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Maintaining culturally disadvantaged fourth-graders' attention to oral verbal teaching through intermittent auditory stimulation: a thesis...

Evelyn M. Noren

University of the Pacific

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MAINTAINING CULTURALLY DISADVANTAGED
FOURTH-GRADEHS' ATTENTION TO ORAL VERBAL TEACHING
THROUGH INTERMITTENT AUDITORY STIMULATION

A Thesis
Presented to
the Faculty of the Department of Psychology
The University of the Pacific

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
Evelyn M. Noren
May 1972
This thesis, written and submitted by

EVELYN M. NOREN

is approved for recommendation to the Committee on Graduate Studies, University of the Pacific.

Department Chairman or Dean:

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Thesis Committee:

[Signature] Chairman

[Signature]

[Signature]

Dated 5/6/72
Acknowledgments

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# Table of Contents

## Acknowledgments

## Chapter 1. THE PROBLEM AND THE REVIEW OF THE LITERATURE

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of the Literature</td>
<td>1</td>
</tr>
<tr>
<td>Listening</td>
<td>2</td>
</tr>
<tr>
<td>Attention</td>
<td>4</td>
</tr>
<tr>
<td>Orienting Reaction</td>
<td>5</td>
</tr>
<tr>
<td>Arousal</td>
<td>6</td>
</tr>
<tr>
<td>Expectancies</td>
<td>7</td>
</tr>
<tr>
<td>Stimulus Change</td>
<td>7</td>
</tr>
<tr>
<td>Habituation</td>
<td>9</td>
</tr>
<tr>
<td>Discrepant Stimuli</td>
<td>10</td>
</tr>
<tr>
<td>Stimulus Placement</td>
<td>12</td>
</tr>
<tr>
<td>Placement of Questions</td>
<td>13</td>
</tr>
<tr>
<td>Need for Present Study</td>
<td>13</td>
</tr>
</tbody>
</table>

## Chapter 2. METHOD

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects</td>
<td>14</td>
</tr>
<tr>
<td>Subjects Used in the Trial Protest</td>
<td>15</td>
</tr>
<tr>
<td>Subjects Used in the Study</td>
<td>16</td>
</tr>
<tr>
<td>Design</td>
<td>16</td>
</tr>
<tr>
<td>Equipment</td>
<td>17</td>
</tr>
<tr>
<td>Procedure</td>
<td>20</td>
</tr>
<tr>
<td>Presentation of Lessons</td>
<td>20</td>
</tr>
<tr>
<td>Environmental Control</td>
<td>20</td>
</tr>
</tbody>
</table>
Chapter | Page
--- | ---
Subject Matter | 21
Control of Information | 22
3. RESULTS AND DISCUSSION | 23
Summary | 33
Recommendations for Future Studies | 56
REFERENCES | 38
APPENDIXES | 45

A. References not Cited in the Text | 43
B. Material Distributed at the Principals' Meeting | 45
C. Texts of the Taped Lessons | 47
Lesson 1: Factual information | 47
Lesson 2: Pronunciation of consonants | 50
Lesson 3: Syllabication | 53
Lesson 4: Sequence of events | 56
Lesson 5: Determining word meanings from the context | 59
Lesson 6: Drawing conclusions | 62
D. Teacher's Instructions to Students Concerning the Tapes | 65
E. Individual Scores on the Trials-Lessons | 66
Table of Means for Rhythm, Melody, and Trials-Lessons | 69
Table of Means for Rhythm and Trials-Lessons | 69
Table of Means for Melody and Trials-Lessons | 70
Table of Means for Rhythm and Melody | 70
List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An Example of the Three-variable Split-plot Factorial Design</td>
<td>17</td>
</tr>
<tr>
<td>2. Pretest Means (15 subjects per mean)</td>
<td>24</td>
</tr>
<tr>
<td>3. Analysis of Variance Table</td>
<td>27</td>
</tr>
<tr>
<td>4. Analysis of Covariance Table</td>
<td>23</td>
</tr>
<tr>
<td>5. Treatment Means over Five Trials</td>
<td>29</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>The melodic stimulus pattern presented to Group II</td>
</tr>
<tr>
<td>2.</td>
<td>The rhythmic stimulus pattern presented to Group III</td>
</tr>
<tr>
<td>3.</td>
<td>A replica of the response sheet used in answering questions</td>
</tr>
</tbody>
</table>
Chapter 1

THE PROBLEM AND THE REVIEW OF THE LITERATURE

Personal experience, confirmed by that of other teachers, indicates that culturally disadvantaged students do not listen well to verbal instruction. As used in this study, the term "culturally disadvantaged" refers to children who come from financially, educationally, and socially impoverished homes (Guidelines, 1971; Philadelphia Council for Community Advancement, 1965). These children often are poor readers, which sometimes makes it necessary to teach them verbally. Also, it is almost impossible to circumvent giving verbal directions for carrying out any type of classroom activity. Although such children seem to be very dependent upon what they hear for their learning, noisy home environments cause them to become somewhat inattentive to auditory stimuli (Ralph, 1965). They have learned to disregard sounds irrelevant to the immediate satisfaction of their desires.

The present research was undertaken to determine whether a utilitarian method could be devised for directing and maintaining culturally disadvantaged students' attention to taped verbal lessons. Extraneous novel tone bell stimuli were inserted prior to the presentation of material about which the children were questioned. The purpose of the
study was to learn whether the nature of the tone bell stimulus reflects the accuracy of responses due to attention having been directed to the lesson content. The author hypothesized that a combination of melody and rhythm would be most effective in attracting attention and, thus, in eliciting a greater number of correct responses.

Review of the Literature

Listening

Recent investigators found that, in lower-class children, deficits in the ability to listen and pay attention are causes of behavior problems and of scholastic underachievement (Philadelphia Council for Community Advancement, 1965). Hughes (1969) believed that the schools' greatest communication difficulty concerns these language-disadvantaged students.

Verbal instruction is an important teacher activity which, to be carried out effectively and efficiently (Anderson, 1970; Hiller, Fisher, & Kaess, 1968), requires that the listeners actively exclude distracting stimuli and focus their attention on what they are hearing (Dow, 1958; Hatfield, 1946; Nicholas & Stevens, 1957). Listening is dependent upon attention; and both are essential to the learning process. The importance of listening has been recognized for many years. Aiken in 1896 reported that she had prepared exercises designed "to cultivate the art of listening (p. 46)."
At various times the interrelationships among the language arts have been pointed out. Hatfield (1946) and Dow (1958) felt that reading, a receptive skill with which educators are greatly concerned, is similar to listening, another receptive activity. Improving listening habits might effect improvement in reading. Hildreth (1968) saw talking, listening, reading, writing, and spelling as being related through the use of common word symbols. Listening with understanding is a prerequisite to the use of the other language arts. Nichols and Stevens (1957) believed listening to be important because so many messages come to us orally. They felt that listening is a necessary skill that has been neglected in spite of the fact that it is essential to learning. Montgomery (1969) found that the listening ability of successful college students was significantly greater than that of nonsuccessful students.

Hatfield (1946) felt that the poor listening habits of adults are the result of the "half-listening" done daily by most children in the classroom. He thought that listening practice is necessary. Nichols and Stevens (1957) concurred in this belief. They thought that listening skill can be improved through training and integration with oral classroom activities. In a recent study of preschool education, disadvantaged youngsters practiced listening to various forms of oral language including stories and directions (Philadelphia Council for Community Advancement, 1965). This practice assisted the children in their classroom work.
Attention

Culturally disadvantaged children seem to have poor ability to concentrate, accompanied by short attention spans (Feitelson, 1966). Because of this, their ability to learn is impaired.

Attention has long been and still is a subject of much interest and importance to psychologists. For Wundt, Tichener, and James it was a core concept (Bakan, 1966). In 1890 William James described attention as "the taking possession by the mind, in clear and vivid form, of one out of what seems several simultaneously possible objects or trains of thought (p. 7)." In the same year Ribot (1890) defined attention as "the tendency toward unity of consciousness (p. 3)." A more recent, but quite similar, definition is that offered by Solley and Murphy (1960): "Tentatively, we may define attention as the acts of the individual which govern the probability of maximally receiving specific sources of stimulation (p. 178)." They further stated that the act of attention includes the preceding moment as well as the period during which a potential perceptual stimulus is being received. Berlyne (1960) said that attention refers to "how effectively behavior is being controlled by the stimulus field as a whole (p. 45)." The word "attention" has been applied to "the processes that determine which elements of the stimulus field will exert a dominating influence over behavior (p. 45)."

Aiken (1896) stressed the importance of early train-
ing in developing the habit of attention, and noted its relevance to memory which is essential to learning. Benoit (1957), Doehring and Rabinovitch (1969), Ellis (1963), Janis (1969), Jeffrey (1967), Kagan (1969), and Zeaman (1963) all agree that attention to the relevant stimulus is an essential core process involved in learning. Therefore, it is important that some means of getting and maintaining students' attention to verbal instruction be devised.

Aiken (1896) spoke of the importance of discovering a method of securing attention. She realized that, even though attention is directed to the stimulus, it is difficult to sustain it without extraneous aid. Her belief was that the teacher's success depended upon her ability to direct and maintain the students' attention. Because voluntary attention cannot be sustained longer than a few seconds at a time (James, 1966), the present study seeks to find a means of redirecting attention from irrelevant stimuli to the target stimulus which is, in this case, verbal instruction.

