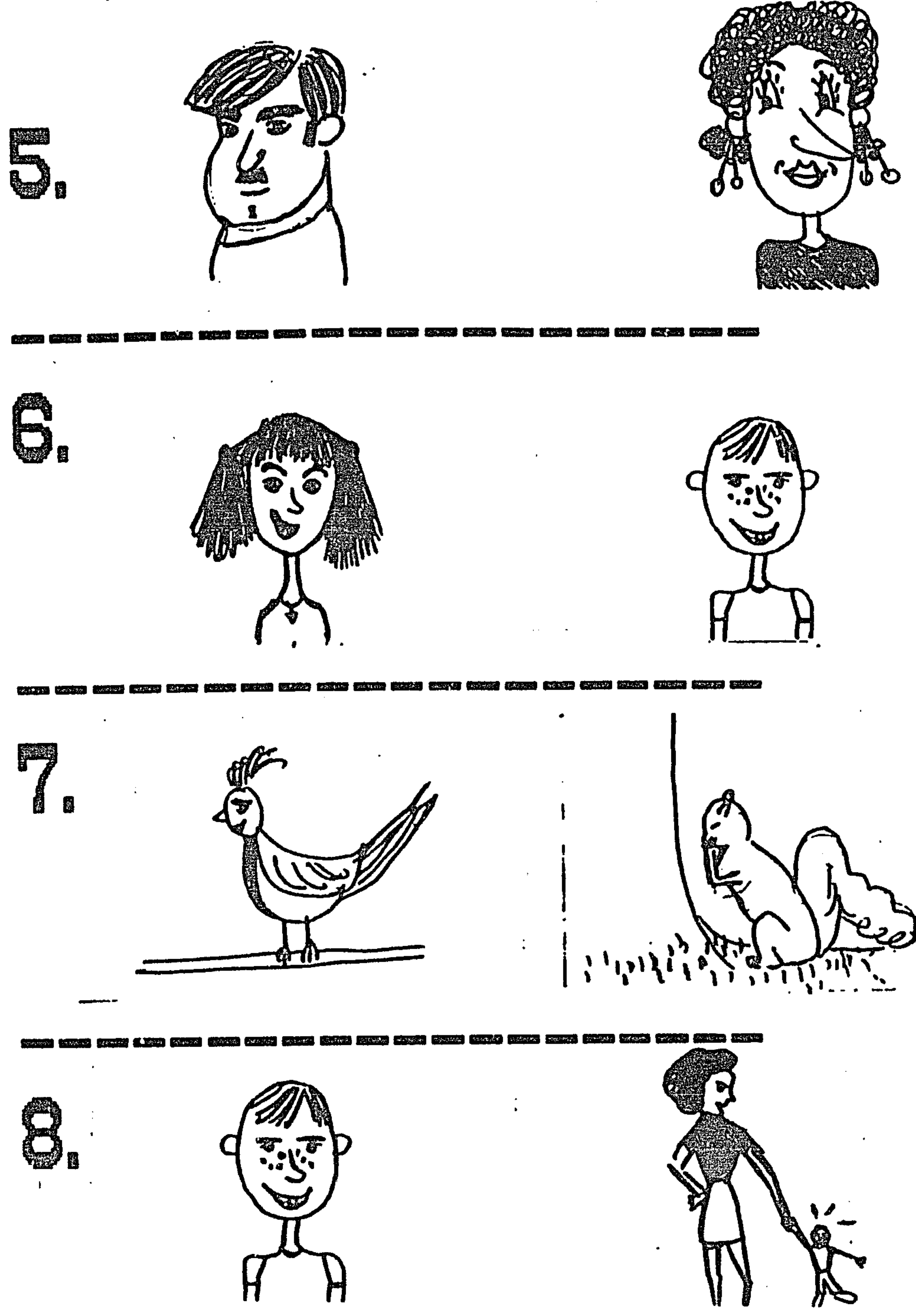

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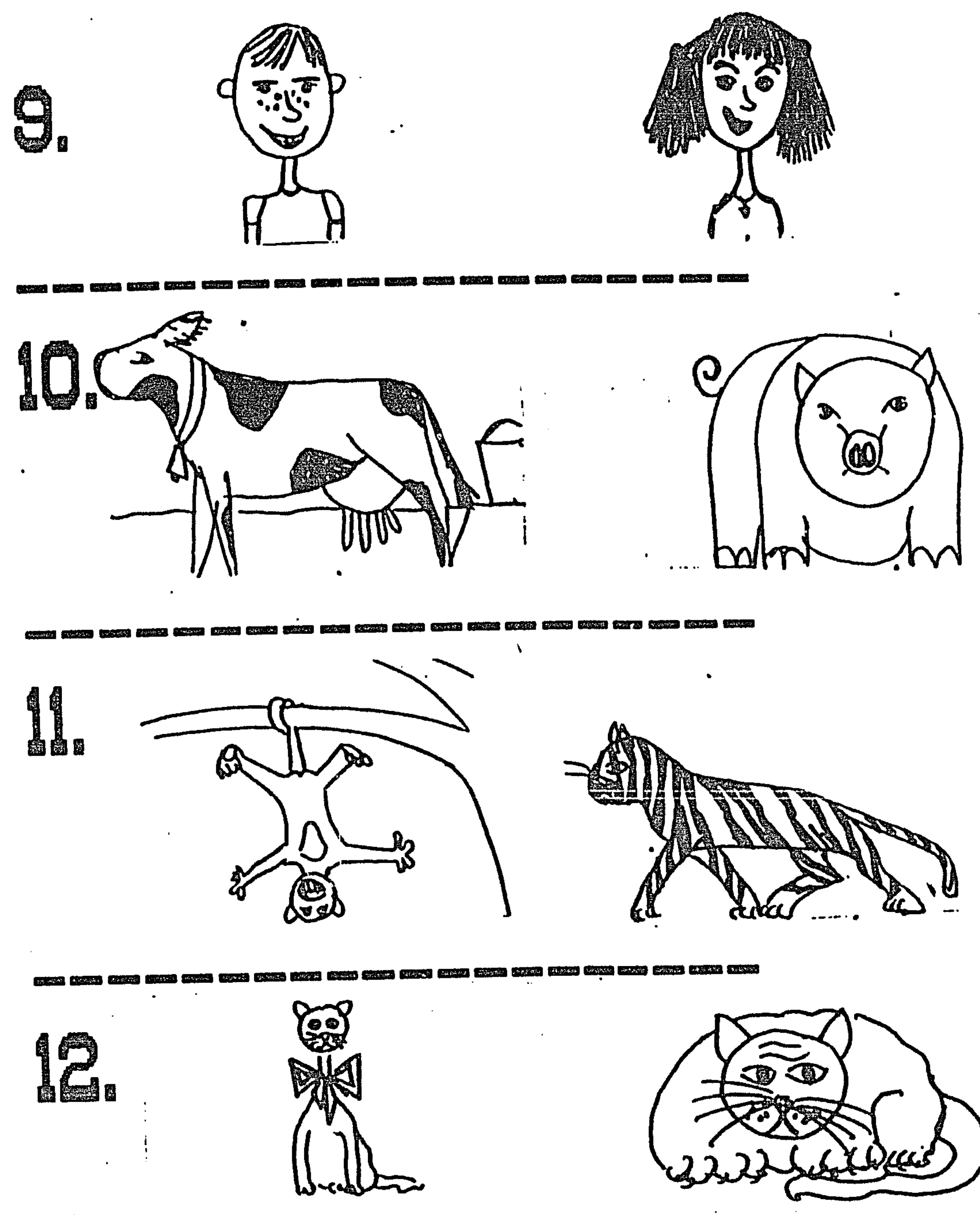

