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ABSTRACT

This final report discusses the outcomes of the third in a series of studies related to the speed with which captions appear on television programs. Video segments captioned at different speeds were shown to 1,102 subjects (aged 11-95) with and without hearing impairments, and the subjects then responded to test items based on the captions in the videos. The caption speeds ranged from 80 words-per-minute (wpm) to 220 wpm. One set of test items was based directly on facts given in the captions. Another set of items was based on inferences that could be made from caption information. Overall, there was no significant relationship between test scores and caption speed. Test scores were compared over various demographic categories. The study did not find a meaningful relationship between age and mean test scores. The mean test scores of females equaled or exceeded the mean test scores of males at all caption speed levels. Subjects who were junior high school students remembered facts as well as the other subjects did, but seemed less able to draw conclusions based on such facts. Overall, nonstudents tended to have slightly higher mean scores than students. (Contains 22 tables; appendices contain videoscripts, a demographic questionnaire, fact tests, narrative tests, and item response distributions). (CR)

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ED 434 446

# Final Report

**For**
**Federal Award Number**
**H180G60013**

# Caption Speed and Viewer Comprehension of Television Programs

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# TABLE OF CONTENTS

**Table of Contents** ..... 2

**List of Tables** ..... 3

**Abstract** ..... 4

**Importance** ..... 5

**Procedure** ..... 8
- Materials Development ..... 8
- Data Collection and Analysiss ..... 10

**Results** ..... 13
- Demographic Variables ..... 13
  - Age ..... 13
  - Sex ..... 13
  - Hearing Loss ..... 14
  - Education ..... 14
  - Student Status ..... 15
  - Household Members ..... 15
  - TV Watching ..... 16
- Fact Test Scores ..... 17
- Narrative Test Scores ..... 19
- Demographic Variables vs. Test Scores ..... 21
  - Age ..... 21
  - Sex ..... 22
  - Hearing Loss ..... 23
  - Education ..... 24
  - Student Status ..... 26
  - Student Status Vs. Education Level ..... 26
  - TV Watching ..... 26

**Summary and Conclusions** ..... 30
- Caption Speed ..... 30
- Demographic Variables ..... 30

**References** ..... 33

# LIST OF TABLES


Table 1: Caption Speed in Each Video Segment ..... 9

Table 2: Number of Subjects ..... 11

Table 3: Age Distribution ..... 13

Table 4: Sex Distribution ..... 13

Table 5: Hearing Loss Distribution ..... 14

Table 6: Education Distribution ..... 14

Table 7: Student Distribution ..... 15

Table 8: Hearing Loss Distribution in Household ..... 16

Table 9: Frequency of Captioned Television Viewing ..... 16

Table 10: Frequency of Caption Viewing by Hearing Loss ..... 17

Table 11: Fact Test Score Means and Standard Deviations ..... 18

Table 12: Correlations Between Fact Test Scores Covering All Topics ..... 19

Table 13: Narrative Test Score Means and Standard Deviations ..... 20

Table 14: Correlations Between Narrative Test Scores Covering All Topics ..... 20

Table 15: Total Test Score Means and Standard Deviations by Age Group ..... 21

Table 16: Correlations Between Age and Caption Speed Subtest Scores ..... 22

Table 17: Means and Standard Deviations by Sex and Caption Speed ..... 23

Table 18 Means and Standard Deviations by Hearing Loss and Caption Speed ..... 24

Table 19: Means and Standard Deviations by Education and Caption Speed ..... 25

Table 20: Means and Standard Deviations by Student Status and Caption Speed ..... 27

Table 21: Means and Standard Deviations by Student Status and Educational Level ..... 28

Table 22: Mean Test Scores by Frequency of Caption Viewing ..... 29

# Abstract

This is the third in a series of studies related to the speed with which captions appear on television programs. In the first study (Jensema, et al 1996) a sample of 183 television programs was examined and it was found that the captions were presented at a mean rate of 141 words-per-minute (wpm). In the second study (Jensema, 1998) subjects were shown video segments captioned at different speeds and it was estimated that the subjects were most comfortable with captions presented at about 145 wpm.

In the study reported here, video segments captioned at different speeds were shown to 1,102 subjects and the subjects then responded to test items based on the captions in the videos. The caption speeds ranged from 80 wpm to 220 wpm. One set of test items was based directly on facts given in the captions. Another set of items was based on inferences that could be made from caption information.

Overall, there was no significant relationship between test scores and caption speed. The data indicate that caption viewers are likely to be able to absorb facts and draw conclusions from captions that are presented as fast as 220 wpm for short periods of time. Although people may not be comfortable with captions presented at high speeds (Jensema, 1998), the present study suggests that viewer reading skills are flexible enough to allow viewers to read and understand fast captions.

Test scores were compared over various demographic categories. The study did not find a meaningful relationship between age and mean test scores. The mean test scores of females equaled or exceeded the mean test scores of males at all caption speed levels. There was no significant difference between the mean test scores of deaf, hard of hearing, and hearing subjects. Subjects who were junior high school students remembered facts as well as the other subjects did, but seemed less able to draw conclusions based on such facts. Overall, non-students (presumably those who had completed their education) tended to have slightly higher mean scores than students.

# Introduction

Television captioning first got its start more than 20 years ago at WGBH in Boston when a cooking program called, "The French Chef" featuring Julia Child, was open captioned (i.e., the captions, or subtitles, were part of the picture and could be seen on any television screen.) The success in captioning this one program soon led to a more ambitious effort. WGBH began a delayed rebroadcasting of "ABC World News Tonight" on a regular basis with open captions for deaf and hard of hearing people. During the 1970's, this was the only regularly broadcast television program in the world designed to be accessible to deaf and hard of hearing people. It was wildly popular with the Deaf community because it was the one television news program to which they had full access.

One of the first three captioners hired at WGBH was Jeff Hutchins. In a 1993 letter, he explained how captioning was done on the rebroadcast of "ABC World News Tonight" at WGBH:

> "In those early days we assumed our duty was to make television programs accessible to every deaf viewer, regardless of their individual reading ability. We were told that many "pre-lingually" deaf people with at least average intelligence could not follow or comprehend written English at anything more than a 2nd or 3rd grade reading level. So, to make the few PBS shows we then captioned "accessible," we developed captioning techniques to reduce the reading speed and language level of the programs' dialogue significantly.
>
> "When we began work on the first captioned TV newscast, 'The Captioned ABC News' (a 5-hour delayed rebroadcast of 'ABC World News Tonight' with open captions), we rewrote the news stories almost completely. The average delivery by the news anchors and reporters was at least 180 words per minute; we captioned at a consistent 120 words per minute, meaning we had to reduce the verbiage by a third. The complexity of the news writing on the show was around 6th grade level; we sought to reduce that by about three grade levels. We removed all passive voice sentence construction. We removed nearly all idioms and eliminated contractions. We converted clauses into short, simple, declarative sentences. The only phrases left intact were historical or literary quotes, and song lyrics. Otherwise, we were ruthless in our cuts. We even replaced puns or other jokes which we felt were rooted in a hearing culture with material we felt would be better understood by a deaf person.
>
> "We thought we were doing the right thing....."
>
> (J. Hutchins, Personal Communication, October 1993.)

The philosophy of editing the captioned news down to a level that every deaf person could understand remained the basis of captioning techniques for many years. When the Federal government established the National Captioning Institute (NCI) in 1979, many of the captioners were former employees of WGBH who brought their captioning techniques with them. Closed caption television, with captions that could be

seen only on television sets equipped with special decoders, was first aired on March 16, 1980. The captioning techniques used were essentially those pioneered by WGBH.

The origin of this editing philosophy seems fairly simple. Deaf student achievement test scores during the early 1970's indicated that deaf students often graduated from high school with about a third grade reading level. Captioners wanted to reach the largest possible deaf audience, so they edited down to this level. This approach greatly underestimated the reading skill of the overall deaf and hard of hearing population for two major reasons:

1. Learning does not stop at high school. Many of these individuals continue to improve their reading ability through self-study.

2. Graduates of educational programs for deaf people are not typical of the deaf and hard of hearing population. Hearing loss is age-related and the majority of people who lose their hearing do so later in life after finishing their formal education.

In those early days of captioning, the people involved were too busy trying to provide a service to do much research on captioning techniques. In general, whenever captioners faced a caption editing problem, they would just talk about it among themselves, reach an agreement, and their decision would become captioning policy. For their part, deaf and hard of hearing people were so delighted to have captioned television that they would literally accept anything thrown on the screen. For years after captioned television became available, deaf and hard of hearing people were very reluctant to criticize the service.

In the last decade, as captioning has become more wide-spread, this situation has begun to change. Both caption providers and caption viewers are taking a more careful look at captioning techniques. Judging from the letters and calls to captioning companies, a majority of deaf and hard of hearing caption viewers are now saying that they want to see every word that hearing people hear on television. In other words, they want verbatim captioning.

At first glance, the idea of verbatim captioning is very appealing. Allowing a deaf or hard of hearing person to read every word that is spoken on television means that the person has full access. However, there is a major question concerning verbatim captioning. It may be possible for spoken television dialogue to go so fast that most people cannot read its verbatim captioning. Creating captions which are delivered too fast to read is counter-productive to the entire purpose of captioning.

Many captioning policies, including the move towards verbatim captioning, are not based on research. We need research to determine how fast captions should appear on the screen, what presentation rates people prefer and are capable of reading. We need to know how these preferences and capabilities vary with different people and correlate this information with the different kinds of captioned programming people watch. These are critically important issues, and they are partially addressed by the study presented here.

This is the third in a series of research studies related to caption speed. The first (Jensema, et al 1996) involved research to determine the speed of captions currently shown on television. A total of 183 television programs with nearly a million captioned words were analyzed. The mean words-per-minute (wpm) rate varied from 106 wpm for sports shows to 177 wpm for talk shows, with an overall average of 141 wpm. The words captioned were compared with the actual audio for a sample of programs and editing practices were analyzed. The study produced very detailed statistics about the current state of television captioning.

The second study (Jensema, 1998) involved the creation of a series of video segments with carefully controlled caption speeds. After viewing each 30-second video segment, the viewer was asked to indicate whether the captioning was Too Fast, Fast, OK, Slow, or Too Slow. These video segments were shown to a large sample of deaf, hard of hearing, and hearing children and adults. Among other findings, the study found that the subjects were most comfortable with caption speeds of about 145 wpm.

The study presented here is the next step in the exploration of captioning speed. It addresses two very basic research questions:

1. What caption speeds are likely to lead to the highest understanding and retention of information?

2. How do these optimal caption speeds vary with age, sex, degree of hearing loss, education, household size, and frequency of caption viewing?

# Procedure

## Materials Development

A total of eight videos were developed for this study. Four of the videos were for testing knowledge of facts. These were titled Salmon, Space, Sailing, and Pyramids. Four other videos were developed for testing comprehension of the story narrative. These were titled Game, Ghost, Murder, and Dinner.

Each video consisted of eight 30-second segments, with each segment being captioned at a different speed. Caption speeds were selected to cover a broad range (80 to 220 wpm) and to have increments (20 wpm) large enough to be meaningful. Total program time for each video was four minutes. Each segment of a video was captioned at a different speed. The speed in Words Per Minute (wpm) for each segment is given in Table 1. Since each segment was 30 seconds long (half a minute), each segment contained exactly half the number of words given in Table 1.

Each video segment was made by moving a camera over a poster to create a colorful background and give the impression of movement. The posters were carefully selected to represent subject matter similar to the caption topic, but not to provide information that would help a subject understand the caption. The videos had no sound.

Scripts were written which told a story about the topic of each video. Three consultants who are experts in reading and the education of people who are deaf edited the scripts. The consultants were Dr. Judith L. Johnson, Dr. Patricia Koskinen, and JoAnn McCann. Each script was divided into eight parts, with each part having the exact number of words needed for a particular segment (half the number of words listed in Table 1.) Each word and each sentence structure was checked to assure that the vocabulary and grammar were consistent, reflected typical television programs, and were appropriate for deaf readers. Copies of the scripts are included in the appendix of this report.

The finished scripts were added to the videos as captions by VITAC, a large professional captioning company. The finished videos were the stimulus materials used in the study.

To obtain data from subjects, a test was constructed for each video. Each test consisted of four items for each of eight video segments, a total of 32 items per test. All test items were multiple choice and had four possible responses.