**Orienting Reaction**

Psychology has directed considerable interest and effort toward external stimulus attributes that arouse children's attention (Jeffrey, 1967). Arousal is considered to be a general state of the individual (Hohmuth, 1970). It is an indication of the degree to which a person is ready to react. The Russians have done a great deal of research on the orienting reaction to arousal stimuli, making an associ-
ation between the orientation reaction and the arousal pattern (Berlyne, 1960). Pavlov described the function of the orienting reflex as producing immediate orientation of the appropriate receptor organ to the slightest environmental change. Other Russian psychologists have elaborated on his description to include autonomic as well as observable reactions. Soviet physiologists believe that the orientation reaction, which is a rise in arousal accompanied by physiological changes including skin-galvanic responses, electrocal brain activity, and dilation and constriction of blood vessels, provides the cerebral cortex with excitation from the brain stem, and that this process is generally essential for the establishment of temporary connections (Bakan, 1966; Berlyne, Borsa, Hamacher, & Koenig, 1966; Solley & Murphy, 1960).

Arousal

Maltzman and Raasch (1966) stated that an orienting response may be produced by any change in stimulation. It makes possible better reception of stimuli, and has a positive effect on learning (Berlyne & Carey, 1968). When an orienting response occurs, the sensitivity of the sensory receptors is increased, producing a state of attention. Hernández-Péon (1966) believed that the reticular formation in the brain stem mediates arousal and stimulus choice—two indispensable aspects of attention. He stated that for attention to operate, some degree of arousal is necessary. Arousal prepares the individual for something which becomes
the conditioned stimulus. In the present study the conditioned stimulus is a sentence about which a question is asked. The arousal stimulus orientst the students' attention to the sentence.

It appears that an intermediate degree of arousal, neither too little nor too great, is optimal for learning, the relationship between discrepancy of stimuli and attention being curvilinear (Berlyne & Carey, 1968; Kagan, 1970; Kuusinen, 1970).

Expectancies

Grrendall's (1970) study indicated the importance of the power of stimuli to arouse expectancies as to what will be heard next. Expectations encourage preparatory action, and increase the probability of success with the expected task. An expectation may be aroused by a signal that has always previously preceded the expected stimulus (Berlyne, 1960). In the present study an arousal stimulus was sounded prior to the verbal presentation of a sentence about which a question was asked. The stimulus was predicted to direct children's attention to that sentence, making it possible for them to answer the question accurately. Anticipatory sound arousal cues were expected to promote a general alertness to the happenings of the next few moments.

Stimulus Change

Sokolov believed that a generalized orienting reaction occurs when there is a change in stimulation, and that repetition of the change brings about a localized orienta-
tion reaction (Berlyne, 1960). The present study is concerned with both types of reactions. The onset of the extraneous stimulus should attract attention; and its repetition should direct the attention to the auditory cues. A child who is awake in the classroom is in a state of arousal. However, he may not be at a functional level of alertness for performing a particular task. Since, as Solley and Murphy (1960) noted, "attending rarely arises spontaneously (p. 188)," there seems to be a need for stimulating arousal during what are intended to be learning sessions.

Although some children may be attentive at the beginning of a verbal presentation, their thoughts often turn to other subjects during the progress of the lesson. Berlyne (1960) pointed out that at times behavior is dependent upon stimuli coming from only one source and is unaffected by simultaneous stimuli from other areas, and that the problem is which stimulus "will occupy the organism's limited information transmitting capacity (p. 45)." In attempting to evaluate the need for arousal in a vigilance task, Hohmuth (1970) found that signal detection decreases as a function of time spent on the task. Swain (1970) observed that little arousal occurs when students passively listen to verbal information. Low arousal was seen by Blum, Graef, and Hauenstein (1968) as being associated with the "breakdown of thought sequences (p. 610)." Berlyne, Borsa, Craw, Gelman, and Mendell (1965) found that paired-associate items learned under white noise arousal were recalled sig-
nificantly more often the following day than those learned without it. This supports the idea that arousal affects recall.

Habituation

Continuous verbal instruction results in a sameness of stimuli to which children adapt provided that interest level is constant. When they have habituated to the repetitive verbal stimuli, they no longer attend and respond accurately to them. The terms "habituation" and "satiation" as used in this study refer to the children's state of insensitivity to the verbal and tone bell stimuli as a result of having been exposed to them repeatedly (English & English, 1968).

Vernon (1966) stated that repeated or prolonged stimuli "may cease to be central in consciousness (p. 46)" because unchanging situations are difficult to attend to over long periods of time due to the "process of habituation or self-inhibition in the functions of the reticular formation (p. 54)." Maltzman and Raskin (1966) also pointed out that the "orienting reflex extinguishes with repeated presentation of a given stimulus (p. 97)." This would seem to be the case when children habituate to verbal instruction and attend to other external environmental stimuli or to their own thoughts. In an experiment involving head-orienting responses to sound stimuli, Beitel (1970) found that the magnitude and frequency of responses decreased in both intrasession and intersession trials. The author of the present study postulated that, after a period during which
sound stimuli aroused interest, the stimuli would become increasingly less effective in eliciting and maintaining the subjects’ attention. That is, the subjects would become satiated with the stimuli.

**Discrepant Stimuli**

It has been found that children respond to novel stimuli. Cantor (1963) presented a comprehensive review of the literature in this area. (See further references in Appendix A). Melson and McCall (1970) and Kagan and McCall (1970) in their studies of infant responses to discrepant stimuli found that infants who habituated rapidly to the standard stimulus, compared to those who did not habituate, paid more attention to discrepancies in both visual and tonal stimuli. In view of their findings, it seems possible that the insertion of discrepant stimuli in verbal lessons might produce an orienting reaction in children who have habituated rapidly. If these rapid habituators are daydreaming rather than attending to the lesson, it is possible that such thoughts might be disorganized by extraneous sound stimuli. Elum et al. (1968) placed their subjects in a state of lowered arousal under hypnosis. The subjects created their own discrepant stimuli (numerals against a standard of words) by saying the numerals either loudly or softly, loudness being considered high arousal. In the waking state thought organization, described as the ability to recall words presented in the hypnotic state, depended on high or low arousal. With the disorganization of irrelevant
thoughts, it is possible that in the present study the children's attention might again be directed to the lesson.

In the current study it is hypothesized that an intramodal sound stimulus (tone bell) entirely different from the verbal stimulus might be classified as a distinctive stimulus capable of attracting and redirecting attention to a verbal stimulus to which students have adapted. In this study the discrepant sound stimuli are tone bells manipulated in various ways. Hernández-Péon (1966) believed that the "process of attention can be triggered directly by a sensory stimulus (p. 187)." Titchener (1966) noted that a "tone that beats, or recurs intermittently, or fluctuates in pitch, within a chord or compound clang stands out clearly from its background (p. 29)" so that attention is attracted to it. If this is true, then an intermittent spacing of tones having rhythm and pitch must stand out from a background of verbal instruction. Pearlestein's (1969) study of pitch and duration of tones showed a significant difference in orienting reaction in favor of the varied pitch stimulus. In speaking of musicians' devices used for arousal, Berlyne (1960) cited Milerian's discovery that melodies, being more complex, arouse more interest than single tones. He also pointed out that rhythm is used to create arousal. Single tones, melodies, and rhythmic stimuli are used in the present study.
Stimulus Placement

Anokhin (Berlyne et al., 1966) concluded that placement of the arousal stimulus makes a difference. For best recall a day later, presentation of the stimulus after the response was not as effective as presentation simultaneously with the response. Berlyne and Carey (1968) found that their subjects' memory for paired English and Turkish words was best when the sound stimulus either began or ended with the onset of the response term. Cats were conditioned to make the orienting response following the presentation of a visual stimulus. Next they were conditioned to an auditory stimulus. Their orienting response was stronger to the auditory stimulus presented prior to the visual stimulus than to the paired stimuli. This seemed to indicate that the tone served as an arousal signal for the onset of the light (Adamec & Melzack, 1970).

Leibrecht (1969), in studying rats' behavior subsequent to habituation to air pressure focused on the ear, found that the sound of a buzzer produced a short period of reinstatement of the habituated head-shake response. The buzzer was a novel, dishabituatatory stimulus presented during intertrial air stimulus habituation training. The results of the foregoing experiments appear to support the idea that sound stimuli placed prior to the expected response are effective in attracting attention and producing a response. In the present study the stimuli were placed before the anticipated responses.
Placement of Questions

The placement of questions about verbal material was a matter of concern. Frase (1968) found that questions placed after reading paragraphs rather than before preserved the continuity of the material and facilitated its retention. In the present study, the students were questioned after they heard the sentence which contained the answer.

Need for Present Study

Several studies have been made of the effect of extraneous sound arousal used during the performance of tasks in which the performance was enhanced (Evans, 1916; Oltman, 1964; Poyntz, 1933; Weinstein & MacKenzie, 1968). However, the author has observed that little investigation has been made of the use of arousal stimuli prior to engaging in a task in an actual classroom lesson situation. This fact, plus the apparent need for such a technique, prompted the present study.