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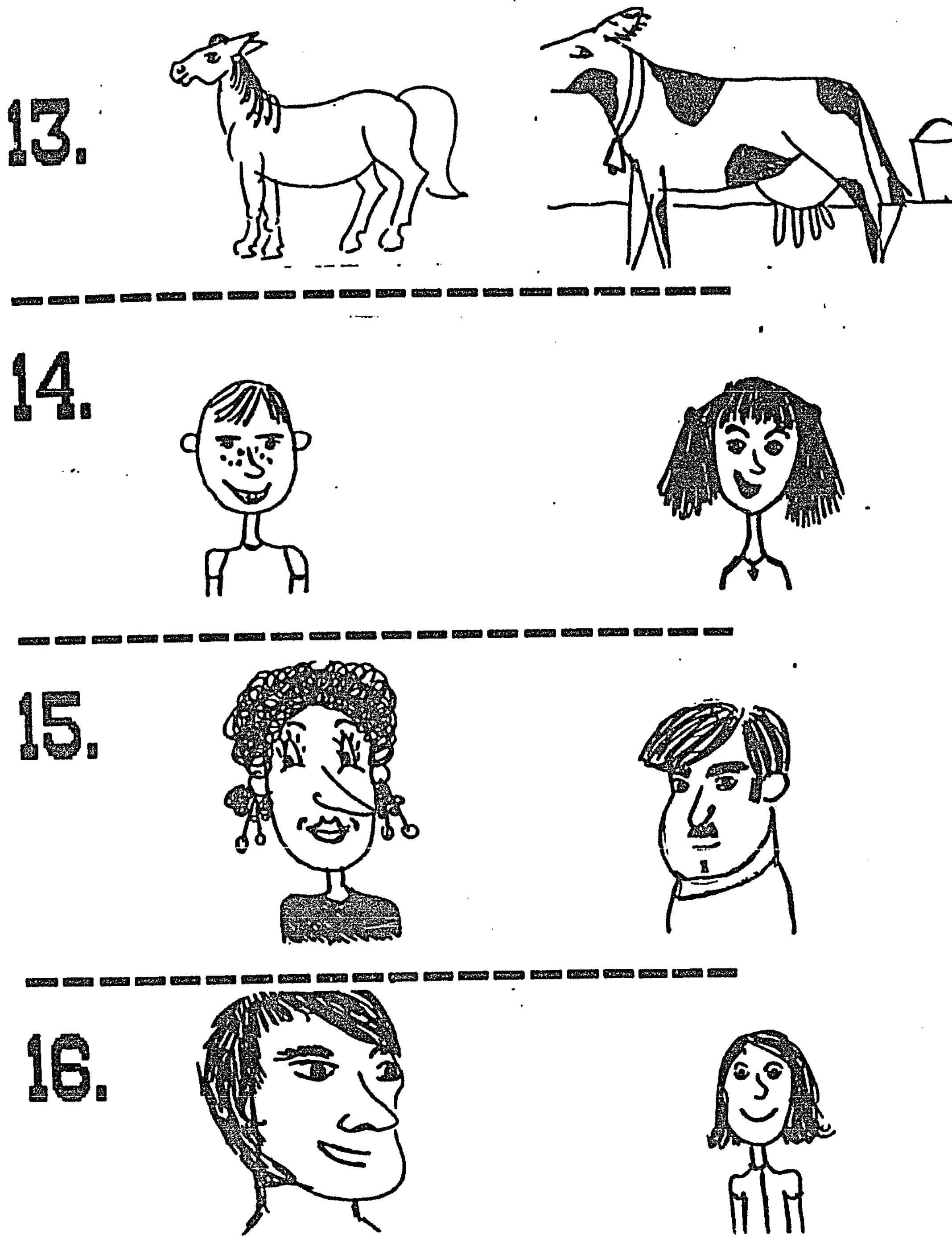