**Table 1**
**Caption Speed in Each Video Segment**
**(Words Per Minute)**

**Fact Videos**

| Segment | Space | Salmon | Sailing | Pyramids |
|---|---|---|---|---|
| 1 | 120 | 140 | 160 | 180 |
| 2 | 100 | 80 | 200 | 200 |
| 3 | 140 | 160 | 180 | 100 |
| 4 | 200 | 120 | 220 | 80 |
| 5 | 160 | 100 | 120 | 220 |
| 6 | 180 | 200 | 100 | 140 |
| 7 | 220 | 180 | 80 | 120 |
| 8 | 80 | 220 | 140 | 160 |

**Narrative Videos**

| Segment | Game | Ghost | Dinner | Murder |
|---|---|---|---|---|
| 1 | 120 | 140 | 80 | 160 |
| 2 | 200 | 200 | 200 | 120 |
| 3 | 140 | 100 | 100 | 180 |
| 4 | 100 | 220 | 220 | 140 |
| 5 | 180 | 180 | 160 | 220 |
| 6 | 80 | 120 | 140 | 100 |
| 7 | 220 | 80 | 120 | 80 |
| 8 | 160 | 160 | 180 | 200 |

All the items for the "fact" videos had correct answers that were exact words taken from the captions. For example, if the captions said "It is winter", a test item might be "What time of year is it?" and the correct answer would be "winter". The items for the "narrative" videos all had correct answers that reflected conclusions that could be drawn from the videos but which were not explicitly given in the captions. For example, if the captions said "There is snow on the ground." a test item might read "What time of year is it?" and the correct answer would be "winter."

The test items were written by the project staff and carefully edited by the consultants. The items were administered to a small group of deaf people without showing the videos. The purpose of this was to determine if any items could be answered correctly from prior knowledge or by intuitive guessing. Items that a majority of the

group answered correctly were examined and rewritten in a way that made them unlikely to be answered correctly without seeing the video. A copy of the test items is included in the appendix.

In addition to the video materials and the tests, a short demographic questionnaire was also developed. This one-page questionnaire included information on age, sex, hearing loss, education, number of people living in the household, and frequency of captioned television viewing. A copy of the demographic questionnaire is included in the appendix.

Finally, a simple vision test was developed to assure that all subjects could see the captions being presented. This test consisted of a small eye chart that was placed on the television screen prior to caption viewing. Subjects were asked to copy the letters they saw on the eye chart. A copy of the eye form is given in the appendix.

# Data Collection and Analysis

Administration of the test materials was done in small groups, usually less than 10 subjects at a time. The subjects were seated comfortably in front of a 27-inch television set. The persons conducting the data collection activities introduced themselves, explained who they were, and described the study being conducted. A data collection questionnaire and a pencil were handed out to each subject. The test administrator placed an eye chart on the television screen and asked the subjects to copy it on to a paper form. Any subjects who seemed to be having trouble copying the eye chart were asked to move closer to the screen. With these precautions, all subjects were able to see the captions.

After the eye chart was filled out, subjects were asked to fill out the demographic questionnaire. The administrators remained available to assist subjects with this questionnaire and answer any questions.

When all subjects had finished the eye chart and the demographic questionnaire, the administrator showed a 30-second video clip about a famous artist. After viewing the video clip the subjects were asked to respond to two multiple-choice questions having four choices. This short practice session helped the subjects become accustomed to the kind of material that would be used.

After the practice session was complete and any questions were answered, the actual video test sessions were conducted. The data collection was divided into two parts: a "fact" video and a "narrative" video. Each video consisted of a series of eight 30-second segments, with a pause (usually 10 seconds) after each segment to allow the subjects to respond to four multiple-choice questions.

There were four fact videos and four narrative videos. One fact video and one narrative video were shown to each group of subjects. After both videos were shown, the administrator collected the questionnaires and answered any questions the subjects had. Each subject was paid a $5 honorarium for participation.

The videos and the number of subjects to which they were shown are given in Table 2. A total of 1,111 subjects completed the testing process in Maryland, Virginia, West Virginia, Pennsylvania, North Carolina, Tennessee, Florida, California, and Arizona. A special effort was made to collect data from a wide variety of people over a wide geographical area. Frank B. Sullivan, Alfred Sonnenstrahl, and Wendy Toone did much of the data collection work.

**Table 2**
**Number of Subjects**

| Video Combination | Subjects |
|---|---|
| Game/Salmon | 164 |
| Ghost/Salmon | 36 |
| Salmon/Dinner | 104 |
| Space/Game | 49 |
| Space/Ghost | 168 |
| Space/Dinner | 79 |
| Game/Sailing | 130 |
| Murder/Sailing | 128 |
| Murder/Pyramids | 147 |
| Dinner Pyramids | 106 |
| **Total Subjects** | **1111** |

**Number of Subjects**
**By Test Topic**
(Two Tests Per Subject)

| Test | Subjects |
|---|---|
| Salmon | 304 |
| Space | 296 |
| Sailing | 258 |
| Pyramids | 253 |
| Game | 343 |
| Ghost | 204 |
| Murder | 275 |
| Dinner | 289 |
| **Total** | **2222** |

The data from each subject was coded and entered into a computer file. After entry of data into the computer, the accuracy of each case was checked against the original data. A few subjects had missing test data, and nine of these (.8 of a percent) had so much missing test data (more than 25% of a test) that they were discarded. The final number of subjects kept for analysis was 1,102. The finished data file was analyzed and the results are presented in the following section.

# Results

## Demographic Variables

### Age

In this study an attempt was made to get a sample of subjects who covered a broad age range. The subjects tested ranged in age from 11 to 95 years, with a mean age of 36.9 years and a standard deviation of 20.7 years. Table 3 gives a breakdown of the subjects by age group.

**Table 3**
**Age Distribution**

| Age in Years | N | % |
|---|---|---|
| **19 and under** | 298 | 28 |
| **20-29** | 231 | 21 |
| **30-39** | 153 | 14 |
| **40-49** | 103 | 10 |
| **50-59** | 82 | 8 |
| **60-69** | 89 | 8 |
| **70-79** | 89 | 8 |
| **80 and over** | 31 | 3 |
| **Total** | 1076 | 100 |
| **Missing data** | 26 | |
| **Grand total** | 1102 | |

### Sex

There were 511 males and 585 females in this study. The sex of six subjects was not given in the data. Table 4 formally shows the sex breakdown of the sample.

**Table 4**
**Sex distribution**

| | N | % |
|---|---|---|
| **Male** | 511 | 47 |
| **Female** | 585 | 53 |
| **Total** | 1096 | 100 |
| **Missing data** | 6 | |
| **Grand total** | 1102 | |

## Hearing Loss

The subjects were asked to classify themselves as "Deaf", "Hard of Hearing", or "Hearing". The result of this classification is given in Table 5. There were 137 subjects who were hearing and all of these were involved with the Deaf community and were familiar with captioning. Most were family members of the deaf subjects in this study.

**Table 5**
**Hearing Loss Distribution**

| | N | % |
|---|---|---|
| **Deaf** | 752 | 69 |
| **Hard of Hearing** | 208 | 19 |
| **Hearing** | 137 | 12 |
| **Total** | 1097 | 100 |
| **Missing data** | 5 | |
| **Grand total** | 1102 | |

## Education

Each subject was asked to mark the highest educational level they had achieved. The categories used and the number of subjects marking each one is given in Table 6.

**Table 6**
**Education Distribution**

| Highest Level Achieved | N | % |
|---|---|---|
| **Jr. High School** | 121 | 11 |
| **High School** | 307 | 28 |
| **Trade School** | 54 | 5 |
| **Some College** | 180 | 16 |
| **Bachelor's Degree** | 277 | 25 |
| **Masters/Doctorate Degree** | 153 | 14 |
| **Total** | 1092 | 100 |
| **Missing data** | 10 | |
| **Grand total** | 1102 | |

## Student Status

Many subjects in the study were enrolled in an educational program. Most were high school students, although some were enrolled in college. Table 7 breaks down the sample in a cross tabulation according to whether or not the subject reported enrollment as a student and the educational level achieved. Student status was reported by 45% of the sample, a very high rate, but an understandable one because many of the subjects were recruited through contacts at educational facilities for the deaf.

**Table 7**
**Student Distribution**

| | Student | | Non-Student | | Total | |
|---|---|---|---|---|---|---|
| **Education Level** | **N** | **%** | **N** | **%** | **N** | **%** |
| **Jr. high School** | 94 | 78 | 26 | 22 | 120 | 100 |
| **High School** | 200 | 66 | 103 | 34 | 303 | 100 |
| **Trade School** | 24 | 45 | 29 | 55 | 53 | 100 |
| **Some College** | 65 | 36 | 114 | 64 | 179 | 100 |
| **Bachelor's Degree** | 81 | 29 | 195 | 71 | 276 | 100 |
| **Master/Doctorate Degree** | 20 | 13 | 133 | 87 | 153 | 100 |
| **Total** | 484 | 45 | 600 | 55 | 1084 | 100 |
| | | | **Missing Data** | | 18 | |
| | | | **Grand Total** | | 1102 | |

## Household Members

The respondents in this study were asked how many people in their household were deaf, hard of hearing, or hearing. It was suspected that most households would be a mix of deaf, hard of hearing, and hearing people. This was not quite the case. Table 8 gives a summary of the responses. Eighteen subjects did not indicate their hearing status. Deaf and hard of hearing were combined into a single "D/HH" category. Almost half of the households (49%) in the sample were a mix of D/HH and hearing people. In 43% of the households all the people had some hearing loss, and in 8% of the households all people were hearing. The "hearing only" group was composed of people who were involved with deaf or hard of hearing people in some way, such as teachers, interpreters, or relatives of D/HH people.

**Table 8**
**Hearing Loss Distribution in Household**

| | N | % |
|---|---|---|
| **Mix of D/HH and Hearing People** | 527 | 49 |
| **D/HH People Only** | 465 | 43 |
| **Hearing People Only** | 92 | 8 |
| **Total** | 1084 | 100 |
| **Missing Data** | 18 | |
| **Grand Total** | 1102 | |

## TV Watching

Since skill in reading captions may be related to the frequency with which they are viewed, the subjects were asked how often they watched captioned television. In giving verbal instructions to the subjects, care was taken to emphasize "captioned" television viewing. The results are given in Table 9. More than three-quarters of the subjects watched captioned television every day.

**Table 9**
**Frequency of Captioned Television Viewing**

| How Often Captioned TV Watched | N | % |
|---|---|---|
| **Every Day** | 822 | 76 |
| **Once a Week** | 100 | 9 |
| **Once a Month** | 42 | 4 |
| **Once a Year** | 29 | 3 |
| **Seldom/Never** | 87 | 8 |
| **Total** | 1080 | 100 |
| **Missing data** | 22 | |
| **Grand total** | 1102 | |

An important point to note is that caption viewing varies with hearing loss. Table 10 shows the reported frequency of viewing by hearing loss. Deaf people report watching captions the most, followed by hard of hearing people, and then hearing people. As was

expected, hearing people reported the lowest frequency of captioned television viewing among the subjects. Among deaf subjects, 85% reported they watched captioned television every day, while among hearing subjects, only 42 % did so.

**Table 10**
**Frequency of Caption Viewing by Hearing Loss**

| | Deaf | | H of H | | Hearing | | All Subjects* | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| **Every Day** | 624 | 85 | 139 | 68 | 58 | 42 | 821 | 76 |
| **Once a Week** | 54 | 7 | 27 | 13 | 19 | 14 | 100 | 9 |
| **Once a Month** | 11 | 1 | 13 | 6 | 18 | 13 | 42 | 4 |
| **Once a Year** | 20 | 3 | 2 | 1 | 7 | 5 | 29 | 3 |
| **Seldom/Never** | 29 | 4 | 22 | 11 | 35 | 26 | 86 | 8 |
| **All Frequencies** | 738 | 100 | 203 | 100 | 137 | 100 | 1078 | 100 |

**Missing Data** 24

**Grand Total** 1102

# Fact Test Scores

The fact tests in this study had items where the correct response was taken directly from the captions on the video. A subject who read the captions and could remember the facts presented in the captions for a minute or two should be able to answer the items correctly. It was expected that subjects might score better at lower captioning speeds because 1) fewer facts were presented in a 30-second video segment at slower captioning rates, and 2) there was more time to read each word and less chance of missing words.

There were four fact tests in this study, each based on a specific four-minute video program: Salmon, Space, Sailing, and Pyramids. The script of each video is given in the Appendix. Each video was broken into eight segments, each at a different caption speed. Each video segment had four test items associated with it, and these four items formed a subtest. Eight subtests times four items yields a total of 32 multiple-choice items per test.

Each subject was given one of the fact tests. The number of subjects taking each test was given earlier in Table 2. The test items each had four possible response choices. The number of subjects giving each possible response to each test item on each test is given in the appendix.

Each video had eight 30-second segments and each segment had four test items. The caption speed on each video segment was given earlier in Table 1. Subjects responded to the four test items immediately after viewing the video segment. The correct

response to each test item was explicitly given in the video segment. Scoring was done by counting the number of correct answers. For each test there were eight subtest scores (one for each caption speed) and one total score covering all eight speeds. A mean and standard deviation over all topics was also calculated. Table 11 gives the means and standard deviations for all these scores.