For additional sources of information related to the present research, see references in Appendix A.
Chapter 2

METHOD

After examining an outline of the purposes and proposed processes of the research project, the Modesto City Schools assistant superintendent, the Riverbank Elementary Schools District superintendent, and the coordinators of the Title I project in both districts gave their permission to initiate and carry it out.

At a meeting of the principals of designated Title I schools the author explained the research project, and gave each person a dittoed list of types of cooperation needed from both principals and teachers, and a sample of the pupil response sheet. See Appendix B for the written material distributed at the meeting. The principals agreed to present the proposal to their fourth-grade teachers.

The teachers who were to become involved consented to cooperate after participating in a period of explanation and discussion of the possible future benefits to children. They, too, received a list of their responsibilities and samples of the pupil response sheets.

Subjects

The subjects were drawn from schools designated as having an enrollment of predominantly culturally and educa-
tionally disadvantaged students. The criterion for determining the classification of a school under the Title I project is whether it is in an attendance area "in which the concentrations of poverty are at least as high as the average concentration of poverty in the school district . . ." (Guidelines, 1971). Factors that were considered in defining qualifying attendance areas were

- Family income or other data reflecting severe poverty, such as payments of Aid to Families with Dependent Children . . ., housing statistics, test scores, infant mortality rates, mobility and attendance records, the need for such services as free lunches, or other indications of need. The attendance areas may be ranked by the percent or by the number of children from low-income families residing in the areas (Guidelines, 1971).

The schools that participated in the study were Bret Harte Elementary School and Washington Elementary School in Modesto, and California Avenue School, Cardozo Elementary School, and Rio Altura School in Riverbank. The ethnic composition of the fourth-grade classes was examined in order to determine which of the classes could feasibly be matched on that variable.

**Subjects Used in the Trial Pretest**

A sixth class at Franklin Elementary School in Modesto, which was composed of a large number of Negro children, was excluded from the main study, but was used for trying out the pretest in order to determine whether the directions and timing were adequate. Their performance indicated the need for making one slight change in the directions of the test.
Subjects Used in the Study

Five teachers were willing to cooperate throughout the duration of the study. Their classes were assigned to the five experimental groups on a random basis. The number of students in the classes ranged from 24 to 35. A few Negro and Chinese children enrolled in one class were eliminated from the study to keep the ethnic composition the same across groups. The number of subjects to be randomly selected from each of the other four classes was determined by the size of this class after the exclusion of these children. Equal numbers of children were used from each of the five classes. All of the children in each class participated in the study. In order to equalize the number of subjects in each group, for the data analysis, only 17 randomly selected subjects were used from each class.

All five classes participated in a pretest which was the presentation of the first reading lesson with no tone bell stimulation. The Stanford Achievement Test reading percentile ranks were used in testing for homogeneity of groups.

Design

The research design was a three-variable split-plot factorial design (SPF-22.5 design, Kirk, 1968) to determine the effect of the variables of melody and rhythm on maintenance of attention to verbal instruction. There were two levels of melody (seven identical tones or seven different
tones) and two levels of rhythm (even-equal spacing or uneven-unequal spacing). The satiation process was examined through comparisons of group means over the five trials (the repeated measures variable). See Table 1. In addition a

**TABLE 1**

An Example of the Three-variable Split-plot Factorial Design

<table>
<thead>
<tr>
<th></th>
<th>Trials</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Melody</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhythm</td>
<td>Even</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uneven</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melody</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Some</td>
<td></td>
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</table>

fifth group (class) was not presented with any tonal stimulus.

**Equipment**

The experimenter prepared 30 orally-taped reading lessons. Each lesson was of 10 min. duration. All tapes presented material not previously learned in reading classes from first through fourth grades. Each class received six successive lessons, one each school week. The first lesson was the pretest which contained no extraneous sound arousal stimuli. The verbal material in each separate lesson was
identical for all classes so that there were only six different lessons with five copies of each. Each lesson was presented simultaneously to all classes. The lessons for Group V contained no interruptions. Lessons Two through Six given to Group I were interspersed with stimuli each of which consisted of the sounding of seven identical bell tones (G above middle C), equally-spaced. Tone Educator Bells manufactured by Scientific Music Industries, Inc. were used for the stimuli. For Group II the arousal stimulus was seven different bell tones equally-spaced. The melodic component is illustrated in Figure 1. 

The arousal stimulus for Group II.

\[ \begin{align*} 
\text{Figure 1. The melodic stimulus pattern presented to Group II.} 
\end{align*} \]

Group III was seven identical bell tones (G above middle C) sounded in the rhythmic pattern illustrated in Figure 2. 

\[ \begin{align*} 
\text{Figure 2. The rhythmic stimulus pattern presented to Group III.} 
\end{align*} \]

Group IV was presented with an arousal stimulus of seven different tone bells sounded in the rhythmic and melodic patterns illustrated in Figures 1 and 2. The duration of every stimulus used on the 20 experimental tapes was 3 sec. The arousal stimuli were inserted in the tapes at identical points in the same lesson for all four experimental groups.
The placement of the bells within a lesson was unequally-spaced, determined by the appropriateness of asking a question about material presented. Prior to presenting material about which a question was asked, a tone bell arousal stimulus was sounded for the purpose of directing attention from thoughts irrelevant to the instruction and drawing attention to the verbal stimulus. There was one sentence between the bell stimulus and the question. A 1.5 sec. interval of silence preceded the presentation of the question to distinguish it from the text. The 30 taped lessons each contained six taped questions. A copy of each lesson may be found in Appendix C.

The children were provided with a pencil and a response sheet for each lesson. Figure 3 is an example of the response sheet which was used. The test directions con-

```
Name______________________

1  2  3

4  5  6

8 1/2"

Figure 3. A replica of the response sheet used in answering questions.
```
tained an example of the question to be asked. The example was, "Did the sentence you just listened to tell you why Darren jumped into the water? If it did tell you why Darren jumped into the water, put a mark in the box that has the numeral 1 in it. If it did not tell you why Darren jumped into the water, do nothing." The teachers moved about the room to ascertain whether the children understood the procedure. An equal number of positive and negative answers were the correct responses. The order of positive and negative answers in each of the six lessons was determined on a random basis.

**Procedure**

**Presentation of Lessons**

The teachers administered the lesson presentations. Prior to giving the pretest, they reproduced the response sheet on the blackboard, and explained its use. To control for administrative effects, the instructions were identical for each class and for each lesson with the exception of the introduction to the pretest. This introduction was intended to explain the reason for the lessons being given, and to motivate the children to work on them. The instructions may be found in Appendix D.

**Environmental Control**

To keep the effects of time and weather constant, the lessons were presented at the same hour on the same day—at 3 o'clock on Wednesday afternoons. The teachers
selected that particular time and day because each of their
classes would be intact during that period. The six days on
which they were presented were as similar as possible in
atmospheric conditions. Fortunately, on all six days the
weather was warm. The lessons were given at one-week inter-
vals with the exception of Easter vacation week. The pres-
entations were made in the same room with the children in
the same seating arrangement for each respective group in
order to control other physical environmental conditions.
The amount of ventilation and lighting, and the temperature
of the rooms was as nearly identical as was feasible. No
room was equipped with air conditioning; so the side windows
were opened. The teachers made an effort to keep the tem-
peratures at approximately 70 degrees Fahrenheit. All of the
lights were turned on. On the outside of the closed doors a
sign was displayed reading, "Testing. Please do not dis-
turb." Such a sign is familiar to school children.
Subject Matter

The subject matter was different in each of the six
lessons. From the pretest to the last lesson, respectively,
each lesson dealt with factual information, pronunciation of
consonants, syllabication, sequence of events, determining
word meanings from the context, and drawing conclusions.
However, attempts were made to keep the interest of the
material to children constant so that any trend in scores
over tapes would not be due to change in interest value of
the lessons. The author consulted with a Title I program
reading specialist regarding the content and interest value of the lessons.

Control of Information

Using pupils from five different schools eliminated the possibility of the subjects discussing the project between groups.
Chapter 3

RESULTS AND DISCUSSION

Correctness of answers to the questions asked about the lesson content was the measure of the attribute of attention hypothesized to be enhanced by the insertion of sound arousal stimuli. A table of all the scores of all the subjects may be found in Appendix E.

Prior to the presentation of five successive lessons containing tone bell stimuli, a pretest was administered to the control group and to the four experimental groups. The pretest, which was the same for all groups, consisted of six questions included in and concerning taped verbal material that was presented to the children. After the groups had been numerically equated on the bases of ethnic composition and of absenteeism on the day of testing, there were 15 students in each group. In addition, before the tone bells were used, the percentile rank on the reading portion of the Stanford Achievement Test was obtained for every student. When the groups were equated on the basis of ethnic composition, there were enough Stanford Achievement Test scores per group so that there were 17 children in each group.

The level of significance was set at .05 for all statistical tests throughout the study.
Table 2 shows the pretest means for each group. An

<table>
<thead>
<tr>
<th>Groups</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td>4.20</td>
<td>4.66</td>
<td>5.33</td>
<td>4.06</td>
<td>3.93</td>
</tr>
</tbody>
</table>

analysis of variance of the five group means obtained on the pretest (CR-5, Kirk, 1968) showed that there was a significant difference between groups ($F = 5.11$, $df = 4/70$, $p < .01$). However, a similar analysis of variance of the group means obtained on the Stanford Achievement Test scores indicated that there was no significant difference between groups ($F = 2.072$, $df = 5/14$, $p > .05$).