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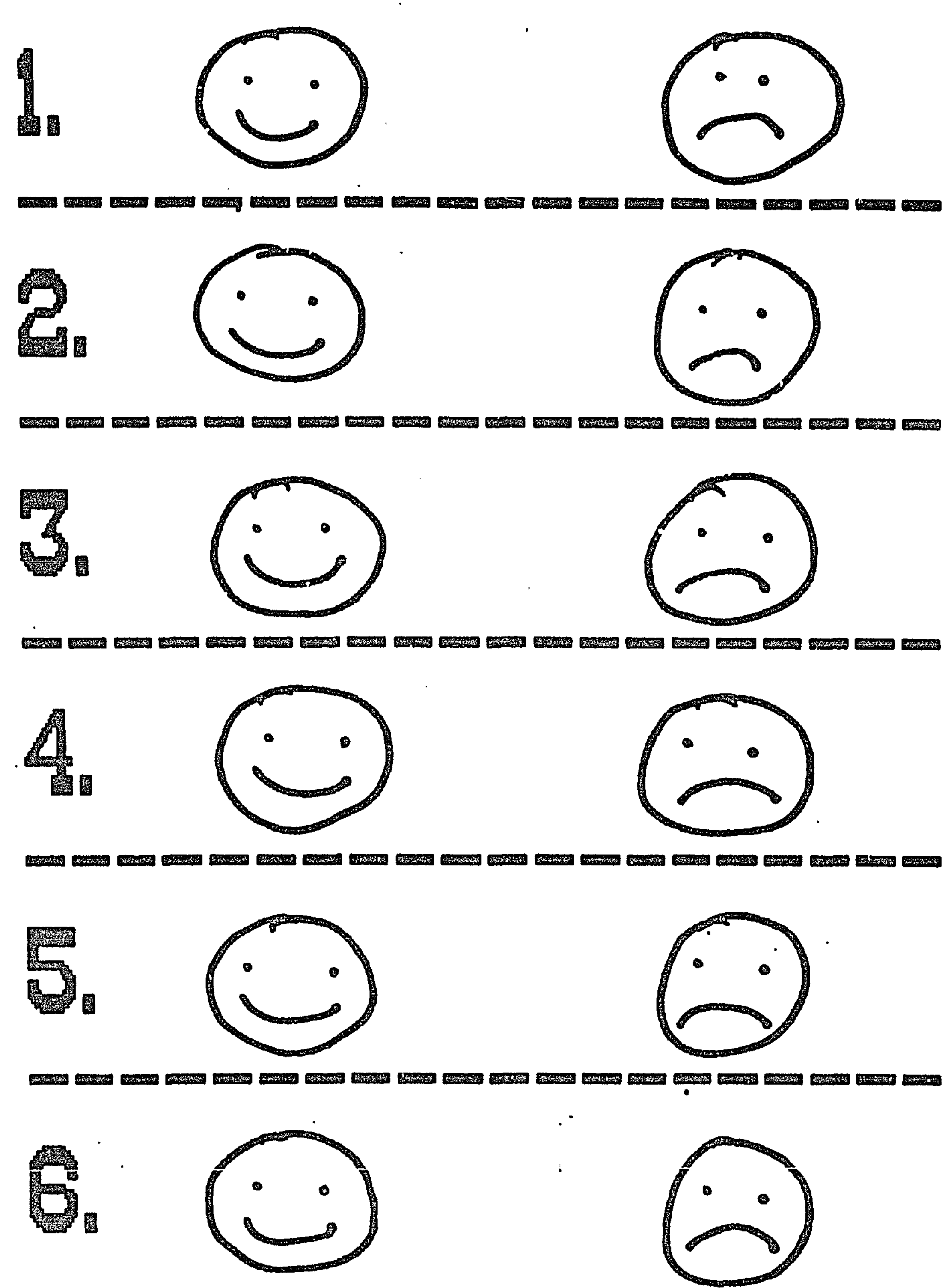
Appendix S