**Table 11**
**Fact Test Score Means and Standard Deviations**

| Speed | Salmon | | Space | | Sailing | | Pyramids | | All Topics | |
|---|---|---|---|---|---|---|---|---|---|---|
| (wpm) | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| **80** | 2.39 | 1.07 | 2.15 | 1.17 | 2.14 | 1.16 | 2.39 | 1.52 | 2.41 | 1.28 |
| **100** | 2.52 | 1.12 | 2.57 | 0.94 | 2.29 | 1.03 | 2.61 | 1.13 | 2.54 | 1.12 |
| **120** | 2.87 | 1.23 | 2.27 | 0.92 | 2.26 | 0.97 | 2.57 | 1.36 | 2.50 | 1.22 |
| **140** | 2.56 | 1.25 | 2.70 | 1.36 | 2.14 | 1.12 | 2.52 | 1.45 | 2.60 | 1.33 |
| **160** | 2.11 | 1.33 | 2.53 | 1.16 | 2.25 | 1.24 | 1.69 | 0.89 | 2.13 | 1.16 |
| **180** | 2.03 | 1.29 | 2.45 | 1.40 | 2.46 | 1.01 | 2.39 | 0.89 | 2.28 | 1.18 |
| **200** | 2.53 | 1.30 | 3.15 | 1.07 | 2.72 | 1.28 | 2.52 | 1.16 | 2.64 | 1.19 |
| **220** | 2.44 | 1.34 | 2.41 | 1.36 | 2.59 | 1.47 | 1.88 | 0.75 | 2.24 | 1.21 |
| **All Speeds** | 19.43 | 6.89 | 20.22 | 7.46 | 18.84 | 6.83 | 18.56 | 7.19 | 19.34 | 7.08 |

The fact subtest scores were very consistent, with all but three of the means being between 2.00 and 2.99. The three aberrations were the 200 wpm subtest on the Space video, the 220 wpm subtest on the Pyramids video, and the 160 wpm subtest on the Pyramids video. The standard deviations displayed a similar consistency.

It had been expected that as the caption speed increased, the subtest scores would be lower because there were more words (and facts) being presented. This did not happen and it appears that subjects were generally able to absorb the material being presented, even when the speed reached 220 wpm.

Table 12 provides the correlations between the "All Topics" subtest scores given above (the last column in the above table.) Correlations between scores at different speeds are generally in the .4 to .5 range. The correlations involving "All Speeds" are not given, since they are part-whole. The highest correlation in Table 12 is .59 between 100 wpm and 200 wpm subtests. The lowest correlation is .29 between 120 wpm and 160 wpm.

A factor analysis of this correlation matrix was done to determine the number of factors involved in the Fact subtests. The eight variables yielded a single principal components factor with an eigenvalue of 4.317. This factor accounted for 54% of the variance in the test scores. All other factors extracted had eigenvalues of much less than 1.00. The factor loadings were .74, .80, .72, .64, .69, .71, .83, and .75 for subtests 80 wpm

through 220 wpm, respectively. It is apparent that there is just one "Fact" factor emerging. If there were other important influences in the data, such as responses changing at certain caption speeds, other factors would be likely to emerge.

**Table 12**
**Correlations Between Fact Test Scores Covering All Topics**

| wpm | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 |
|---|---|---|---|---|---|---|---|---|
| **80** | 1.00 | 0.57 | 0.51 | 0.42 | 0.41 | 0.44 | 0.53 | 0.44 |
| **100** | 0.57 | 1.00 | 0.57 | 0.41 | 0.48 | 0.54 | 0.59 | 0.48 |
| **120** | 0.51 | 0.57 | 1.00 | 0.33 | 0.29 | 0.43 | 0.58 | 0.49 |
| **140** | 0.42 | 0.41 | 0.33 | 1.00 | 0.51 | 0.28 | 0.52 | 0.37 |
| **160** | 0.41 | 0.48 | 0.29 | 0.51 | 1.00 | 0.40 | 0.50 | 0.48 |
| **180** | 0.44 | 0.54 | 0.43 | 0.28 | 0.40 | 1.00 | 0.51 | 0.55 |
| **200** | 0.53 | 0.59 | 0.58 | 0.52 | 0.50 | 0.51 | 1.00 | 0.56 |
| **220** | 0.44 | 0.48 | 0.49 | 0.37 | 0.48 | 0.55 | 0.56 | 1.00 |

The fact tests in this study were based on 30-second video segments, a format that is very different from a typical viewing situation. However, the results suggest that the tests were measuring effectively and that, under these circumstances at least, caption speed has little influence on viewer's ability to absorb the facts presented in the captions.

# Narrative Test Scores

The narrative tests were created and handled in exactly the same way the fact tests were. The difference was that the narrative test items could be answered correctly only by drawing conclusions from the captions. They could not be answered correctly simply by remembering the words. The fact tests were designed to measure whether a subject read and remembered the captions. The narrative tests were designed to determine if a subject understood and could make inferences from them.

There were four 4-minute narrative videos: Game, Ghost, Murder, and Dinner. The script for each of these videos is given in the appendix.

As with the fact tests, each narrative test had 32 four-choice items. Each video had eight 30-second segments and there were four test items for each segment. Table 1 gives the caption speed of each video segment. Each subject was given one of the narrative tests and Table 13 gives the number of subjects taking each of these four tests. A breakdown of the responses to the items is given in the appendix.

Test administration and scoring of the narrative tests was carried out exactly as it was for the fact tests. For each test there were eight subtest scores (one for each caption speed) and one total score covering all eight speeds. A mean and standard deviation over

all topics was also calculated. Table 13 gives the means and standard deviations for all these scores.

**Table 13**
**Narrative Test Score Means and Standard Deviations**

| Speed | Game | | Ghost | | Murder | | Dinner | | All Topics | |
|---|---|---|---|---|---|---|---|---|---|---|
| (wpm) | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| **80** | 2.38 | 1.28 | 2.57 | 1.39 | 2.61 | 1.49 | 2.91 | 1.10 | 2.60 | 1.33 |
| **100** | 2.59 | 1.28 | 2.24 | 1.08 | 2.19 | 1.11 | 3.17 | 1.16 | 2.56 | 1.23 |
| **120** | 2.71 | 1.11 | 2.10 | 1.25 | 2.66 | 1.46 | 3.31 | 1.12 | 2.72 | 1.30 |
| **140** | 2.43 | 1.31 | 1.91 | 0.92 | 2.18 | 1.00 | 2.68 | 1.29 | 2.33 | 1.19 |
| **160** | 2.11 | 1.11 | 2.52 | 1.28 | 2.79 | 1.43 | 3.29 | 1.07 | 2.65 | 1.30 |
| **180** | 2.51 | 1.30 | 2.10 | 1.05 | 2.44 | 1.20 | 3.23 | 1.20 | 2.59 | 1.27 |
| **200** | 1.94 | 1.24 | 1.84 | 1.32 | 2.11 | 0.77 | 3.00 | 1.21 | 2.22 | 1.23 |
| **220** | 1.93 | 1.19 | 2.31 | 1.01 | 2.57 | 1.49 | 2.88 | 1.26 | 2.40 | 1.31 |
| **All Speeds** | 18.60 | 6.63 | 17.58 | 7.55 | 19.53 | 8.55 | 24.47 | 7.90 | 20.07 | 8.05 |

The subjects did not display a trend toward a major drop in narrative test scores as caption speed increased. This was the same result that was obtained from the fact test scores. It is apparent that caption viewers are, in general, able to adjust variations in caption speed and are able to draw correct conclusions from the captions they are viewing, regardless of speed.

Below, Table 14 gives the correlations between the various "All Topics" narrative caption speed subtest scores given above (the last column in the above table.) The correlations between the speed scores and the "All Speeds" score is not given because these correlations would be part-whole.

**Table 14**
**Correlations Between Narrative Subtest Scores Covering All Topics**

| Wpm | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 |
|---|---|---|---|---|---|---|---|---|
| **80** | 1.00 | 0.60 | 0.66 | 0.46 | 0.65 | 0.68 | 0.53 | 0.59 |
| **100** | 0.60 | 1.00 | 0.69 | 0.64 | 0.54 | 0.67 | 0.63 | 0.60 |
| **120** | 0.66 | 0.69 | 1.00 | 0.53 | 0.67 | 0.66 | 0.57 | 0.58 |
| **140** | 0.46 | 0.64 | 0.53 | 1.00 | 0.49 | 0.51 | 0.42 | 0.50 |
| **160** | 0.65 | 0.54 | 0.67 | 0.49 | 1.00 | 0.49 | 0.52 | 0.60 |
| **180** | 0.68 | 0.67 | 0.66 | 0.51 | 0.49 | 1.00 | 0.54 | 0.53 |
| **200** | 0.53 | 0.63 | 0.57 | 0.42 | 0.52 | 0.54 | 1.00 | 0.52 |
| **220** | 0.59 | 0.60 | 0.58 | 0.50 | 0.60 | 0.53 | 0.52 | 1.00 |

The above correlation matrix was subjected to a factor analysis to determine the number of factors involved in the narrative subtests. Using 1.0 as the cut off for factor extraction, a single principal components factor emerged that had an eigenvalue of 5.027 and accounted for 63% of the variance in the eight narrative subtest scores. The factor loadings were .82, .85, .85, .71, .78, .80, .74, and .77, respectively for subtests 80 wpm through 220 wpm. The different speeds loaded rather uniformly on the single factor, suggesting that different speeds do not have different influences.

# Demographic Variables vs. Test Scores

## Age

The mean over all ages for the fact total test score was 19.34 and for the narrative total test score it was 20.07. To examine whether the scores varied by age, the subject ages were classified into 10-year categories and the means and standard deviations of the total fact test scores and the total narrative test scores were calculated for each age category. The results are given in Table 15.

**Table 15**
**Total Test Score Means and Standard Deviations by Age Group**

| | Fact Total Scores | | | Narrative Total Scores | | |
|---|---|---|---|---|---|---|
| **Age Group** | **N** | **Mean** | **S.D.** | **N** | **Mean** | **S.D.** |
| **< 20** | 301 | 19.0 | 7.2 | 278 | 19.4 | 8.0 |
| **20-29** | 222 | 18.2 | 6.4 | 226 | 18.7 | 8.3 |
| **30-39** | 149 | 19.2 | 6.5 | 146 | 20.2 | 7.5 |
| **40-49** | 100 | 21.1 | 7.0 | 96 | 22.2 | 7.9 |
| **50-59** | 78 | 21.0 | 6.3 | 77 | 21.8 | 7.7 |
| **60-69** | 85 | 19.9 | 8.3 | 86 | 20.5 | 9.0 |
| **70-79** | 87 | 20.9 | 7.3 | 88 | 21.5 | 7.3 |
| **>79** | 30 | 20.7 | 5.3 | 30 | 21.6 | 6.4 |
| **Total** | 1052 | | | 1027 | | |
| **Missing** | 50 | | | 75 | | |
| **Grand Total** | 1102 | | | 1102 | | |

An ANOVA was applied to the fact total test scores and to the narrative total test scores using age groups as the treatment groups. For the fact scores, the results (F=3.389, df= 7, 1044) were significant at the .0014 level. For the narrative scores, the results (F=3.274, df= 7, 1019) were significant at the .0019 level. This indicates a statistically significant difference in test scores by age.

The test means given in the table above range from 18.2 (fact score for age 20-29) to 22.2 (narrative score for age 40-49). Although the ANOVA indicated a statistically significant difference between the test scores by age groups, the difference appears to mean little in practical terms.

Consideration of correlations also suggests that there is little meaningful relation between age and caption speed scores in these data. Table 16 gives the correlations between subject age and the subtest scores at each caption speed level. With one exception (e.g. one slightly negative correlation), all correlations are low and positive, meaning that there tends to be a small positive correlationship between age and test scores in this study. The correlations are too small to have much practical meaning. Overall, the correlations account for about one percent of the variance in the test scores (.11 squared = .0121).

**Table 16**
**Correlations Between Age and Caption Speed Subtest Scores**

| Caption Speed | Fact Scores | Narrative Scores |
|---|---|---|
| **80 wpm** | -.09 | .12 |
| **100 wpm** | .18 | .09 |
| **120 wpm** | .10 | .04 |
| **140 wpm** | .03 | .03 |
| **160 wpm** | .04 | .18 |
| **180 wpm** | .19 | .07 |
| **200 wpm** | .16 | .06 |
| **220 wpm** | .06 | .12 |
| **All Speeds** | .11 | .11 |

## Sex

There were 502 males and 567 females in this study who had fact test scores, and 497 males and 546 females who had narrative scores. Table 17 gives the mean and standard deviation for males and females on each of the speed subtest scores and on the total scores. Note that females consistently have a mean score that is equal to or higher than the males mean score. The difference is not great, but it does tend to be consistent.