Cochran's test of homogeneity of variance (Kirk, 1968) indicated that each set of five variances of both the Stanford Achievement Test scores and the pretest scores were homogeneous ($G = .307$, $df = 5/16$, $p < .05$; and $G = .338$, $df = 5/14$, $p < .05$), respectively.

Therefore the variances of the five treatment groups were homogeneous on both the Stanford Achievement Test and pretest measures. The means of the Stanford Achievement Test scores were not significantly different from each other. The means of the pretest scores were significantly different from each other, with the mean of the control group (Group V) being significantly less than the mean of Group III.
The experimental hypothesis was that culturally disadvantaged fourth-graders would more frequently give correct responses to oral verbal instruction when the verbal material was interspersed with tone bell arousal stimuli than when no attention-getting stimuli were used. Observation of the means of the control group and of the combined means of the experimental groups over the five trials showed that the effect of the tone bell stimuli was in a direction contrary to the prediction. The mean for the experimental groups was 4.1 while that for the control group was 4.4. Thus the experimental hypothesis was not supported by the data. Lack of support for the prediction was not a function of group differences in performance on either the Stanford Achievement Test or on the pretest since the means for the former did not differ significantly from each other; and the control group's mean for the latter was less than that of any other group, and significantly less than that for Group III.

The tone bell stimuli may have created too high an arousal level (Berlyne & Carey, 1968; Kagan, 1970; Kuusinen, 1970). The discrepancy between the interest value of the tone bell stimuli and that of the lesson content (Blum et al., 1968) may have been so great that the children listened for and concentrated on the tone bells to such an extent that their attention was distracted from the verbal material.

The control group's teacher reported that, compared with other Title I classes she had taught, this class seemed to be more easily motivated, and when motivated, was more
highly so and was more interested in the activity in which they were engaged. Beginning with lesson Two, the first of the test series of five lessons, she complied with their request to supply them with the correct answers after their response sheets had been collected. The fact that they received feedback may have constituted a reward and motivation that the experimental groups did not experience.

It was further hypothesized that the frequency of correct responses would be related to evenness of rhythm and presence or absence of melody. The analysis of variance (SPF-22.5, Kirk, 1968) almost supported this hypothesis. The interaction of the variables of rhythm and melody approached significance ($F = 5.04$, $df = 1/64$, $p < .10$). The summary of the analysis of variance is presented in Table 3. See Appendix F for tabled means of each group's scores under various levels of treatment over the five trials.

Dunn's multiple comparison procedure (Kirk, 1968) applied to the smallest and largest treatment means showed that there were no significant differences, and that the four experimental groups were essentially equivalent, although the average performance was best in the case of Group IV.

An analysis of covariance (CRFAC-2.2, Kirk, 1968) was applied to the same data with the exception of subtracting two subjects from each group to equalize the number of subjects across groups, since some children had not been present to take the pretest. The pretest scores were used as the covariate. The results are presented in Table 4.
### Table 3

Analysis of Variance Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$F$ (A, B, and C Subjects Random)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between subjects</td>
<td>132.127</td>
<td>67</td>
<td>.662</td>
<td>.33</td>
</tr>
<tr>
<td>A</td>
<td>.662</td>
<td>1</td>
<td>.662</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>.238</td>
<td>1</td>
<td>.238</td>
<td>.12</td>
</tr>
<tr>
<td>AC</td>
<td>5.955</td>
<td>1</td>
<td>5.955</td>
<td>3.04</td>
</tr>
<tr>
<td>Subj. w. groups</td>
<td>125.272</td>
<td>64</td>
<td>1.957</td>
<td></td>
</tr>
<tr>
<td>Within subjects</td>
<td>382.400</td>
<td>272</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>60.627</td>
<td>4</td>
<td>15.156</td>
<td>13.16**</td>
</tr>
<tr>
<td>AB</td>
<td>4.262</td>
<td>4</td>
<td>1.065</td>
<td>.92</td>
</tr>
<tr>
<td>BC</td>
<td>8.922</td>
<td>4</td>
<td>2.230</td>
<td>1.93</td>
</tr>
<tr>
<td>ABC</td>
<td>13.851</td>
<td>4</td>
<td>3.462</td>
<td>3.00*</td>
</tr>
<tr>
<td>B x subj w. groups</td>
<td>294.738</td>
<td>256</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>514.527</td>
<td>339</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .01$
The conclusions from the covariance adjusted results were

TABLE 4
Analysis of Covariance Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F (A, B, and C Fixed Effects, Subjects Random)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_{adj}$</td>
<td>0.1</td>
<td>1</td>
<td>0.1</td>
<td>.01</td>
</tr>
<tr>
<td>$C_{adj}$</td>
<td>7.4</td>
<td>1</td>
<td>7.4</td>
<td>.74</td>
</tr>
<tr>
<td>$A_C_{adj}$</td>
<td>31.2</td>
<td>1</td>
<td>31.2</td>
<td>3.12*</td>
</tr>
<tr>
<td>Subj $w.A_C_{adj}$</td>
<td>548.3</td>
<td>55</td>
<td>10.0</td>
<td></td>
</tr>
</tbody>
</table>

*$p < .10$

the same as those obtained through the analysis of variance. There was almost a significant interaction of melody and rhythm as predicted. However the main effects of melody and rhythm were not significant. The mean scores of the two melody groups were approximately the same when the means were adjusted for pretest differences as when they were not adjusted for those differences. The mean scores of the two rhythm groups were essentially the same when the means were adjusted for pretest differences as when they were not adjusted for those differences. Therefore pretest differences did not account for the lack of posttest differences.

It was hypothesized that the frequency of correct responses would be greatest under the treatment for Group IV, that it would be greater under the treatment for Group II than under those for Groups III and I, and that it would be
greater under the treatment for Group III than under that for Group I, that is IV > II > III > I. The combined means for each group over the five trials are presented in Table 5.

TABLE 5

Treatment Means over Five Trials

<table>
<thead>
<tr>
<th>Groups</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td>4.17</td>
<td>3.96</td>
<td>4.00</td>
<td>4.51</td>
</tr>
</tbody>
</table>

The prediction that the mean for Group IV would be greater than that of each of the other means was supported. However the differences were not significant.

The method by which an answer could be indicated on the response sheets may have been too simple. The correct responses consisted of three negative and three positive answers on each test. Negative answers were indicated by making no mark, and positive by making a mark. It was possible to obtain a score of three either by making no marks or by marking all six boxes. Therefore a score of three could have been made by paying no attention at all. The preponderance of scores was in the range of from three to five. It is possible that many of these could have been obtained by guessing or by marking randomly. The dearth of scores in the range of from zero to two might indicate that the method of responding did not discriminate the true low scorers.
Figure 4. Graph of the total scores of each of the four experimental groups on each trial.
An analysis of variance on the trials data (SPF-22.5, Kirk, 1968) indicated that the trials effect was significant at the .01 level ($F = 13.16, df = 4/256$). The interactions of rhythm and trials ($F = .92, df = 4/256, p = >.10$) and the interactions of melody and trials ($F = 1.93, df = 4/256, p = >.10$) were not significant. The interaction of rhythm, melody, and trials was significant at the .05 level ($F = 3.00, df = 4/256$). The total score of each of the four experimental groups on each trial was graphed. See Figure 4.

From the first trial to the second all groups improved. From the second through the fourth trials the scores became progressively smaller. This trend seemed to indicate that the children were habituating over trials. On the last trial the scores improved for all but Group II. Although the teachers and the Title I reading specialist agreed that the last lesson was difficult, the former noted that the children laughed occasionally which, in addition to the teachers' personal evaluations of the lesson content, led them to conclude that the material was more interesting and thus more conducive to maintaining attention. The second group's failure to improve on the last trial might have been due to the presence of a substitute teacher on that day.

To better examine the melody by rhythm by trials interaction, a test for trend using orthogonal components was made to determine the shapes of the lines that best fit the group means on the trials-lessons (Kirk, 1968). A major portion (82%) of the variation associated with the interac-
Figure 5. Comparison of the satiation process within and between groups, using straight lines that best fit the total scores for each group on each of the five trials.
tion of rhythm, melody, and trials was attributed to a difference in the four linear trends of the trials, the linear sum of squares being 11.38 ($F = 9.90, df = 1/256, p < .01$).

Using the equation $Y' = \bar{Y} + b_{y,x}(X - \bar{X})$ the straight lines that best fit the total scores on each of the five trials for each group were constructed. Group V was plotted, also, for comparison. The resulting graph is shown in Figure 5. This graph makes possible a clear comparison of the satiation process within and between groups.

It was hypothesized that satiation would occur more rapidly in Group V, the control group, than in the four experimental groups. This prediction was not supported. As indicated in the graph Groups II and III satiated more rapidly than Group V. However, Group V did satiate faster than Group IV, which was stimulated by the combination of rhythm and melody. This lack of support for the hypothesis might have been due to the above-mentioned reward and motivation in the form of feedback given to Group V.