Practice - Phonotactics Task



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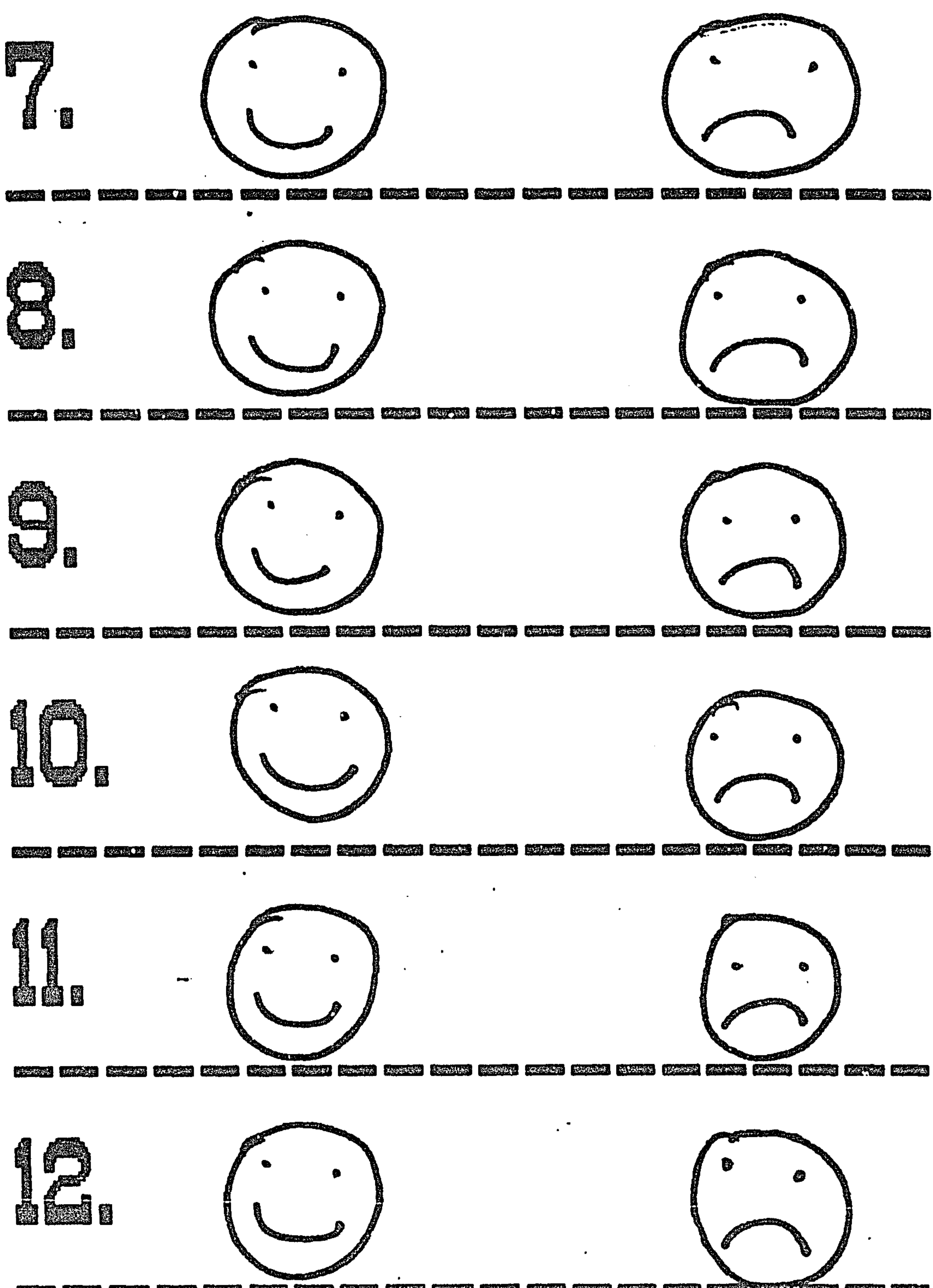
Appendix S