A t-test was done to compare the sexes on the fact total score and on the narrative total score. On the fact total score the t value was –1.615 (df = 1067) and the probability was .1065, clearly non-significant. On the narrative total score the t value was –2.722 (df = 1041) and the probability was .0066. Although this is statistically significant beyond the .01 level of confidence, the male and female narrative means (19.5 vs. 20.8) appear to have little practical difference.

**Table 17**
**Mean and Standard Deviation by Sex and Caption Speed**

**Fact Test**

| | Male | | Female | |
|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.4 | 1.3 | 2.5 | 1.2 |
| **100 wpm** | 2.5 | 1.1 | 2.6 | 1.1 |
| **120 wpm** | 2.4 | 1.2 | 2.6 | 1.2 |
| **140 wpm** | 2.6 | 1.4 | 2.6 | 1.3 |
| **160 wpm** | 2.1 | 1.2 | 2.2 | 1.1 |
| **180 wpm** | 2.3 | 1.2 | 2.3 | 1.1 |
| **200 wpm** | 2.6 | 1.2 | 2.7 | 1.1 |
| **220 wpm** | 2.2 | 1.2 | 2.2 | 1.2 |
| **All Speeds** | 19.1 | 7.1 | 19.8 | 6.9 |

**Narrative Test**

| | Male | | Female | |
|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.5 | 1.4 | 2.7 | 1.3 |
| **100 wpm** | 2.5 | 1.3 | 2.6 | 1.2 |
| **120 wpm** | 2.6 | 1.4 | 2.8 | 1.2 |
| **140 wpm** | 2.3 | 1.2 | 2.4 | 1.2 |
| **160 wpm** | 2.6 | 1.3 | 2.7 | 1.3 |
| **180 wpm** | 2.5 | 1.2 | 2.7 | 1.3 |
| **200 wpm** | 2.1 | 1.2 | 2.3 | 1.2 |
| **220 wpm** | 2.3 | 1.3 | 2.5 | 1.3 |
| **All Speeds** | 19.5 | 8.4 | 20.8 | 7.6 |

## Hearing Loss

Table 18 gives the fact test and narrative test score means and standard deviations by the hearing status of the subjects in this study. An ANOVA was computed on each of the different caption speed levels and on the total test scores. Statistical significance beyond the .01 level was noted only for the fact test at 140 wpm and 200 wpm, and for the narrative test at 140 wpm and 160 wpm. These appear to be isolated findings and the ANOVA on the total test score found no significant difference between hearing loss groups for either the fact test or narrative test.

**Table 18**
**Mean and Standard Deviation by Hearing Loss and Caption Speed**

**Fact Test**

| | Deaf (N = 733) | | Hard of Hearing (N = 205) | | Hearing (N = 130) | |
|---|---|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.5 | 1.3 | 2.3 | 1.3 | 2.3 | 1.4 |
| **100 wpm** | 2.5 | 1.1 | 2.6 | 1.0 | 2.7 | 1.3 |
| **120 wpm** | 2.5 | 1.2 | 2.7 | 1.2 | 2.4 | 1.3 |
| **140 wpm** | 2.7 | 1.3 | 2.5 | 1.3 | 2.3 | 1.4 |
| **160 wpm** | 2.2 | 1.1 | 2.0 | 1.3 | 2.0 | 1.2 |
| **180 wpm** | 2.3 | 1.2 | 2.3 | 1.2 | 2.4 | 0.9 |
| **200 wpm** | 2.7 | 1.1 | 2.5 | 1.2 | 2.4 | 1.3 |
| **220 wpm** | 2.2 | 1.2 | 2.2 | 1.2 | 2.4 | 1.2 |
| **All Speeds** | 19.6 | 6.8 | 19.1 | 7.2 | 19.0 | 7.7 |

**Narrative Test**

| | Deaf (N = 720) | | Hard of Hearing (N = 197) | | Hearing (N = 126) | |
|---|---|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.6 | 1.3 | 2.8 | 1.1 | 2.5 | 1.5 |
| **100 wpm** | 2.6 | 1.2 | 2.6 | 1.2 | 2.6 | 1.3 |
| **120 wpm** | 2.7 | 1.3 | 2.9 | 1.1 | 2.7 | 1.3 |
| **140 wpm** | 2.2 | 1.2 | 2.6 | 1.1 | 2.5 | 1.2 |
| **160 wpm** | 2.6 | 1.3 | 3.0 | 1.1 | 2.4 | 1.3 |
| **180 wpm** | 2.6 | 1.2 | 2.6 | 1.3 | 2.7 | 1.4 |
| **200 wpm** | 2.3 | 1.2 | 2.3 | 1.2 | 2.0 | 1.2 |
| **220 wpm** | 2.4 | 1.3 | 2.5 | 1.2 | 2.2 | 1.5 |
| **All Speeds** | 19.9 | 8.0 | 21.2 | 7.3 | 19.7 | 9.0 |

## Education

The means and standard deviations of the test scores for the various educational levels of the subjects in this study are given in Table 19. An ANOVA was computed for each speed and for each total test score. There was relatively little difference between the fact test scores for different educational levels, with significant differences beyond the .01 level of confidence found only at 100 wpm and 120 wpm.

However, differences between the groups on the narrative scores were highly significant, with significance beyond the .01 level being reached at 100 wpm, 120 wpm, 140 wpm, 180 wpm, 200 wpm, 220 wpm, and the total score. Further, examination of the means indicates that the main differences were for the lowest educational group. Subjects whose highest educational achievement level was junior high school were least able to draw conclusions from captions.

**Table 19**
**Mean and Standard Deviation by Education and Caption Speed**

**Fact Scores**

| | Jr. High School (N= 118) | | High School (N = 302) | | Trade School (N = 54) | | Some College (N = 174) | | Bachelor's Degree (N = 264) | | Master/ Doctorate Degree (N = 151) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.4 | 1.2 | 2.6 | 1.3 | 2.3 | 1.1 | 2.4 | 1.3 | 2.3 | 1.3 | 2.4 | 1.2 |
| **100 wpm** | 2.4 | 1.1 | 2.5 | 1.1 | 2.3 | 1.2 | 2.6 | 1.1 | 2.6 | 1.1 | 2.9 | 1.1 |
| **120 wpm** | 2.7 | 1.2 | 2.4 | 1.2 | 2.5 | 1.0 | 2.4 | 1.2 | 2.5 | 1.2 | 2.9 | 1.2 |
| **140 wpm** | 2.6 | 1.2 | 2.6 | 1.4 | 2.8 | 1.3 | 2.6 | 1.3 | 2.6 | 1.3 | 2.7 | 1.3 |
| **160 wpm** | 2.2 | 1.2 | 2.3 | 1.3 | 2.2 | 1.2 | 2.0 | 1.1 | 2.0 | 1.1 | 2.2 | 1.0 |
| **180 wpm** | 2.3 | 1.2 | 2.4 | 1.2 | 2.2 | 1.3 | 2.2 | 1.1 | 2.1 | 1.1 | 2.5 | 1.1 |
| **200 wpm** | 2.8 | 1.3 | 2.5 | 1.3 | 2.6 | 1.2 | 2.7 | 1.1 | 2.6 | 1.1 | 2.8 | 1.1 |
| **220 wpm** | 2.4 | 1.2 | 2.3 | 1.2 | 2.3 | 1.1 | 2.2 | 1.2 | 2.1 | 1.2 | 2.3 | 1.1 |
| **All Speeds** | 19.8 | 6.6 | 19.5 | 7.5 | 19.2 | 7.0 | 19.2 | 6.5 | 18.8 | 6.8 | 20.8 | 6.7 |

**Narrative Scores**

| | Jr. High School (N= 118) | | High School (N = 302) | | Trade School (N = 54) | | Some College (N = 174) | | Bachelor's Degree (N = 264) | | Master/ Doctorate Degree (N = 151) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.3 | 1.5 | 2.7 | 1.3 | 2.8 | 1.3 | 2.7 | 1.2 | 2.5 | 1.4 | 2.7 | 1.3 |
| **100 wpm** | 2.0 | 1.1 | 2.6 | 1.3 | 2.6 | 1.2 | 2.6 | 1.2 | 2.6 | 1.2 | 2.8 | 1.2 |
| **120 wpm** | 2.3 | 1.1 | 2.8 | 1.3 | 2.9 | 1.0 | 2.7 | 1.3 | 2.8 | 1.4 | 2.8 | 1.3 |
| **140 wpm** | 1.8 | 1.1 | 2.4 | 1.2 | 2.4 | 1.2 | 2.3 | 1.2 | 2.4 | 1.2 | 2.5 | 1.3 |
| **160 wpm** | 2.5 | 1.2 | 2.8 | 1.3 | 2.5 | 1.2 | 2.6 | 1.4 | 2.6 | 1.3 | 2.7 | 1.4 |
| **180 wpm** | 2.0 | 1.3 | 2.6 | 1.2 | 2.7 | 1.2 | 2.7 | 1.2 | 2.7 | 1.2 | 2.8 | 1.3 |
| **200 wpm** | 2.0 | 1.3 | 2.3 | 1.2 | 2.2 | 1.4 | 2.0 | 1.2 | 2.3 | 1.2 | 2.5 | 1.2 |
| **220 wpm** | 2.0 | 1.2 | 2.5 | 1.2 | 2.3 | 1.3 | 2.4 | 1.4 | 2.4 | 1.4 | 2.6 | 1.3 |
| **All Speeds** | 16.9 | 7.5 | 20.7 | 7.8 | 20.5 | 7.4 | 19.9 | 7.9 | 20.3 | 8.1 | 21.5 | 8.4 |

The results suggest that education had little influence on simple remembering of captioned facts, but that low educational achievement was a major factor in drawing conclusions from captions. This is especially true at the junior high school level, a finding that has important educational implications and deserves future study.

## Student Status

A relatively large proportion of the subjects in this study (45%) reported that they were students. Table 20 gives the means and standard deviations for the students and non-students for whom data were available. A t-test of means was calculated for the various caption speeds and for the total score on the fact and narrative tests. The difference between the student and non-student groups on the fact test was significant beyond the .01 level of confidence for 80 wpm, 100 wpm, 180 wpm, 200 wpm, 220 wpm, and for the total score. The conclusion is that non-students (e.g. those who have completed their formal education) have significantly higher scores on the fact test.

Student versus non-student t-tests were also computed for the various caption speeds and for the total score on the narrative test. The means were significantly different beyond the .01 level of confidence only for the 160 wpm speed and for the total score. For both the fact test and the narrative test, the differences by student status are not great and appear to have little practical consequence. However, as will be shown in the next section, there are very significant differences for a specific educational level subgroup.

## Student Status Vs. Educational Level

The means and standard deviations of for students and non-students were calculated at each educational level for both the fact total score and the narrative total score. The results are given in Table 21. With one minor exception (High School - Narrative Test), the non-students had a higher mean score than the students at all educational levels. In general, subjects who have finished their education tend to perform better than subjects who are still students, regardless of education level.

Table 21 also emphasizes something previously observed in Table 19: subjects whose highest educational achievement level was junior high school perform poorly on the narrative test. Table 21 takes this a step further and shows that junior high school students did poorly on the narrative test while non-students performed relatively well. The non-students tend to be older people and the students are all young teenagers. This indicates that young people enrolled in junior high school tend to remember facts well but are unable to draw conclusions from them.

## TV Watching

The subjects were asked how often they watched captioned television and Table 22 gives the mean test scores for each caption speed at each watching frequency. It is difficult to draw conclusions from this table because the mean test scores to not vary consistently with particular viewing frequencies. An ANOVA was calculated for each caption speed level using frequency of caption watching as the grouping variable. The speeds at which the probability was less than .01 are noted. One of the factors that make it difficult to draw conclusions is that frequency of viewing is related to hearing loss. Deaf people are more likely to watch captions on a daily basis, and the subgroup of deaf people also includes more young people. The subgroups that watch captions less frequently have a greater percentage of hearing people.