**Summary**

Since children must attend to what they are hearing in order to learn from it, the purpose of the present study was to devise a means of attracting and maintaining their attention to oral lessons. Interest was focused on culturally disadvantaged children because of their deficits in the areas of attending and listening to verbal instructional material.
Personal experience led the author to believe that tone bells were a pleasing, attractive stimulus to these children. Interspersed throughout taped verbal lessons, they were used as arousal stimuli sounded prior to the presentation of a sentence about which a question was asked.

Over five lessons or trials, five fourth-grade class groups responded to questions concerning identical verbal material that they heard. Lessons for the four experimental groups contained four different combinations of rhythmic and melodic stimuli. The combination for each group was consistent over the trials. The control group's lessons contained no tone bell stimuli. The experimental hypothesis was that the four experimental groups would more frequently give correct responses than would the control group because of the predicted attention-getting value of the discrepant sound stimuli.

This hypothesis was not supported as was evidenced by examination of the means of the control group and of the combined means of the experimental groups over trials. Two factors apparently were principally responsible for this lack of support. The interest value of the bells might have been so much greater than the interest value of the verbal presentations that the children were distracted from the latter to the former. As Solley and Murphy (1960) stated, attention is a function of the preceding moment as well as the period during which the potential stimulus is being received. The sentence about which a question would be
asked was intended to be the "potential stimulus," while the
tone bell stimuli occurred during the "preceding moment."
Their attention may have been arrested for too long a time at
the "preceding moment." A brief period of silence between
the bell stimulus and the sentence might have permitted the
children to attend to the tone bells, to recover sufficiently
from the arousal effect, and to better direct their atten-
tion to the forthcoming sentence.

The second, and probably most important, factor
seemed to be the reinforcing and motivating effect of the
feedback given to the control group by their teacher.

Since the groups, to begin with, were intact classes,
it is possible that some variable existed within the control
group that caused it to differ from the other groups in its
reaction to the experimental situation.

Although, in this study, the use of discrepant sound
stimuli did not result in higher scores than those obtained
by the control group, it should not be concluded that some
such type of stimulation will not be of benefit in other
similar verbal teaching situations. In a future study a
less attractive stimulus might be used followed by a brief
pause prior to the presentation of the target sentence.
Also, participating teachers should be instructed not to add
anything to the procedure, nor to change it in any other way.

The combination of melody and uneven rhythm proved
to be more effective in eliciting correct responses than any
of the other three combinations: melody and even rhythm,
same tones and even rhythm, and same tones and uneven rhythm. Therefore if this type of stimulus is to be used, it appears that melody and rhythm combined would be the preferred choice. The fact that Group IV, which experienced melody and rhythm, did not habituate while the others did gives added support to the belief that this combination may be of value in attracting attention and eliciting correct responses.

The fact that the scores of four groups improved on the last trial after habituation had apparently been taking place suggests that adding more interest to the verbal material may be a way of inducing dishabituation. Thus this method of teaching can be prolonged over a greater interval of time.

A teacher could use this type of lessons in one of two ways—successively until habituation has taken place and dishabituation is no longer possible, or interspersed throughout the school year so that satiation does not occur.

Recommendations for Future Studies

In the present study longitudinal time was limited. A future study might investigate further the effects of the stimuli, and the satiation process by presenting lessons over a longer period of time.

The indication that the variable of feedback contributed more to the improvement in scores than did the arousal stimuli suggests that feedback needs further study
in regard to this type of lesson used with culturally disadvantaged children.

Future studies might examine the variable of lesson content. An attempt could be made to keep the instructional content homogeneous, and the material across lessons of equal interest. Additional investigation of interest might necessarily precede such an attempt.
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Appendix A

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Appendix B

Material Distributed at the Principals' Meeting

A. Principal's cooperation will be needed in granting:

1. Permission to work in the school.

2. Permission to contact teachers after school hours on the premises.

3. Permission to examine lists of fourth-grade class members for the purpose of matching classes on ethnic composition.

4. Access to cumulative folders for the purpose of obtaining I.Q. scores and achievement test results--to save teacher time.

5. Use of tone bells for recording sound stimuli.

B. Teachers' assistance will be needed in:

1. Presenting and playing the tapes—one a week for six weeks.

2. Supervising the use of the response sheets, and collecting them.

3. Maintaining identical environment for each testing session: seating arrangement, ventilation, lighting, temperature.

C. Children's response sheet. See the following page.
Appendix C

Texts of the Taped Lessons

Lesson 1: Factual information. This is a story about how civilization began. Civilization is a way of living. We are civilized people. We think about how other people feel, and we try to live together so that no one gets hurt. Our laws or rules help us to get along well with each other. We work with other people so that all of us can have enough to eat, comfortable clothes to wear, and a house to keep us warm. Civilized people are able to have more than just the things we need in order to stay alive. We also have games, toys, pictures, music, T.V. sets, and automobiles. Because we are civilized, we can read and write. We can learn about the things that people did long ago; and we can write stories about the things that we are doing, so that people who will live here after us will know about how we are living now.

We are a part of what is called Western civilization. Western civilization began thousands of years ago along the rivers of far-off Egypt and Babylonia. (1 1/2 sec. pause) Did the sentence you just listened to tell you where Western civilization began? If it did tell you where Western civilization began, put a mark in the box that has the numeral 1 in it. If it did not tell you where Western civilization began, do nothing. (10 sec.) There was much rain so that many plants and animals could live there. People were able to live by hunting, fishing, picking fruit, and digging roots for food.

As the years went by, there was not as much rain. The land became more dry; and there was not as much food. People could not be sure that they would always find food whenever they needed it, and wherever they went. So they tamed some of the animals, such as sheep and goats; and they began to plant seeds and make gardens which they took care of. They no longer went from one place to another whenever they felt like it. (1 1/2 sec.) Did the sentence you just listened to tell you that people went from one place to another whenever they felt like it? If it did tell you that people went from one place to another whenever they felt like it, put a mark in the box that has the numeral 2 in it. If it did not tell you that people went from one place to another whenever they felt like it, do nothing. (10 sec.) They had to stay where their animals and gardens were. People who took care of animals were called herdsmen. Those who took care of gardens were called farmers. Herdsmen and farmers started what we call agriculture or farming. (1 1/2
Agriculture was the very beginning of civilized life. People had to work together to dig canals so that the plants and animals would have water during the times of the year when there was no rain. People needed each other. They could no longer live alone and move around whenever they felt like it. They lived closer to each other in bigger groups, and stayed in one place most of their lives. That was the beginning of a community. We live in the community of Modesto (Riverbank).

In order for everyone to work well together, a few people told all of the others what needed to be done; when and how to do it; and what job each person should do. That was the beginning of a government. Modesto (Riverbank) has a government. It has a mayor and councilmen chosen by the people to make laws that help them live together in peace.

Because the farmers of long ago lived and worked well together, they raised more animals and food than they could use. They traded the animals and food that were left over for other things they needed, and for some things that they did not need, but just wanted because they were pretty. (1 1/2 sec.) Did the sentence you just listened to tell you what the people did with the animals and food that were left over? If it did tell you what the people did with the animals and food that were left over, put a mark in the box that has the numeral 4 in it. If it did not tell you what the people did with the animals and food that were left over, do nothing. (10 sec.) Also, they had time to do other things besides making a living. They learned to make better tools, houses, and clothes. They made things that they did not need, but that they liked—things such as pretty dishes and gold and silver jewelry. (1 1/2 sec.) Did the sentence you just listened to tell you that the people made things that they needed? If it did tell you that the people made things that they needed, put a mark in the box that has the numeral 5 in it. If it did not tell you that the people made things that they needed, do nothing. (10 sec.)

Some people went to other places to trade with the people who lived there. They took the ideas of their civilization wherever they went until more and more people became civilized.

Sailors like Christopher Columbus went across oceans to other lands. They sometimes found people who were still wandering about looking for food. They taught these people
how to live in one place and raise their own food. They
brought some of their civilization to the lands they visited.
Some people stayed in these lands and lived with the people
who were already there.

Many civilized people came to America from many dif-
ferent places. (1 1/2 sec.) Did the sentence you just lis-
tened to tell you that many civilized people came to America
from one special place? If it did tell you that many civil-
ized people came to America from one special place, put a
mark in the box that has the numeral 6 in it. If it did not
tell you that many civilized people came to America from one
special place, do nothing. (10 sec.) These people and the
Indians who were already here taught each other some of the
things from their different civilizations. We live in the
American civilization which is made up of things learned from
many different civilizations.

The material contained in the above lesson is rewrit-
ten from Boak, A. E. R., Hyma, A., & Slosson, P. The growth
Lesson 2: Pronunciation of consonants. This is a lesson about consonants. Sometimes there are two consonants right next to each other in a word. For example, the word "then" starts with the two consonants "t" and "h". The "t" and "h" together make only one sound—"th". Because they make only one sound, they are called a consonant digraph. Some other words that start with the consonant digraph "th" are "that," "there," "this," "these," and "though."

Another consonant digraph is made up of the letters "c" and "h" next to each other in a word. The "ch" or (sound of "ch") in the words "chain," "chin," "child," and "chair" is a consonant digraph. (TONE BELLS) The word "chop" begins with the consonant digraph "ch". (1 1/2 sec.) Did the sentence you just listened to tell you that the word "chop" begins with a consonant digraph? If it did tell you that the word "chop" begins with a consonant digraph, put a mark in the box that has the numeral 1 in it. If it did not tell you that the word "chop" begins with a consonant digraph, do nothing. (10 sec.) "Church" is a word that both begins and ends with the consonant digraph "ch".