Practice - Phonotactics Task



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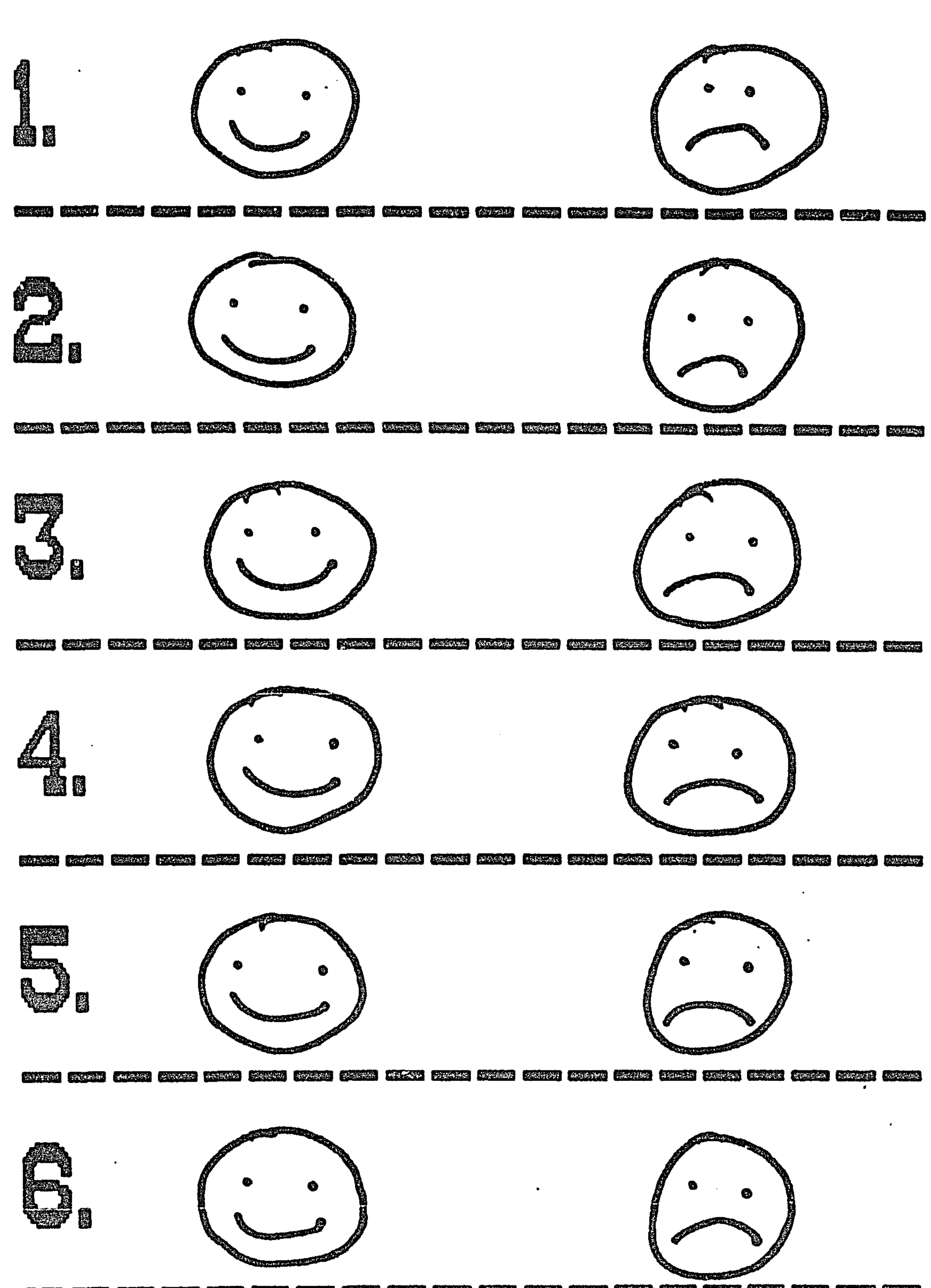