**Table 20**
**Mean and Standard Deviation by Student Status and Caption Speed**

**Fact Scores**

| | Student (N = 469) | | Non-Student (N = 590) | |
|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.6 | 1.3 | 2.3 | 1.3 |
| **100 wpm** | 2.4 | 1.2 | 2.7 | 1.0 |
| **120 wpm** | 2.4 | 1.3 | 2.6 | 1.2 |
| **140 wpm** | 2.6 | 1.3 | 2.6 | 1.4 |
| **160 wpm** | 2.1 | 1.2 | 2.1 | 1.2 |
| **180 wpm** | 2.1 | 1.1 | 2.4 | 1.2 |
| **200 wpm** | 2.5 | 1.2 | 2.8 | 1.1 |
| **220 wpm** | 2.1 | 1.2 | 2.3 | 1.2 |
| **All Speeds** | 18.8 | 7.0 | 19.9 | 6.9 |

**Narrative Scores**

| | Student (N = 450) | | Non-Student (N = 584) | |
|---|---|---|---|---|
| **Speed** | **Mean** | **S.D.** | **Mean** | **S.D.** |
| **80 wpm** | 2.5 | 1.4 | 2.7 | 1.3 |
| **100 wpm** | 2.5 | 1.3 | 2.6 | 1.2 |
| **120 wpm** | 2.7 | 1.3 | 2.8 | 1.3 |
| **140 wpm** | 2.2 | 1.2 | 2.4 | 1.2 |
| **160 wpm** | 2.5 | 1.3 | 2.8 | 1.3 |
| **180 wpm** | 2.5 | 1.3 | 2.7 | 1.2 |
| **200 wpm** | 2.2 | 1.1 | 2.3 | 1.3 |
| **220 wpm** | 2.3 | 1.3 | 2.5 | 1.3 |
| **All Speeds** | 19.4 | 8.0 | 20.7 | 8.0 |

**Table 21**
**Mean and Standard Deviation by Student Status and Educational Level**

| | Fact Total Test Score | | | | Narrative Total Test Score | | | |
|---|---|---|---|---|---|---|---|---|
| | Student | | Non-Student | | Student | | Non-Student | |
| **Education Level** | **Mean** | **S.D.** | **Mean** | **S.D** | **Mean** | **S.D.** | **Mean** | **S.D** |
| **Jr. High School** | 19.0 | 6.5 | 22.5 | 6.6 | 15.7 | 7.3 | 20.4 | 7.3 |
| **High School** | 19.4 | 7.4 | 19.9 | 7.6 | 21.4 | 7.5 | 19.7 | 8.2 |
| **Trade School** | 18.5 | 7.2 | 19.4 | 6.7 | 20.1 | 7.5 | 20.6 | 7.5 |
| **Some College** | 18.7 | 6.5 | 19.4 | 6.5 | 19.0 | 8.6 | 20.4 | 7.4 |
| **Bachelor's Degree** | 17.3 | 6.9 | 19.3 | 6.7 | 19.0 | 7.8 | 20.8 | 8.2 |
| **Master/Doctorate Degree** | 19.1 | 6.4 | 21.0 | 6.7 | 17.7 | 8.3 | 22.0 | 8.2 |
| **All Education Levels** | 18.8 | 7.0 | 19.9 | 6.9 | 19.4 | 8.0 | 20.7 | 8.0 |

**Table 22**
**Mean Test Scores for Frequency of Captioned TV Viewing**

**Fact Scores**

| Speed (wpm) | Every Day (N=799) | Once a Week (N=98) | Once a Month (N=40) | Once a Year (N=29) | Seldom/ Never (N=85) | |
|---|---|---|---|---|---|---|
| **80** | 2.4 | 2.4 | 2.5 | 2.7 | 2.5 | |
| **100** | 2.6 | 2.4 | 2.3 | 2.3 | 2.8 | |
| **120** | 2.5 | 2.8 | 2.4 | 2.1 | 2.4 | |
| **140** | 2.6 | 2.6 | 2.2 | 2.8 | 2.7 | |
| **160** | 2.1 | 2.3 | 1.9 | 2.1 | 2.3 | |
| **180** | 2.4 | 2.3 | 2.2 | 1.6 | 1.8 | **P < .01** |
| **200** | 2.7 | 2.7 | 2.3 | 2.3 | 2.6 | |
| **220** | 2.3 | 2.5 | 2.5 | 1.5 | 2.1 | **P < .01** |
| **All Speeds** | 19.6 | 19.9 | 18.3 | 17.3 | 19.2 | |

**Narrative Scores**

| Speed (wpm) | Every Day (N=788) | Once a Week (N=92) | Once a Month (N=39) | Once a Year (N=27) | Seldom/ Never (N=80) | |
|---|---|---|---|---|---|---|
| **80** | 2.6 | 2.3 | 2.5 | 2.9 | 2.8 | |
| **100** | 2.7 | 2.2 | 2.2 | 2.1 | 2.4 | **P < .01** |
| **120** | 2.7 | 2.5 | 2.5 | 3.1 | 3.0 | |
| **140** | 2.4 | 2.1 | 2.0 | 1.9 | 2.1 | **P < .01** |
| **160** | 2.7 | 2.5 | 2.2 | 2.9 | 2.7 | |
| **180** | 2.7 | 2.2 | 1.9 | 2.6 | 2.7 | **P < .01** |
| **200** | 2.3 | 1.9 | 1.8 | 2.1 | 2.2 | **P < .01** |
| **220** | 2.5 | 2.2 | 2.2 | 2.3 | 2.3 | |
| **All Speeds** | 20.6 | 17.8 | 17.2 | 20.0 | 20.2 | **P < .01** |

# Summary and Conclusions

## Caption Speed

Probably the most interesting finding in this study has been the flexibility of the subjects in handling different caption speeds. Previous research has shown that television programs have a mean speed of about 141 wpm (Jensema, et al 1996) and that subjects felt comfortable with this speed (Jensema 1998). It was expected that fact and narrative test scores in this study would relate to caption speed, with scores becoming lower as speeds became faster. By the time caption speed reached 220 wpm, the researchers expected to see a distinct drop in test scores due to inability of subjects to read fast enough to keep up with the captions. This did not happen and no meaningful drop in caption scores was observed at higher caption speeds.

The fact that the subjects were able to keep up with fast caption rates does not necessarily mean that they were comfortable in doing so. The video segments in this study were 30 seconds long, far shorter than a normal television program and too short for fatigue to be a factor. What this study demonstrates is that captioned television viewers are likely to be able to keep up with very fast captions for a short period of time.

There is undoubtedly some point where caption speed becomes so fast that viewers are unable to read the captions. Jensema, et al (1996) noted that one rap music video had captioning at over 300 wpm and the captions could be understood only with repeated viewing. There is a point where unreadability sets in, but it is over 220 wpm for the typical caption material used in this study (see Tables 11 and 13).

Related to this, it should be noted that the difficulty of the reading material is an important factor in understanding captions. For example, test scores from captioning at 220 wpm would be much lower if the material involved a commentator discussing the political structure of the Balkans or some similarly complicated topic with difficult vocabulary. The captions in this study were deliberately geared to reflect both typical television programs and the language skills of viewers.

The bottom line is that this study indicates that **caption viewers are likely to be able to absorb facts and draw conclusions from captions that are presented as fast as 220 wpm for short periods of time.** In general, this suggests that caption viewers are capable of keeping up with most verbatim captioning, since normal speech rates are unlikely to exceed 220 wpm.

## Demographic Variables

The demographic data collected in this study was limited, but demonstrated that the subjects covered a broad range of the population. The selection of subjects had been limited to people 13 years of age or older because the research team wanted subjects who could reasonably be expected to have enough reading skills to read captions. A few

younger students showed up in the school classes tested (eight 12-year-olds and two 11-year-olds). Overall, 28% of the sample was under the age of 20. On the other end of the age scale, 3% of the sample was 80 years or more, with the oldest being 95 years old.

It had been expected that the youngest subjects might score lower because they were still being educated and that the oldest subjects might score lower because of slightly lower mental functioning brought on by age. In fact, no major differences in mean scores were observed among age groups. The overall fact score mean for all subjects was 19.34, with mean scores of 19.0 and 20.7 for the youngest and oldest groups, respectively. For narrative test scores the overall mean was 20.07, with mean scores of 19.4 and 21.6 for the youngest and oldest groups (see Table 15).

Further, the product-moment correlations between subject age and the test scores at various caption speeds was very low (see Table 16). The overall implication from the means and correlations is that in this study (age range 11 to 95 years) **age was not a factor in ability to absorb facts and draw conclusions from captions**.

One of the more intriguing findings of the study is that for both fact and narrative tests, **females did better or at least as good as males** at every single caption speed level (see Table 17). The difference between females and males was not great, but the superiority of female scores was consistent.

Another interesting finding was that there was **no significant difference between the test scores of deaf, hard of hearing, and hearing subjects.** Since almost all the teenage subjects in this study (28% of the subjects) were from schools and programs for deaf and hard of hearing people, there were few hearing teenagers and the hearing subjects tended to be somewhat older and better educated. It was thought that the hearing subjects might score higher on the tests. On the other hand, hearing subjects watched captions less often and may have had less practice reading captions. Perhaps this was enough to balance out test score differences.

The educational level achieved by the subjects appeared to have little relation to the fact test scores of the subjects. However, educational level was related to narrative test scores. **Subjects who had only attended junior high school seemed less able to draw conclusions from the captioned television segments** and scored significantly lower on the narrative tests (see Table 19).

Students made up a large proportion (45%) of the sample in this study. This includes all educational levels, from junior high school through graduate school. **Non-students (e.g. those who had completed their education) tended to score slightly higher** on both the fact test and the narrative test.

Comparison of educational level and student status pinpointed an especially interesting finding: Subjects who were junior high school students scored very significantly lower on the narrative test than other subjects. This was not true on the fact test, suggesting that **junior high school students were able to remember facts, but did**

**poorly on drawing conclusions from facts**.

A majority of the subjects in this study (76%) watch captioned television "every day" and the remaining subjects watched anywhere from "once a week" to "seldom/never." The mean test scores were significantly different beyond the .01 level at 180 and 220 wpm for the fact tests (see Table 21) and at 100, 140, 180, and 200 wpm for the narrative tests. Unfortunately, the pattern in these results is not clear. **Several significant differences occur in test scores on the basis of the caption viewing frequency, but these differences defy a simple explanation.**

To summarize, this has been a comprehensive study of how well captioned television viewers can remember facts from short captioned television segments and draw conclusions from those facts. Caption speed ranged from 80 wpm to 220 wpm, representing the extremes likely to be found in normal television programming. The 1,102 caption viewers in this study demonstrated that they could respond effectively to captions that are presented as fast as 220 wpm for short periods of time. They may not be comfortable with captioning at such speeds, but they can read and respond to the material. Further, with the exception of junior high school students, such demographic variables as age, sex, hearing loss, and educational level do not appear to have a meaningful relationship to performance on the tests used in this study. The implication is that the majority of caption viewers should be able to use verbatim captioning and that editing to reduce caption speed is not required.

# References

Jensema, C., McCann, R., Ramsey, S., Closed Captioned Television Presentation Speed and Vocabulary. American Annals of the Deaf, 1996, 141, 4, 284-292.

Jensema, C., Viewer Reaction to Different Television Captioning Speeds, American Annals of the Deaf, 1998, 143, 4, 318-324.

# Appendix

**Video Scripts**
**Demographic Questionnaire**
**Fact Tests**
**Narrative Tests**
**Item Response Distributions**

# Video Scripts

# Salmon

## Segment 1

Every year
upstream migrations of salmon
start in February
with the Chinook,
or king salmon.
The weight of the Chinook
averages 22 pounds,
but some weigh
70 to 100 pounds.
Some Chinook have white flesh,
but their usual color
is deep red.
The Chinook prepare
for their migration
by storing away
a large quantity of oil.
Water pollution, and
competition for water by humans
have diminished the number of salmon.

## Segment 2

The small humpbacked, or pink, salmon;
the keta or dog salmon; and
the silver, or coho salmon
enter the rivers
in summer and fall
to spawn.
These salmon do not require
much fat because they spawn
close to the sea.

## Segment 3

Salmon eggs are spawned
in gravel beds, in tributary streams, or lakes.
After about three months time
the fish hatch.
For about six weeks
they live on large yolk sacs
under their bodies.
Then they must find food
for themselves.
Some species
of the young fry
hurry away to sea
as soon as they are able
to swim.
Other species remain
in fresh water
up to three years.
The oily food from
the ocean enables the
fish to grow rapidly.

## Segment 4

When the salmon
leave the ocean
they are in splendid condition.
They are at least 3 years old.
when they leave the ocean.
After they enter fresh water,
the fish eat nothing.
They fiercely fight
their way upstream
becoming thin and battered.
During this time
the males' jaws develop
into powerful hooks
which they use to compete
for a mate.

**Segment 5**

The salmon's route
to the spawning grounds
is obstructed
by a series of dams.
Fish ladders allow the salmon
to pass upstream
around the dams through
a series of step-like pools.
However, the fish cannot pass
beyond the Grand Coulee Dam,
because it does not have
a fish ladder.

**Segment 6**

Soon after they have been
hatched in fresh water,
the Pacific salmon
"run away to the sea."
Several years later
the salmon return to their
native streams to spawn.
The fish search for the
special features that belong
to their home stream.
The king salmon
of the Yukon River
travel 2,000 miles upstream
to their home waters.
They leap over waterfalls
as high as 10 feet,
cut through churning rapids
and wriggle across shallows.
They need to reach the stream
where they were born
to produce the eggs of the next generation.
All Pacific salmon die
soon after they spawn.