The letters "s" and "h" next to each other are a consonant digraph. "Shame," "sheet," "shy," "show," and "shoot" all begin with the consonant digraph "sh" or (sound of "sh"). Some words that end with the consonant digraph "sh" are "rash," "dish," "mesh," and "crush." (TONE BELLS) "Dash" is another word that ends with the consonant digraph "sh". (1 1/2 sec.) Did the sentence you just listened to tell you that the consonant digraph "sh" is at the end of the word "dash"? If it did tell you that the consonant digraph "sh" is at the end of the word "dash," put a mark in the box that has the numeral 2 in it. If it did not tell you that the consonant digraph "sh" is at the end of the word "dash," do nothing. (10 sec.)

The consonant digraph is found in the middle of some words such as the "th" or "sh" in the middle of the words "feather" and "mother."

"Ph" and "gh" are two consonant digraphs that sound like "f". In the words "telephone" and "elephant" the consonant digraph is "ph"; and it sounds like "f". At the end of the words "rough" and "tough" the "f" sound is made by the consonant digraph "gh". We have learned that when two consonants that are next to each other make only one sound, they are called a digraph.

Sometimes two consonants that are next to each other in a word make more than one sound. Consonants that are next to each other and make more than one sound are called consonant blends. Examples of consonant blends are the "g" and "r" or "gr" in "grow," the "c" and "l" or "cl"
Now we have learned about both consonant digraphs and consonant blends. (TONE BELL$) A digraph is made up of consonants that together make only one sound, while a blend makes two or more sounds. (1 1/2 sec.) Did the sentence you just listened to tell you that the word "street" begins with a consonant digraph that is made up of three consonants? If it did tell you that the word "street" begins with a consonant digraph that is made up of three consonants, put a mark in the box that has the numeral 3 in it. If it did not tell you that the word "street" begins with a consonant digraph that is made up of three consonants, do nothing. (10 sec.) The word "sprout" is another word that begins with a consonant digraph that is made up of three letters. The letters are "s", "p", and "r" which are pronounced "spr". Adding "out" to "spr" makes "sprout".

Some consonants can be either hard- or soft-sounding. The words "celery," "city," "cement," and "Cynthia" all begin with a soft "c" which sounds like an "s". A hard "c" sounds like a "k". Hard "c's" are the first letters of the words "cut," "camp," "could," and "Carl." (TONE BELL$) The word "cute" begins with a "k" sound which is made by a hard "c". (1 1/2 sec.) Did the sentence you just listened to tell you that the word "cute" begins with a soft "c"? If it did tell you that the word "cute" begins with a soft "c", put a mark in the box that has the numeral 5 in it. If it did not tell you that the word "cute" begins with a soft "c", do nothing. (10 sec.) Sometimes there is a soft "c" in the middle of a word. In the word "icy" the soft "c" is in the middle. A hard "c" may be found in the middle of a word, too. There is a hard "c" in the middle of the word "acre."

The consonant "g" may be either hard or soft. If it is hard, it sounds like (sound of "g" as in "get"). If it is soft, it sounds like a "j" or "g"). In the word "gone" the hard "g" or (sound of "g" as in "get") is at the beginning. The hard "g" or (sound of "g" as in "get") is in the middle of the word "wiggle." At the end of the word "bug" there is a hard "g" or (sound of "g" as in "get"). "Dag" begins and ends with a hard "g".

A soft "g" may be found either at the beginning, in the middle, or at the end of a word, and sometimes in more
than one of these places in a single word. (TONE BELLS)
The word "gorge" has a hard "g" or (sound of "g" as in "get")
at the beginning and a soft "g" or "ğ" near the end. (1 1/2
sec.) Did the sentence you just listened to tell you that
the word "gorge" has both a hard and a soft "g" in it? If
it did tell you that the word "gorge" has both a hard and a
soft "g" in it, put a mark in the box that has the numeral 6
in it. If it did not tell you that the word "gorge" has both
a hard and a soft "g" in it, do nothing. (10 sec.)

In this lesson we have learned some things about
c consonants. We know that two consonants next to each other
that make one sound are called a digraph. If two consonants
together make more than one sound, they are called a blend.
Also, we found that the consonants "g" and "c" may be either
soft or hard.

Much of the material contained in the above lesson
is quoted, paraphrased, and rewritten from Russell, D. H., &
McCullough, C. M. Manual for teaching the Fourth reader:
Lesson 3: Syllabication. This lesson is about the number of syllables that words have. Every word has one or more parts. Each part of a word is called a syllable. There must be a vowel in each syllable. The vowels, you remember, are "a", "e", "i", "o", and "u", and sometimes "w" and "y". A vowel may sound like its letter name in the alphabet—for instance, the vowel "a" may sound like its letter name "a"—or it may have a different sound such as "æ" or "æ". But, no matter how it sounds, when you hear it, you know that you are hearing a syllable.

The word "ate" has the vowel "a" in it. That is the only vowel that you hear. You hear only one vowel; so there is only one syllable. The word "cat" has the vowel "a" in it. In this word the vowel "a" sounds like "æ". You hear only one vowel in the word "cat"; so there is only one syllable. The word "car" has the vowel "a" in it. In this word the vowel "a" sounds like "æ". You hear only one vowel; so there is only one syllable. In each of the words "ate," "cat," and "car" there are other letters; but "a" is the only vowel that you hear. (TONE BELLS) Whenever you hear only one vowel, you are hearing only one syllable. (1 1/2 sec.) Did the sentence you just listened to tell you that you hear one syllable when you hear one vowel? If it did not tell you that you hear one syllable when you hear one vowel, put a mark in the box that has the numeral 1 in it. If it did not tell you that you hear one syllable when you hear one vowel, do nothing. (10 sec.)

You can hear more than one vowel in some words. If you can hear two vowels in a word, then that word has two syllables. "Delight" is a word that has two syllables. You can hear the vowel "e" in "dē" and the vowel "i" in "light." You hear two vowels; so the word "delight" has two syllables. (TONE BELLS) In the word "design" you can hear the same two vowels that you heard in the word "delight." (1 1/2 sec.) Did the sentence you just listened to tell you that you hear different vowels in the words "design" and "delight?" If it did tell you that you hear different vowels in the words "design" and "delight," put a mark in the box that has the numeral 2 in it. If it did not tell you that you hear different vowels in the words "design" and "delight," do nothing. (10 sec.)

"Unload" is another word that has two syllables. They are "un" and "load." You can hear two vowels—"u" in "un" and "æ" in "load." so there are two syllables. In the word "below" there are two syllables. You can hear the "e" in "bē," and the "ō" in "low." The word mistake has two syllables. (TONE BELLS) You can hear the "i" in "mis" and the "a" in "take." (1 1/2 sec.) Did the sentence you just listened to tell you that you can hear the "i" in "mis," and the "oō" in "took?" If it did tell you that you can hear the "i" in "mis," and the "oo" in "took," put a mark in the
box that has the numeral 3 in it. If it did not tell you that you can hear the "i" in "mis," and the "oo" in "took," do nothing. (10 sec.)

The word "radium" has three syllables or vowel sounds. You can hear the "æ" in "ra," the "i" sound in "dï," and the "u" sound in "um." Some other three-syllable words are "grandfather," "bicycle," and "chocolate." (TONE BELLS) Each of these words has three vowel sounds. If it did tell you that each of these words has three vowel sounds, put a mark in the box that has the numeral 4 in it. If it did not tell you that each of these words has three vowel sounds, do nothing. (10 sec.) Listen carefully for the three vowel sounds in each word: "grænd . fæ . thør," "blï . cʏ . cle," "chɔc . ɔ . lɪt."

Let's go over what we have just learned. You can hear only one vowel "i" in the word "kïte;" so "kïte" has only one syllable. You can hear two vowels in the word "bathtub"—the "ä" in "bath," and the "œ" in "tub;" so "bathtub" has two syllables. You can hear three vowels in the word "vacation"—the "æ" in "væ," the "æ" in "cæ," and the "i" in "tion;" so "vacation" has three syllables. (TONE BELLS) The number of syllables in a word is the same as the number of vowels you hear in that word. (1 1/2 sec.) Did the sentence you just listened to tell you that the number of syllables in a word is the same as the number of vowels you hear in that word? If it did tell you that the number of syllables in a word is the same as the number of vowels you hear in that word, put a mark in the box that has the numeral 5 in it. If it did not tell you that the number of syllables in a word is the same as the number of vowels you hear in that word, do nothing. (10 sec.)

Words can have even more than three syllables. The word "automobile" has four syllables: "æu . to . mo . bïle." There are four vowel sounds: "æ . ɔ . ɔ . and e—automobile." "Dictionary" is another word that has four vowel sounds and four syllables: "di . sha . nar . y--i . ū . ʌr . i."