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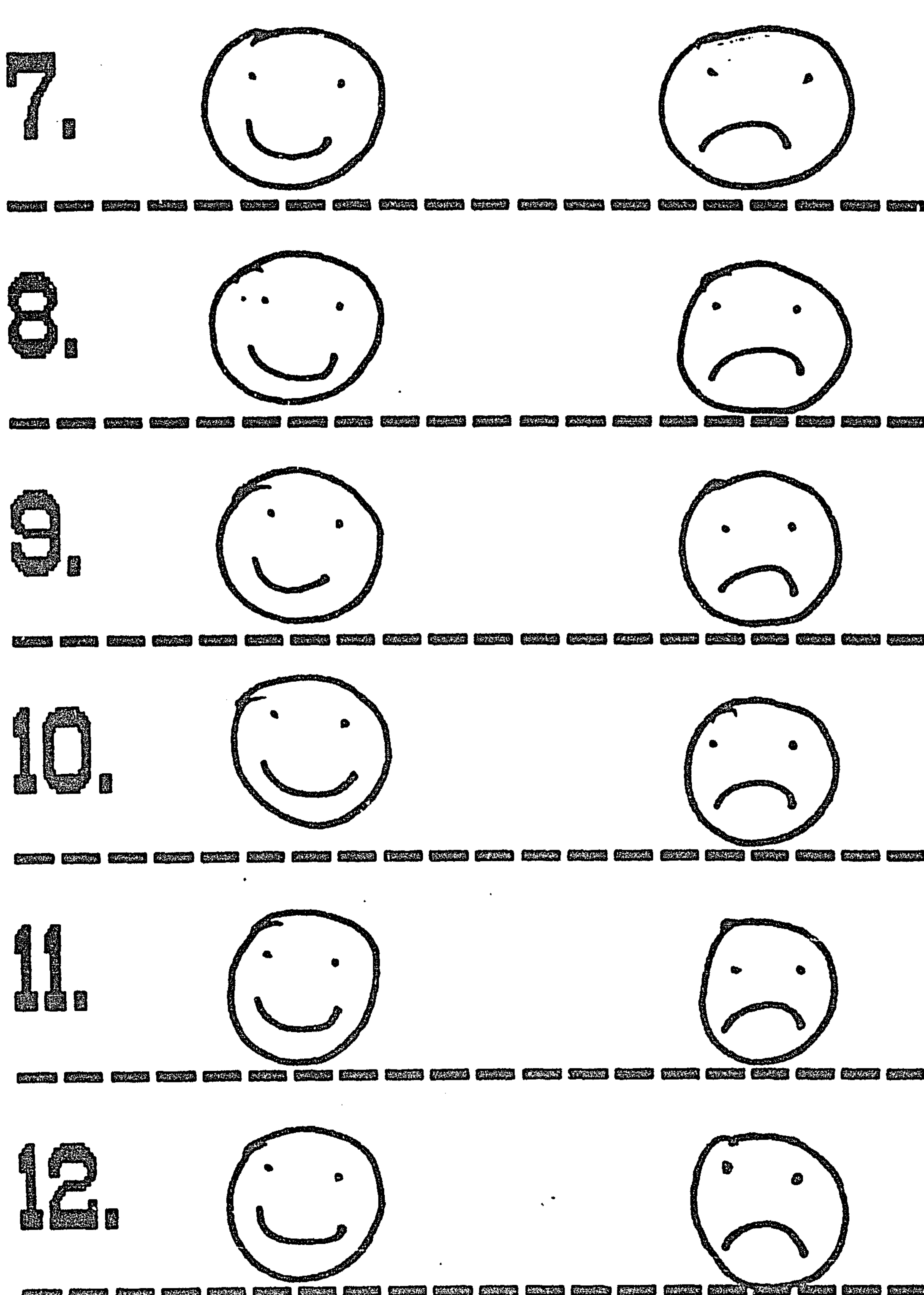