**Segment 7**

For years the salmon heading for
for the tributaries of the
Columbia River
above Grand Coulee Dam
were caught
at Rock Island Dam.
They were then transported
to the fish hatcheries
in Leavenworth, Washington,
or to the tributaries
below Grand Coulee Dam.
The fish were forced
to spawn in these specific streams.
Because all salmon return
to the stream
where they were hatched,
it was possible
to stop transporting the salmon
a few years later because
there were no longer
any fish in the tributaries
above the Grand Coulee Dam

**Segment 8**

The Chinook Indians
arranged their lives
by the annual run of the salmon.
In spring and summer the Indians
gathered along the Columbia River
to spear the salmon as
they swam upstream.
The Chinook then dried the salmon
and stored them for winter food.
Today the Pacific salmon
are the most valuable
of the North American commercial fishes.
The Pacific Salmon generally live
in the temperate and Arctic waters
of the North Pacific.
They spawn in streams
along the North American
and the Asian coasts.
The Atlantic Salmon, however,
are a very different species.
They are related to the trout.
They do not return to their
native waters to spawn.

## Sailing

### Segment 1

Sailboat races are held by
local, regional, or national organizations.
All races are governed by
the International Yacht Racing Union.
Sailboat competition is
a well-organized sport
at the 2400 yacht clubs
in the United States.
A United States racer may start
at the club level and
advance to interclub, regional, and
North American Yacht Racing
Championships.
Men, women and juniors compete at their
own levels.
The highest achievement in
small-craft sailing competition
is participation in the Olympic Games.

### Segment 2

The America's Cup Race is
the most famous sailing competition
in the world.
America's Cup racing yachts have
traditionally used a single hull yacht.
In 1988, the Stars and Stripes yacht
from the United States
used a catamaran or a two-hulled yacht
for the first time.
The catamaran won the race.
New Zealand protested the
use of a catamaran in court.
The court decided in favor
of the United States and
use of the catamaran was allowed.
In 1989, guidelines for the
International America's Cup races
were established.
Ships up to 75 feet became eligible for the
America's Cup.

### Segment 3

The sport of windsurfing is also called
boardsailing.
Boardsailing combines sailing and surfing.
It first became popular in
Europe in the 1970's.
It is now popular around the world.
Advanced teaching techniques have
made the sport easier to learn.
Lighter, stronger, and faster boards
have been developed.
These boards are made of high
density foam covered by a plastic shell.
Sail evolution has produced efficient sails.
These sails transfer the wind's energy into
greater forward thrust.
The world speed record for boardsailing
was set by a French man in 1993.

### Segment 4

Boardsailors or windsurfers enjoy their sport
in many different ways.
They use short boards to ride the ocean surf.
Speed sailors look for flat waters and high
wind to reach high speed.
Recreational windsurfers enjoy catching the
wind on lakes, streams, rivers, bays, and
oceans.
Highly skilled riders jump waves and soar
high into the air.
More adventurous riders have perfected
the technique of jumping a wave,
doing a complete flip in the air,
then landing and sailing away.
There are international competitions for
amateur and professional windsurfers.
Windsurfing has also been a part of the
Olympics since 1984.
In the Olympics there are separate divisions
for men and women.

**Segment 5**

The earliest sailing ships
were flat rafts with
a short mast in the middle..
These sailboats were propelled
by oars manned by slaves.
A rectangular sail was hoisted
up onto a mast.
These ships were steered by an
extra large oar called a steerboard.
The term "starboard" for
the right side of the ship
came from the word "steerboard".

**Segment 6**

America's Cup is
an international yacht race.
Yacht crews compete to represent
their home countries.
The race was named the America's Cup
after members of the New York Yacht Club
won the race in 1851
with a 170 ton schooner named America.
United States vessels won
the next 24 competitions.

**Segment 7**

From 1930 to 1983
America's Cup races
were held off the coast
of Rhode Island.
During the World War II period,
no races were held.
After the war, race participants were
discouraged by the costs of building
and maintaining sailboats

**Segment 8**

The most spectacular and dangerous
yachting races are competitions
sailed by one person.
There are two races like this,
the Single-Handed Transatlantic Race, and
the Single-Handed Race Around the World.
The Transatlantic Race started in 1960, and
happens every four years.
The Race Around the World
was first held in 1968.
The winner of the race was
the only person who finished the race.
He was from England.

## Space

### Segment 1

In ancient times space travel
was only a fantasy.
Later science researchers developed an
understanding of the solar system.
In the 7th century B.C., Greek philosophers
discovered that earth is a sphere.
In the 3rd century B.C. another Greek,
discovered that the earth
moves around the sun.
And in the 2nd century B.C.
information was recorded
about the stars and the moon.

### Segment 2

The space age began
when the Soviet Union
launched Sputnik I
in October 1957.
The United States launched
Explorer 1 in January 1958.
Later, the United States created the
National Aeronautics and Space
Administration (NASA).
Since 1957, many
spacecraft have been launched and
twelve men have walked on the moon.

### Segment 3

One challenging and exciting aspect
of space exploration
is manned space flight.
After the first satellites
were launched in 1957,
Soviet and American design teams
began to work on manned space vehicles.
Several unmanned space flights
were launched in the early 1960's.
Then the Soviet Union launched the world's
first manned spacecraft, Vostok,
on April 12, 1961.
The first pilot was a 26 year old
Russian astronaut named Yuri Gagarin.

### Segment 4

United States President
John Kennedy was committed
to the space program.
His goal was to land a man
on the moon before the end
of the 1960's.
The first U.S. astronaut landed
on the moon on July 20, 1969.
As technology continued to improve
through the years, the United States
developed new ways to get information.
One way was sending unmanned spacecraft
around the earth.
By 1986 thousands of objects
were circling the earth.
These objects included
earth-orbiting satellites.
Satellites provided a new source
of scientific data.
Satellites have also improved
global communications,
weather forecasting, and
navigation around the world.

**Segment 5**

The United States Space Shuttle is
a reusable spacecraft.
It is designed
to be launched into orbit
by rockets.
It returns to the Earth's surface
by gliding down
and landing on a runway
just like an airplane.
In 1970, the Shuttle was selected
as the primary space launcher and
carrier vehicle.
It was developed
by the National Aeronautics and Space
Administration (NASA).
The Space Shuttle was designed to replace
expensive booster rockets.
The Shuttle completed NASA's new
Space Transportation System.

**Segment 6**

Space is a hostile environment
for humans in many ways.
Space does not contain air or oxygen,
so human beings cannot breathe.
The vacuum of space and environmental
conditions can destroy a human body
in a few seconds.
Temperatures in space
in the shadow of a planet
are close to zero.
Direct sunlight can cause
the temperatures to become
fatally hot.
The design and construction of materials are
adapted to the space environment.
Experiments in weightlessness
have been studied
to discover what effects
this condition has
on humans in space.

**Segment 7**

Spacecraft that do not carry humans
can be a variety of sizes and shapes.
These spacecraft have
radio transmitting equipment
for relaying information
back to earth.
This equipment also
signals the position
of the spacecraft.
Spacecraft that carry humans
are designed to provide
air, food, and water for the astronauts.
The spacecraft has separate
seating and sleeping areas.
It also carries communication equipment.
The communication equipment is used
to send and receive information
from the control center on earth.
Manned spacecraft also carries the
most recent technology for navigation and
guidance.
The manned spacecraft has
a heat shield.
The heat shield protects
the vehicle as it re-enters the atmosphere.

**Segment 8**

One future project in space is
large-scale colonization.
New earth-observation technologies
will be developed
to improve monitoring
of the Earth.
These technologies will be applied
to future space stations
and probes of the Sun,
planets, asteroids, and comets.

## Pyramids

### Section 1

Egypt is a country located
in northeastern Africa.
The ancient Egyptians created the idea
of building pyramids as their tombs.
The Egyptian pyramids
were built before 1000 BC.
The pyramids were built
for the pharaohs and their close relatives.
The pyramid's design was based on
worship of the sun.
Today, pyramid ruins can be found
in Egypt and the Sudan.
Pyramids evolved from the
style of tombs called mastabas.
The first pyramids were mastabas
stacked on top of each other.
The first pyramid built this way
was the Step Pyramid.

### Section 2

A mastaba is a
rectangular stone structure
that is erected over a tomb.
The word mastaba means
"earthen bench " in Arabic.
Many of the mastabas are very
large structures.
One of the largest has
at least 32 rooms.
The first true pyramid
was built after the mastabas were built.
Each pyramid was built for a pharaoh.
Many of the pyramids
have nicknames based
on their color or the way they look.
The nickname of one of the
pyramids is the Bent Pyramid.
It is called the Bent Pyramid
because the incline changes halfway up,
causing the pyramid to look bent.

### Section 3

Imhotep was the
first Egyptian architect.
Imhotep was responsible
for designing
the first pyramid called
the Step Pyramid.
This pyramid is the
oldest stone structure in Egypt.
The Step Pyramid
has a large mastaba
as the base and
has six terraces of different sizes,
built on top of each other.

### Section 4

Egyptian kings built
huge stone pyramids
as their tombs.
Each pyramid includes
a valley temple,
a mortuary temple,
and causeways.
Small pyramids were built
near the large pyramids
for Egyptian queens.
Many pyramids have
elaborate carved hieroglyphics
on the walls.

**Section 5**

There are three famous pyramids
in the city of Giza, Egypt.
Giza is a small city
located southwest of Cairo.
The pyramids were built for three pharaohs.
The largest pyramid is known
as the Great Pyramid
and originally stood 482 feet high.
The smallest of the three pyramids
is only 218 feet high.
The pyramids at Giza
were built west
of the Nile River
because Egyptians believed the
home of the dead
should face the setting sun.
These three pyramids are the most
elaborate examples of temple complexes.
They have all been stripped
of their original smooth limestone covering
because modern day Egyptians
have taken the stone for
their buildings.

**Section 6**

The Great Pyramid
has over 2.3 million blocks.
It took 20 years to
build this pyramid.
It was built
for the Pharaoh Khufu.
More than 100,000 men
worked on the Great Pyramid.
Many of the men spent most of their
lives building the pyramid..
The Great Pyramid and its temples
were completed in 2500 BC.
It was the largest in the world,
originally 482 feet high
and 756 feet wide.

**Section 7**

The Black Pyramid
is the only pyramid built of brick.
It was built for the pharaoh,
Amenemhet III.
It was never used by him.
It is the northernmost pyramid in Egypt.
The pyramid is in very bad shape.
Many of its passageways
have collapsed.
The only way to enter the pyramid's
burial chamber is to crawl
through a narrow tunnel.

**Section 8**

The Pyramid of Sahure
is extremely dangerous inside.
It is sometimes possible to enter
but you must carry flashlights.
Visitors must be willing
to crawl on their stomachs to get inside.
The temple is the most interesting thing
about this pyramid.
Another pyramid,
the Pyramid of Unas, has
an 1100 yard-long causeway
that connects its outside temple
to the pyramid.
The oldest religious writings
are on the walls of
the Pyramid of Unas.
They are called
the Pyramid Texts.

## The Game

### Segment 1

My brother was always
there for me when
I was a little kid.
Our father had died
a year after I was born,
so Ben took over the role.
He tutored me when
I needed help in school
and he took me to sporting events.
He taught me how
the games were played.
He was really very good at that.

### Segment 2

I guess you can tell
that I idolized my brother.
He taught me about things,
and about myself.
If it wasn't for him,
I wouldn't be a
successful business owner now.
He had an incredible zest for life
and always
gave of himself to other people.
Ben was two years older than me.
He wanted to be a
professional football player.
But, he had bad knees and
so a career on the grid-iron was not to be.
He became a high school
physical education teacher and football coach.
His first year out of college,
he became a head coach.

### Segment 3

Ben's teams were always ready
and motivated for their games.
His enthusiasm rubbed off on everyone.
In just his first year as coach,
he took his team to the State Championships
for the first time in the school's history.
Even though they lost 24-13,
my brother had the team
believing they were winners!
He made them proud of their accomplishments,
just as he always made me proud of mine.

### Segment 4

There was always next year,
with new goals and aspirations.
For those on the team
who thought they had failed,
he made it clear that
failure wasn't in the falling down,
it was only in not getting back up!
So, the following year
the team began with three straight wins.

**Segment 5**

At the end of that third game,
Ben collapsed in the locker room.
By the time the ambulance
got him to the hospital,
he seemed fine.
They decided to keep him overnight
for observation
and to take some tests
just to be on the safe side.
My mother and I were there
when Ben was given the results.
Ben had a rare form of cancer
quickly spreading through his body.
They could do chemotherapy,
but there was no hope for recovery.
My brother had less than three months to live.