Words may have one, two, three, four, or even five or six syllables. You can tell how many syllables they have by counting the number of vowel sounds you hear. (TONE BELLS) The word "television" has four vowel sounds and four syllables. (1 1/2 sec.) Did the sentence you just listened to tell you that the word "television" has five vowel sounds and four syllables? If it did tell you that the word "television" has five vowel sounds and four syllables, put a mark in the box that has the numeral 6 in it. If it did not tell you that the word "television" has five vowel sounds and four syllables, do nothing. (10 sec.) The word "everlasting..."
has five vowel sounds and five syllables. The word "responsibility" has six vowel sounds and six syllables. Remember that the number of syllables in a word is the same as the number of vowel sounds you can hear in that word.

Lesson 4: Sequence of events. You are going to hear some very short stories. Questions will be asked about a sentence in some of the stories.

First story: To the people of the far North, the reindeer is sheep, goat, cow, and horse. The animal supplies the people with meat, milk, and clothing. It also provides the chief means of transportation in its cold northern home.

Next story: Boston, Massachusetts, is often called the city of baked beans. In the early days baked beans and brown bread were often served in the homes on Saturday nights. They were also served for breakfast on Sunday mornings. This custom still exists, though it is not as common as it once was.

Next story: We remember Hernando De Soto because he was the first white man to find the Mississippi River. He happened to do this while he was looking for gold. However he never found any gold. (TONE BELLS) De Soto was born in Spain, came to America, helped conquer the Indians of Peru, landed in Florida, and traveled through the South until he discovered the Mississippi River. (1 1/2 sec.) Did the sentence you just listened to tell you that De Soto conquered the Indians of Peru after he landed in Florida? If it did tell you that De Soto conquered the Indians of Peru after he landed in Florida, put a mark in the box that has the numeral 1 in it. If it did not tell you that De Soto conquered the Indians of Peru after he landed in Florida, do nothing. (10 sec.) He and the men who traveled with him had trouble with the Indians. A year after discovering the Mississippi River, De Soto died. His men buried him at night so that the Indians would not know that their leader was dead. They were afraid that the Indians would fight them even harder if they knew of his death.

Next story: Mark and David went for a hike in the woods. They planned to stay there overnight. After climbing over logs, jumping across little streams, and pushing their way through bushes, they were hungry and tired. (TONE BELLS) They put their packs on the ground, sat down on the pine needles and rested awhile, built a fire, and cooked their supper. (1 1/2 sec.) Did the sentence you just listened to tell you that the boys cooked their supper and then rested? If it did tell you that the boys cooked their supper and then rested, put a mark in the box that has the numeral 2 in it. If it did not tell you that the boys cooked their supper and then rested, do nothing. (10 sec.)

Next story: Uncle Abe was one of the best-known mascots in the Union Army. One of the soldiers bought this lively eagle from an Indian. In battle Uncle Abe flew over the enemy, screeching and screaming. This famous eagle caused alarm in the ranks of the soldiers of the South.
Next story: On a clear night we can see hundreds of stars when we look at the sky. They shine brightly because they are burning. But there are many stars that we are not able to see, although we are looking right at the places where they are. Among the many stars that we cannot see are "dead" stars. At one time these stars were alive. They blazed brightly. (TONE BELLS) These stars burned up all their fuel, became "dead," and stopped twinkling and shining so that we cannot see them any more. (1 1/2 sec.) Did the sentence you just listened to tell you that these stars stopped twinkling and shining before they burned up all their fuel? If it did tell you that these stars stopped twinkling and shining before they burned up all their fuel, put a mark in the box that has the numeral 3 in it. If it did not tell you that these stars stopped twinkling and shining before they burned up all their fuel, do nothing. (10 sec.)

Next story: The Indians who used to live on the plains or flat, grassy lands of the mid-west depended upon the buffalo. They used the skins for tepees and for clothing. The meat was a part of their food supply. They sometimes used fire to help kill buffalo. (TONE BELLS) When buffalo were sighted in grassy fields, the Indians circled them, set the grass on fire, and trapped the buffalo inside the ring of flames. (1 1/2 sec.) Did the sentence you just listened to tell you that the buffalo were trapped after the Indians set the grass on fire? If it did tell you that the buffalo were trapped after the Indians set the grass on fire, put a mark in the box that has the numeral 4 in it. If it did not tell you that the buffalo were trapped after the Indians set the grass on fire, do nothing. (10 sec.) The buffalo ran in circles until Indian arrows brought them death.

Next story: There are roads to almost every part of our country. We need roads so that we may travel from place to place, and so that such things as food and lumber can be taken in trucks to people who need them. (TONE BELLS) Roads may have started as deer tracks and Indian trails, then grew into roads, and finally became the giant highways of today. (1 1/2 sec.) Did the sentence you just listened to tell you that deer tracks and Indian trails grew into roads? If it did tell you that deer tracks and Indian trails grew into roads, put a mark in the box that has the numeral 5 in it. If it did not tell you that deer tracks and Indian trails grew into roads, do nothing. (10 sec.) Highways now reach from coast to coast and all the way from north to south.

Next story: Long ago, letters were not put in envelopes when they were mailed. The sheets were just folded so that the writing could not be seen; then the sheets were sealed with hot wax; and a writer's seal or sign was pushed into the hot wax. When that was done, they were ready to be
Next story: Sound needs something to carry it. Since we are surrounded by air, most sounds reach us by traveling through the air. Sounds can travel through water. Sounds can also travel through the ground. Sounds can travel through any solid, liquid, or gas. In its travels, whenever sound reaches an ear that can hear, sound is then heard. The animal or person that hears it tries to decide what made the sound.

Next story: Many kinds of spiders spin webs in which insects get stuck. Then when the spiders are hungry, they eat the insects. Some spiders go fishing when they get hungry. (TONE BELLS) The fisher spider climbs down plant stems into the water, injects its powerful poison into the fish, drags the fish up on land, and then eats it. (1 1/2 sec.) Did the sentence you just listened to tell you that the fisher spider injects poison into the fish before it drags the fish up on land? If it did tell you that the fisher spider injects poison into the fish before it drags the fish up on land, put a mark in the box that has the numeral 6 in it. If it did not tell you that the fisher spider injects poison into the fish before it drags the fish up on land, do nothing. (10 sec.)

Next story: A man from another country counted all the car accidents. He found out that dark-colored cars are the hardest to see. Cars painted pink or any light shade seem to be safer. The light colors are more easily seen. Cars of two or three different colors may be even safer.

Lesson 5: Determining word meanings from the context. When you are reading, you often find a word that you have never seen before. Sometimes you can tell what it means by thinking about how it is used in the sentence. Now you are going to hear some single sentences, some pairs of sentences, and some short stories. Questions will be asked about the meaning of a word in some of the sentences.

"The bridge collapsed under the weight of the huge truck." In that sentence the word "collapsed" means "fell in." We could have said, "The bridge fell in under the weight of the huge truck."

Here are two sentences that have the word "stroke" in them. Because of the way it is used, the word "stroke" means something different in each sentence. In the sentence, "He liked to stroke the dog's head," the word "stroke" means "to rub gently." In the sentence, "His stroke with the paint brush was steady and smooth," the word "stroke" means "one movement with a tool."

Here are two other sentences that have the word "jam" in them. "Kathy wanted to eat the jam." (TONE BELLS) "He was in such a jam that he didn't know what to do." (1 1/2 sec.) Did the sentence you just listened to make you think that the word "jam" means "cooked fruit and sugar?" If it did make you think that the word "jam" means "cooked fruit and sugar," put a mark in the box that has the numeral 1 in it. If it did not make you think that the word "jam" means "cooked fruit and sugar," do nothing. (10 sec.)

Here is a short story. The Indians needed glue to attach feathers to their arrows and war bonnets. They also needed glue in making birch bark canoes. (TONE BELLS) They got jelly-like glue from deer horns, the neck of buffalo, and the pitch of evergreen trees. (1 1/2 sec.) Did the sentence you just listened to make you think that the word "pitch" means "to throw?" If it did make you think that the word "pitch" means "to throw," put a mark in the box that has the numeral 2 in it. If it did not make you think that the word "pitch" means "to throw," do nothing. (10 sec.) Indians also made glue from certain other plants.

Here is another story. The sheets in hospitals are not always white. Operating rooms often use green linen. The linen for children's rooms is sometimes pink or blue. (TONE BELLS) Using a color system makes it easier to identify the part of the hospital to which linens must be sent. (1 1/2 sec.) Did the sentence you just listened to make you think that the word "identify" means "to tell" or "to know?" If it did make you think that the word "identify" means "to tell" or "to know," put a mark in the box that has the numeral 3 in it. If it did not make you think that the word "identify" means "to tell" or "to know," do nothing. (10 sec.)
There is a new bed for hospitals. The bed is soft. The patient just "floats" in the fiberglass bed. Billions of small beads are held up by air so that the bed is almost like a liquid. The new bed is very helpful to people suffering from burns.

Everyone knows what a bank is. Everyone knows what a hospital is. Did you ever hear of a bank in a hospital? (TONE BELLS) There is such a thing, but there isn't any money in this bank. (1 1/2 sec.) Did the sentence you just listened to make you think that the word "bank" means a place that takes in and lends money? If it did make you think that the word "bank" means a place that takes in and lends money, put a mark in the box that has the numeral 4 in it. If it did not make you think that the word "bank" means a place that takes in and lends money, do nothing. (10 sec.) It is called a blood bank. Blood is kept there until someone in the hospital needs it.