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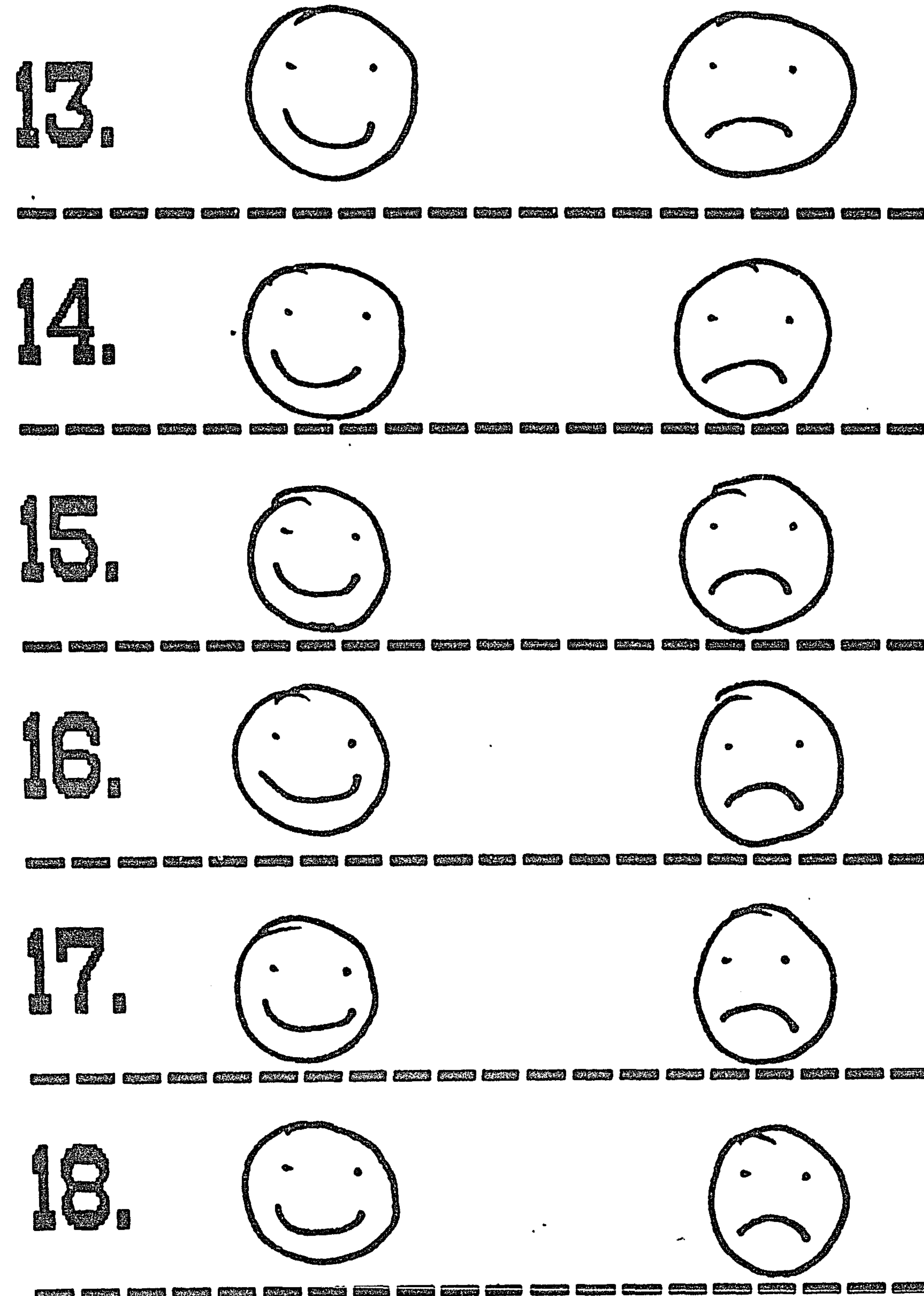

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