**Segment 6**

The next few days
I couldn't talk without crying.
The doctor had to give mom sedatives.
But Ben accepted his fate
and went back to school.
He coached his team
and they earned a trip back
to the State Championships.

**Segment 7**

The week before the big game,
Ben had a team meeting.
He was very tired.
He knew his time was running out.
He wanted his team to know
he was proud of them.
Ben wanted them to know
that win or lose,
they were champions.
He was rushed to the hospital
two hours before
the game was to start.
Officials wanted to postpone the game.
But Ben left strict instructions
that no matter what,
he wanted the game played.
The players didn't know it at the time,
but my brother died at 9:10 pm.
That was the exact time
that the Cougars of Hilltown High School
scored the winning touchdown.

**Segment 8**

I miss my brother very much.
He was an inspiration
to everyone who knew him.
Hilltown High School chose to honor
Ben's memory with a very special dedication.
My brother went out a champion
and left his legacy through
all the lives he touched.
And now when you enter
the new football stadium
at Hilltown High,
you can feel my brother's spirit.
It makes me very proud each time
I watch a football game
in the Ben Turner Memorial Stadium.

## A Ghost Story

### Segment 1

I took a large room,
far up Broadway,
in a huge old building
whose upper stories
had been unoccupied
for years until I came.
The place was dusty
and full of cobwebs.
For the first time in my life
a superstitious fear came over me.
I went up the stairway
and an invisible cobweb
swung in my face and stayed there.
I shivered as if
I had seen a ghost.

### Segment 2

I was glad
when I reached my room
and locked out the mold
and the darkness.
A cheery fire was
burning in the grate.
I sat down
with a sense of relief.
For two hours I sat there,
thinking of old times and
old faces out of the past.
The shrieking of the
winds outside
softened to a wail.
The angry beating
of the rain
against the panes
slowed down
to a light drizzle.
One by one, the
noises in the street stopped,
until the footsteps
of the last straggler
died away in the distance
and left no sound behind.

### Segment 3

A sense of loneliness
crept over me.
I undressed, tiptoeing
around the room.
I did what I had to do
as if people were sleeping
all around my room.
I lay in bed listening
to the rain and wind
and the faint creaking
of distant shutters, until
I fell asleep.

### Segment 4

Suddenly, I found myself awake,
and filled with fear.
All was still.
All but my own heart.
I could hear it beat.
Presently the blankets began
to slip away slowly
toward the foot of the bed.
It was as if someone
were pulling them.
The blankets continued to slip away.
Then with a great effort
I grabbed them and
pulled them over my head.
I waited and listened.
Then I heard
a heavy footstep
in my room.
It did not sound human.
It was moving away from me.
I heard it approach the door
and pass through without
moving the bolt or lock and then
there was silence once more.

**Segment 5**

And so I lay there
thinking it over
until I convinced myself
that it was only a dream.
I got up and
turned on a light.
I checked to see that
the locks and bolts were
as I had left them.
I lit my pipe
and was just sitting down
before the fire, when
I dropped the pipe on the floor.
I gasped.
In the ashes on the fireplace,
next to my own bare footprint,
was another footprint
much larger than mine.
There had been a visitor
in my room.

**Segment 6**

I returned to bed.
I lay listening a long time.
Then I heard
a noise.
It sounded like
the dragging of a heavy body.
The windows in my room
were shaking.
In other parts of the building
I heard doors slamming.
I heard heavy footsteps
creeping around the hallways.
These noises
approached my door, paused,
and then went away again.

**Segment 7**

When everything was quiet again,
I crawled out of bed,
and started a fire.
My hands were shaking terribly.
I sat and thought about
the huge footprint in the ashes.
The flames in the fireplace
were getting smaller and smaller.

**Segment 8**

I heard the loud footsteps again.
They came closer
and the light in my room
became dimmer.
The footsteps reached my door
and stopped.
The door did not open
but I felt wind on my face
and I was conscious of
a huge cloudy presence before me.
I watched with fascinated eyes.
A pale glow
surrounded the Thing.
First, an arm appeared,
then legs,
then a body and
last a great sad face.
The majestic Cardiff Giant
loomed above me.

...**A Case Of Murder**

**Segment 1**

The sign on my door
reads "Ellen Bartrum, Attorney-at-Law".
Susan Parker and I have been
best friends forever and
she was in a lot of trouble.
Of course I said yes
when she asked me to help her.
I was an honest and dedicated lawyer.
I gave my clients the best defense possible.
But they had to be truthful with me.
I only took cases where I believed,
beyond a shadow of a doubt,
that they were innocent.

**Segment 2**

Susan had married
a very wealthy physician
only a year ago.
The wedding was beautiful
and the bride and groom
seemed to be very much in love.
Susan's husband had been
married once before,
but this was her first time at the altar.
After a long honeymoon
on the French Riviera,
they returned to their new home
in San Francisco.

**Segment 3**

Susan's husband Peter did not want her
to continue her career as an actress.
So, instead she volunteered
her time to charities.
I could tell that she wasn't happy.
In fact, she seemed depressed
and even a little resentful
that she had to give up
what she loved doing.
When she was a little girl,
she swore to me that someday
she would be a famous movie star.
I had not heard from Susan in several weeks
when I received a call informing me
that her husband had been murdered.

**Segment 4**

Evidently the police felt
they had sufficient evidence to arrest her
and accuse her of the murder.
When I visited her at the County Jail,
Susan filled me in on the
past few months.
Peter, she told me,
had been acting mysterious.
She tried to find out what was wrong
but he would just get upset.
He yelled at her and threw tantrums.
He had never acted that way before.

**Segment 5**

The police and District Attorney were
confident that Susan was guilty.
The neighbors had heard them
arguing a lot lately.
Supposedly, the police had a witness
that put Susan at the crime scene
around the time of the murder,
and, to top it off,
there was a one million dollar insurance policy
with Susan as the beneficiary.
Peter's body was found on the floor
of his office, but Susan swore
she had not seen him at all
on the day of the murder.
She claimed he had not
slept at home the night before,
and that she had been worried about him.
Now she was confused and scared to death.

**Segment 6**

I checked Peter's desk at his office
and found some receipts
and an appointment book
in the bottom drawer.
One receipt was for a room
at the Bayside Hotel.
I was able to confirm
that he stayed there
the night before he was murdered,
and that he was not alone.

**Segment 7**

After looking at Susan's picture,
the hotel clerk insisted
Susan was the woman
who had been with Peter.
So, the clerk was the star witness.
But Susan insisted she was
home alone that night.
So who was the mysterious woman?

**Segment 8**

In reviewing Peter's appointments,
one name came up often,
Katherine Richards.
I found a file on her
and in it there was a picture.
It was incredible.
The woman looked exactly like
my friend Susan.
Peter's personal notes told me that
his ex-wife had wanted him back.
She had reconstructive surgery to make her
look like Susan.
She had planned to kill Susan
and take her place.
When Peter found out
he must have tried to stop her,
and she killed him instead.
When I informed the police,
Katherine was picked up at the airport.
This case was closed.

## Dinner Date

### Segment 1

My mother and father
had always told me
not to talk to strangers.
Now that I am an adult,
employed as a regional sales manager
for a very large kitchen products company,
I have to talk with strangers every day.

### Segment 2

I was on my way home
from visiting with
one of my customers.
I'm not married and
there was no one
expecting me for dinner.
I decided to stop at
a local restaurant to eat.
While I was waiting in line for a seat,
an elderly woman came in
and stood behind me.
She told the hostess
that she was alone.
When the hostess came to seat me
she informed the older woman
that it might be about 15 minutes
before another table was available.
So, I asked the woman
if she would like to join me
at my table.

### Segment 3

Her name was Harriet and
she loved to talk.
She told me how grateful she was
that I was a good listener.
She was just like my mother
who lives in Canada.
I was more than happy to listen
to the wonderful stories that
this sweet senior citizen told me.

### Segment 4

But then Harriet told me a story
that made her very sad.
It was about how lonely she was.
She never married and had no family.
Harriet cried as she told me she lived alone.
She said she didn't eat out often,
but today was her birthday
so she decided to treat herself.
I wanted to hug her
and let her know that someone cared.
I offered her money as a birthday present,
but she refused it.
She would not even let me drive her home.
Before she left the restaurant,
she asked my name.
She said that someday I would be rewarded
for being so nice to a stranger.

**Segment 5**

Several months after that evening with Harriet,
I met the woman who would become my wife.
Beth was a beautiful woman.
Three years later we had our first child
and life was wonderful.
Then my company informed me
that they were going out of business.
I was shocked.
Beth had quit her job
to take care of our child.
My income was important.
Four months later I was still unemployed.
I had never felt so bad in my entire life.

**Segment 6**

Then came a very surprising phone call.
I was being called for a job interview
for a sales manager position
with a company that said
they got my number from a friend.
The Vice President of this company
seemed impressed with my experience
and background and
asked me to return the next day
to meet the President.
My wife and I were so excited,
but the job wasn't mine yet.

**Segment 7**

When I returned for my interview
the Vice President greeted me warmly.
He lead me to the President's office,
opened the door,
and the company's owner stood there
looking out her window.
She turned around and
I almost fell to the floor.
It was Harriet!
She had a huge smile on her face
and told me I had the job.

**Segment 8**

Harriet said she had been checking on me.
She was so impressed with
how I treated her,
a stranger, on her birthday.
She found out where I lived
and where I worked
and when she learned
that I lost my job,
she couldn't wait to hire me.
She had told me
I would be rewarded
for being nice to a stranger.
Now she wanted to
take my wife and me to
a nice little restaurant
to celebrate my new job.
You can bet that I knew
which restaurant it was!

# Demographic Questionnaire

**IDRT**
**CAPTION RESEARCH PROJECT**

The Institute for Disabilities Research and Training (IDRT) was established in 1986 to provide research, training, technical assistance, workshop & conference planning services, and advocacy for organizations which serve special populations. We are a small company that does research on issues related to the Deaf community. Most of our research is supported by grants from the U. S. Department of Education. One of our research projects is to explore caption speed and how it effects comprehension.

Have you ever watched captioned television? Do you sometimes think the captions are too fast or too slow? Do you sometimes have a hard time understanding the captions or what was said? Today, you will have a chance to see captions at a variety of speeds. We will have one practice story before we start. Then we will begin by showing two short captioned stories which are divided into several sections. After each story, you will be prompted by the video screen to answer four multiple choice questions.

Please do not turn the page until instructed to do so. Remember these sections are timed and you will **not** have the opportunity to return to unfinished questions.

# DEMOGRAPHIC QUESTIONAIRE

Name: _____

Age: _____ Sex: _____

Are you?
___ Deaf
___ Hard of Hearing
___ Hearing

Education: (check the highest level you have achieved)
__ Middle School/Jr. High School
__ High School
__ Trade School
__ Some College
__ Bachelor's
__ Master's/Doctorate degree