Here is a story about Indians. Before they had horses, the American Indians traveled on foot. They hunted over a small territory. When brave Indians caught and rode a wild mustang, the life of the Indians changed. They became wonderful horsemen, able to hunt far and wide and make war on distant enemies. Some of the Indian tribes, including both the Sioux and the Comanche, operated on horses. In one operation they would slit the horse's nostrils. During the battle charges and buffalo hunts, the horses needed to breathe more freely. The large nostrils helped.

The most common food of the American Indians was pemmican. Pemmican is dried meat pounded into powder and mixed with fat and dried berries. It could be kept for several years. Pemmican was easy for Indians to carry when they traveled great distances. (TONE BELLS) Indians did not have red paint with which to paint themselves or dye their clothes. (1 1/2 sec.) Did the sentence you just listened to make you think that the word "dye" means "to color?" If it did make you think that the word "dye" means "to color," put a mark in the box that has the numeral 5 in it. If it did not make you think that the word "dye" means "to color," do nothing. (10 sec.) They used a wildflower called the bloodroot. The juice of this plant is so red that some people call it redroot, or Indian paint.

Long ago when Indians had white visitors, they rarely laughed or smiled. They rarely showed any feelings whatsoever. Their faces were without feeling or expression. They would make short greetings and point to a seat. Then the Indians would sit without saying anything for many minutes.
Here are two sentences in which the word "flood" means two different things. "The flood of letters came after the broadcast." In that sentence the word "flood" means "a great number of something." "A great number of letters came after the broadcast." In the sentence, "The flood covered fences and houses," the word "flood" means "a great flow of water over the land."

The word "buck" can mean different things depending on how it is used in a sentence. In the sentence, "The horse began to buck," the word "buck" means "to spring upward with head and back arched." In the sentence, "The buck stood very still at the sound of the cracking twig," the word "buck" means "a male deer, goat, hare, rabbit, or rat."

"Curiosity" is one of many words that can have different meanings depending on the way it is used in a sentence. In the sentence, "The student was full of curiosity," the word "curiosity" means "an eager wish to learn." In the sentence, "The building had so many towers that people thought it a curiosity," the word "curiosity" means "a strange or unusual thing."

(TONE BELLS) The bird's bright plumage made it look like a blossom among the leaves. (1 1/2 sec.) Did the sentence you just listened to make you think that the word "plumage" means "feathers?" If it did make you think that the word "plumage" means "feathers," put a mark in the box that has the numeral 6 in it. If it did not make you think that the word "plumage" means "feathers," do nothing. (10 sec.)

Lesson 6: Drawing conclusions. This is a lesson in drawing conclusions. You are going to hear some very short stories. Questions will be asked about a sentence in some of the stories. Use what you have learned from hearing the story to answer each question.

First story: The Badlands of South Dakota got its name from the land itself. The wind and rain have carved steep hills and gullies. In southwestern South Dakota there is very little plant life. Sand and gravel cover the area. The farm land is poor.

Next story: Nearly all people have been bitten by mosquitoes. Few people know that the "bite" is not really just a bite at all. The mosquito is sucking blood from the body. Once the "meal" is over, off flies the mosquito.

Next story: Babies have to learn to see. Newborn babies can't see shapes clearly. (TONE BELLS) They can tell the difference between very bright things and dark things, but they cannot follow things with their eyes. (1 1/2 sec.) Did the sentence you just listened to make you think that newborn babies can tell night from day? If it did make you think that newborn babies can tell night from day, put a mark in the box that has the numeral 1 in it. If it did not make you think that newborn babies can tell night from day, do nothing. (10 sec.) It takes them a few weeks to see shapes and a few months to see colors.

Next story: Lantern fish are very unusual. They have organs or glands in the sides of the head and body, which give off light much like a lantern. Whether it swims deep in the ocean or up near the surface, the lantern fish lights its own way.

Next story: How would you like to eat insects? People of the future may be eating insects quite often. Scientists are looking for a new food supply as more and more people are born. Some scientists say that insects may be just what we need!

Next story: When winds blow across the ocean, they start waves. The stronger the wind, the higher the waves. (TONE BELLS) No matter how hard the wind blows and how high the waves reach, the water far below the surface is quiet and peaceful. (1 1/2 sec.) Did the sentence you just listened to make you think that waves reach to the bottom? If it did make you think that waves reach to the bottom, put a mark in the box that has the numeral 2 in it. If it did not make you think that waves reach to the bottom, do nothing. (10 sec.) Isn't that difficult to believe?

Next story: Shattered glass has caused many injuries and deaths. Glass makers have come up with an answer
to this problem. They have made windshields that do not cut even when shattered. The use of this glass in automobiles is expected to save many lives.

Next story: During colonial days most people did not use forks. People balanced food on the flat end of a knife. It was hard to pick up peas on the flat end of a knife. (TONE BELLS) Honey was smeared over the peas so they would stay on the knife. (1 1/2 sec.) Did the sentence you just listened to make you think that honey was used because it was sticky? If it did make you think that honey was used because it was sticky, put a mark in the box that has the numeral 3 in it. If it did not make you think that honey was used because it was sticky, do nothing. (10 sec.)

Next story: Labor Day is a day set aside to honor working people. It comes on the first Monday of September in our country and in Canada. For most people Labor Day is a day of rest and fun. The idea for the holiday came from Peter McGuire in 1882.

Next story: Gray wolves are not very fast. They can be beaten over short distances. Yet wolves can run longer distances than almost any animal. They are great distance runners. Wolves have been known to run ninety miles dragging steel traps all the way.

Next story: Not all animals help old animals. Some animals drive the old or sick relatives away or even kill them. (TONE BELLS) Young elephants have been known to feed blind old elephants who cannot find food. (1 1/2 sec.) Did the sentence you just listened to make you think that some young animals are kind? If it did make you think that some young animals are kind, put a mark in the box that has the numeral 4 in it. If it did not make you think that some young animals are kind, do nothing. (10 sec.) Pictures have been taken of young elephants actually putting food into an old elephant's mouth.

Next story: Scientists are working on a new kind of bread that will not get stale--at least not as fast as the bread that we buy. (TONE BELLS) The longer-lasting loaf of bread contains a kind of starch that helps keep it from becoming hard and dry. (1 1/2 sec.) Did the sentence you just listened to make you think that in the future more bread will be thrown away? If it did make you think that in the future more bread will be thrown away, put a mark in the box that has the numeral 5 in it. If it did not make you think that in the future more bread will be thrown away, do nothing. (10 sec.)

Next story: When you water your plants, do not use icy water. Water that is neither very hot nor very cold is
best. Try not to wet the leaves. It is best to water early in the day, since plants lose their moisture more rapidly during daylight.

Next story: For many thousands of years people have used their hands and arms to "talk" to people who did not speak their own language. (TONE BELLS) Such motions with the arms and hands are known as sign language. (1 1/2 sec.) Did the sentence you just listened to make you think that in sign language there is sound? If it did make you think that in sign language there is sound, put a mark in the box that has the numeral 6 in it. If it did not make you think that in sign language there is sound, do nothing. (10 sec.) Sign language is one language that everyone speaks.

Next story: One plant of South Africa is often called the "window plant." Its pale green leaves are smooth. Only the tips of the leaves stick up from the dry ground in which it grows. You can see through the upper part of the leaves.

Appendix D

Teacher’s Instructions to Students Concerning the Tapes

Before first tape (Lesson 1): A person who goes to school just like you do would like us to help her with something that she has to do in one of her classes. She is trying to find different ways of using tapes for teaching reading to fourth-grade girls and boys. We thought you might like to help by listening to some of the tapes. So we are going to have a taped reading lesson today. Have your pencils ready. Sit quietly and listen very carefully, because the story you will hear and the questions that will be asked will not be repeated. This is the kind of question that will be asked, "Did the sentence you just listened to tell you why Darren jumped into the water? If it did tell you why Darren jumped into the water, put a mark in the box that has the numeral 1 in it. If it did not tell you why Darren jumped into the water, do nothing." Do not let anyone else know what your answer is. We are trying to find out how well you can listen.

Before remaining tapes (Lessons 2 through 6): We are going to have another taped reading lesson today. Have your pencils ready. Sit quietly and listen very carefully, because the lesson you will hear and the questions that will be asked will not be repeated. This is the kind of question that will be asked, "Did the sentence you just listened to tell you why Darren jumped into the water? If it did tell you why Darren jumped into the water, put a mark in the box that has the numeral 1 in it. If it did not tell you why Darren jumped into the water, do nothing." Do not let anyone else know what your answer is. We are trying to find out how well each of you can listen.
### Appendix E

**Individual Scores on the Trials-Lessons**

Group I (Even Rhythm/No Melody)

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<tr>
<th>Subject</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
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**Mean Scores**

|         | 4.1 | 4.7 | 3.9 | 3.6 | 4.4 |
## Group II (Even Rhythm/Melody)

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**Mean Scores** | 3.8 | 4.7 | 4.5 | 3.8 | 4.8

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**Mean Scores** | 4.5 | 4.5 | 4.2 | 3.8 | 4.8
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Trials-Lessons Means  67.2 82.5 68.2 60.5 71.2

### Table of Means for Rhythm and Trials-Lessons

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Trials-Lessons Means  3.9 4.8 4.0 3.5 4.1
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