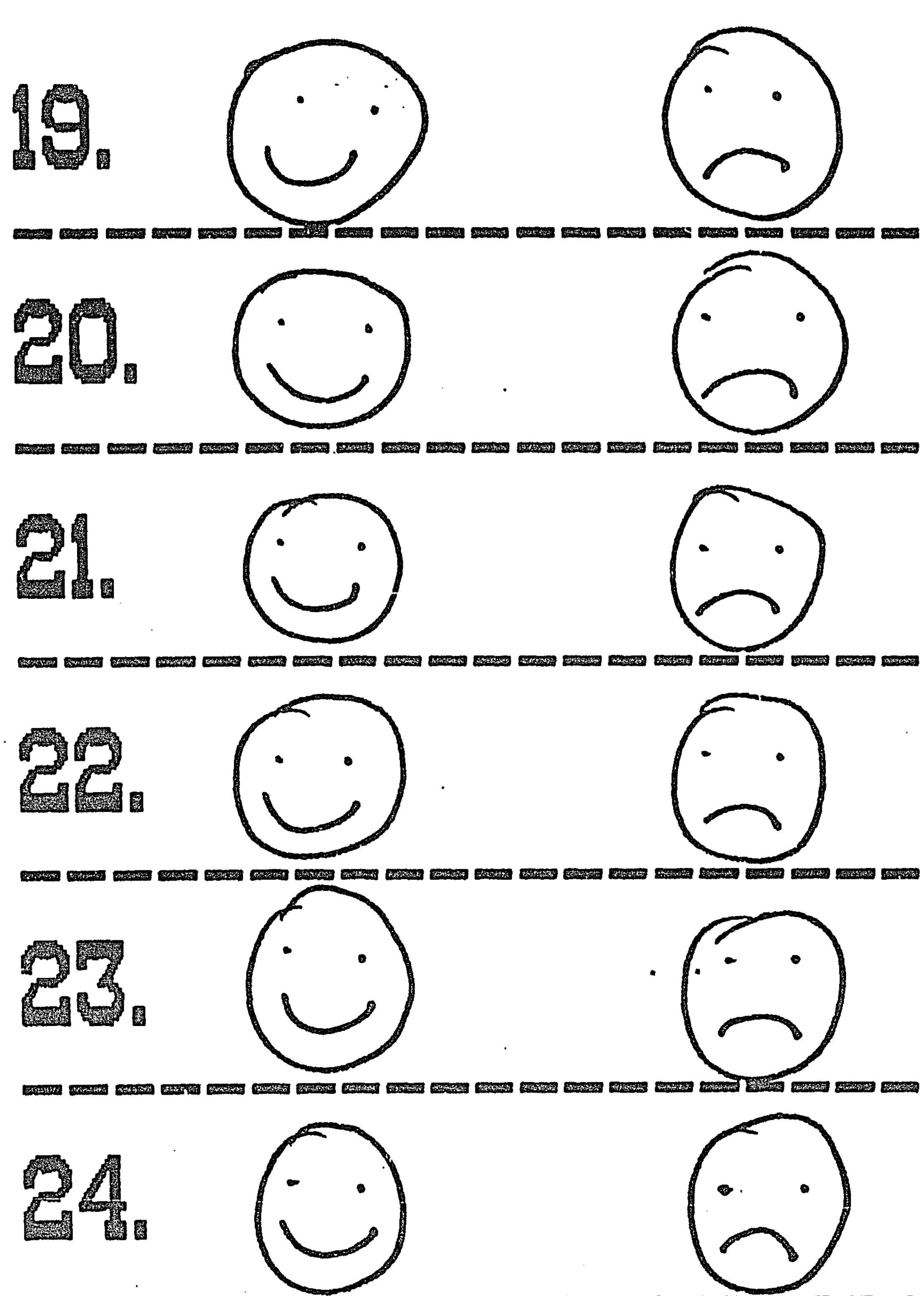

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