Are you are student now?
___ Yes ____ No

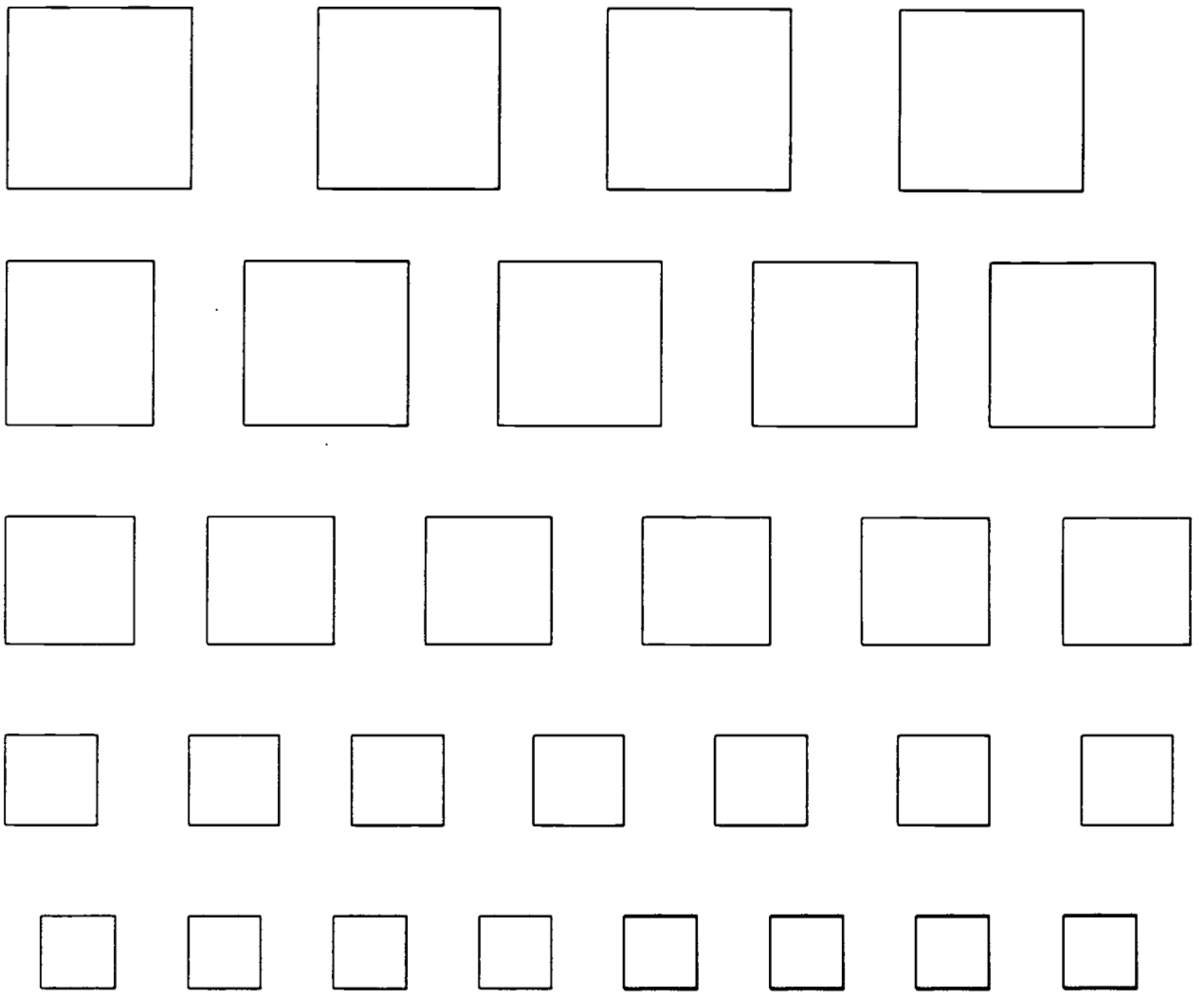
How many _____ people live in your house?
___ Deaf
___ Hard of Hearing
___ Hearing

How often do you watch **captioned** television?
___ every day
___ once a week
___ once a month
___ once a year
___ Seldom/never watch closed caption television.

# CLOSED CAPTION STUDY

Data Collection Vision Test Form

**INSTRUCTIONS:** Please fill in as many blanks as you can, starting from the top. (If you are certain that you can see all of the last row, just complete that one.)



## Practice Test One

### Section 1

1. **Claude Monet was born in the _____ .**

   a. **1500's**

   b. **1600's**

   c. **1700's**

   d. **1800's**

2. **The painting in this section is called _____.**

   a. "Lake Monet"

   b. "Field of Dreams"

   c. "Field of Poppies"

   d. "Mount Monet"

# Fact Tests

**Salmon**

**Section 1**

1. Upstream migration of salmon start in _____ .

   a. February

   b. May

   c. August

   d. October

2. The Chinook salmon weigh an average of _____ pounds.

   a. 2

   b. 13

   c. 22

   d. 31

3. The Chinook prepare for migration by storing away _____ .

   a. oil

   b. Milt

   c. food

   d. eggs

4. Salmon numbers have been greatly diminished because of _____.

   a. disease

   b. water pollution

   c. bacteria

   d. increased fishing sports

**Section 2**

1. Small humpbacked salmon are also known as _____ salmon.

   a. pink

   b. red

   c. white

   d. yellow

2. The salmon enter the _____ in summer and fall to spawn.

   a. ocean

   b. river

   c. stream

   d. delta

3. These salmon do not require much _____.

   a. water

   b. food

   c. strength

   d. fat

4. The silver salmon spawn close to _____

   a. the sea

   b. a dam

   c. the shore

   d. a lake

**Section 3**

1. The eggs are spawned in _____ beds.

   a. ocean

   b. fish

   c. gravel

   d. weed

2. The fish hatch in _____ months.

   a. 2 weeks

   b. 1 month

   c. 6 weeks

   d. 3 months

3. For six weeks they live upon large _____ under their bodies.

   a. yolk sacs

   b. Mothers milk

   c. eggs

   d. plankton

4. The _____ food from the ocean enables the fish to grow rapidly.

   a. fresh

   b. salty

   c. oily

   d. available

**Section 4**

1. When the salmon leave the _____ they are in splendid condition.

   a. river

   b. ocean

   c. gulf

   d. stream

2. After they enter fresh water, the salmon eat _____.

   a. fish

   b. nothing

   c. everything

   d. snails

3. The males' develop _____.

   a. powerful hooks

   b. powerful tails

   c. sharp scales

   d. powerful fins

4. They use their powerful hooks to compete for _____.

   a. a mate

   b. food

   c. territory

   d. fresh water

**Section 5**

1. The salmon's route is obstructed by a series of _____.

   a. dams

   b. rocks

   c. currants

   d. streams

2. Fish _____ allow the salmon to pass upstream.

   a. tunnels

   b. ladders

   c. nets

   d. boats

3. The fish cannot pass beyond the _____ Dam.

   a. Hoover

   b. Grand Coulee

   c . Columbia

   d. Rock Island

4. The salmon pass through a series of step-like _____.

   a. pools

   b. streams

   c. rivers

   d. tanks

**Section 6**

1. Salmon return to their native _____ to spawn.

   a. stream

   b. ocean

   c. shore

   d. lake

2. The king salmon travels the _____ River.

   a. Oregon

   b. Columbia

   c. Yukon

   d. Colorado

3. The king salmon travels _____ miles to its home waters.

   a. 500

   b. 1000

   c. 1500

   d. 2000

4. All Pacific salmon _____ soon after they spawn.

   a. leave

   b. die

   c. change

   d. mate

**Section 7**

1. The salmon were transported to the _____ at Leavenworth, Washington.

   a. hatcheries

   b. ocean

   c. rivers

   d. tributaries

2. The salmon were _____ at Rock Island Dam.

   a. released

   b. born

   c. caught

   d. killed

3. The fish were forced to _____ in these streams.

   a. spawn

   b. live

   c. die

   d. swim

4. There are no longer any fish in the tributaries _____ the Grand Coulee Dam.

   a. above

   b. below

   c. near

   d. at

**Section 8**

1. The _____ Indians arranged their lives by the annual run of the salmon.

   a. Chinook

   b. Sioux

   c. Navajo

   d. Apache

2. Salmon were dried and used for _____.

   a. food

   b. medicine

   c. bait

   d. fertilizer

3. Pacific salmon live in the waters of the _____.

   a. West Atlantic

   b. North Pacific

   c. South Pacific

   d. East Pacific

4. The Atlantic Salmon is related to the _____.

   a. swordfish

   b. halibut

   c. trout

   d. dolphin

## SPACE

**Section 1**

1. In the 7th century, Greek _____ discovered that earth is a sphere.

   a. explorers

   b. scientists

   c. astronomers

   d. philosophers

2. In the 3rd century a _____ discovered that the earth moves around the sun.

   a. Greek

   b. Roman

   c. Phoenician

   d. Spaniard

3. In the _____ century, information was recorded about the stars.

   a. 1st

   b. 2nd

   c. 3rd

   d. 4th

4. Information was also recorded about the _____.

   a. moon

   b. sun

   c. planets

   d. asteroids

**Section 2**

1. In 1957 _____ was launched by the Soviet Union.

   a. Mir

   b. Vostok

   c. Sputnik

   d. Explorer

2. In 1958 _____ was launched by the United States.

   a. Explorer

   b. Apollo

   c. Challenger

   d. Sputnik

3. The _____ created the National Aeronautics and Space Administration.

   a. United States

   b. Soviet Union

   c. United Nations

   d. Peoples Republic of China

4. _____ men have walked on the moon and returned to earth.

   a. 3

   b. 5

   c. 7

   d. 12

**Section 3**

1. _____ space flight is the most challenging aspect of space exploration.

   a. Continuous

   b. Unmanned

   c. Competitive

   d. Manned

2. The first manned spacecraft was launched in the _____.

   a. 1940's

   b. 1950's

   c. 1960's

   d. 1970's

3. The pilot of the first spacecraft was a 26 year old _____.

   a. American

   b. Russian

   c Swede

   d. Spaniard

4. _____ was the Soviet Union's first manned spacecraft.

   a. Challenger

   b. Vostok

   c. Mir

   d. Sputnik

**Section 4**

1. President Kennedy was committed to landing on the moon before the end of the ____.

   a. 1950's

   b. 1960's

   c. 1970's

   d. 1980's

2. In 1969, the _____ landed on the moon.

   a. Soviet Union

   b. Japanese

   c. Chinese

   d. United States

3. Objects circling the earth include _____.

   a. satellites

   b. lasers

   c. keck

   d. rockets

4. Earth-orbiting satellites provide information about _____.

   a. heat shields

   b. weather

   c. Mars

   d. weightlessness

**Section 5**

1. The Space Shuttle is a reusable _____.

   a. rocket

   b. spacecraft

   c. jet

   d. airplane

2. The Space Shuttle uses _____ to launch it into space.

   a. jets

   b. rockets

   c. boosters

   d. machines

3. The Space Shuttle lands _____.

   a. in the water

   b. on a runway

   c. in a field

   d. on a launch pad

4. The Space Shuttle was developed by the _____.

   a. World Space Agency

   b. United Nations Space Consortium

   c. International Space Administration

   d. National Aeronautics and Space Administration

**Section 6**

1. Space does not contain air or _____.

   a. hydrogen

   b. oxygen

   c. nitrogen

   d. helium

2. The vacuum of space can destroy a human in a few _____.

   a. seconds

   b. minutes

   c. hours

   d. days

3. Temperatures in the shadow of a planet are close to _____.

   a. zero

   b. freezing

   c. the Earth's

   d. boiling

4. _____ can cause space temperatures to become fatally hot.

   a. The ozone

   b. Direct sunlight

   c. Ultra violet rays

   d. The black hole

**Section 7**

1. Spacecraft without humans have _____ equipment.

   a. radio-transmitting

   b. television-transmitting

   c. energy-transmitting

   d. laser-transmitting

2. _____ equipment is used to send and receive information.

   a. Navigation

   b. Guidance

   c. Communication

   d. Video

3. The heat shield protects the vehicle as it _____

   a. lifts off.

   b. orbits earth.

   c. re-enters the atmosphere.

   d. lands on earth.

4. A manned spacecraft communicates with a control center _____.

   a. on earth

   b. on the moon

   c. in space

   d. traveling with it

**Section 8**

1. One future project in space is large-scale _____.

   a. colonization

   b. destruction

   c. construction

   d. development

2. New technologies will be developed to improve _____ of the earth.

   a. temperatures

   b. monitoring

   c. rotation

   d. navigation

3. New technology developed can be used for future _____.

   a. moons

   b. space stations

   c. stars

   d. planets

4. New technology will also be applied to probes of the _____.

   a. moon

   b. earth

   c. sun

   d. craters

## Sailing

**Section 1**

1. All races are governed by the

   a. Olympic Committee

   b. Yacht Racing Parliament

   c. International Yacht Racing Union

   d. North America Yacht Racing Association

2. There are 2400 yacht clubs in _____.

   a. North America

   b. the United States

   c. Russia

   d. Europe

3. A racer starts racing at the _____ level.

   a. novice

   b. local

   c. club

   d. regional

4. The highest achievement in competition is to participate in the _____.

   a. World Cup

   b. Olympic Games

   c. International Games

   d. World Championships

**Section 2**

1. In 1988, the United States used a _____for the first time.

   a. catamaran

   b. single hull yacht

   c. schooner

   d. three-hulled yacht

2. _____ protested the Stars and Stripes yacht in court.

   a. Australia

   b. England

   c. New Zealand

   d. France

3. In 1989, _____ were established for the International America's Cup Races.

   a. guidelines

   b. award categories

   c. sail ratios

   d. design specifications

4. Ships up to _____ feet became eligible for the America's Cup Race.

   a. 50

   b. 75

   c. 100

   d. 125

**Section 3**

1. _____ is also called boardsailing.

   a. Windgliding

   b. Windsurfing

   c. Windsailing

   d. Windboarding

2. Boardsailing first became popular in _____.

   a. Australia

   b. North America

   c. Europe

   d. South America

3. The _____ transfers the wind's energy into greater forward thrust.

   a. rudder

   b. sail

   c. wave

   d. fin

4. The world _____ record was set by a French man in 1993.

   a. distance

   b. endurance

   c. speed

   d. solo

**Section 4**

1. _____ boards are used to ride ocean surf.

   a. Long

   b. Short

   c. Lightweight

   d. Heavier

2. Speed sailors look for _____ to reach high speeds.

   a. flat water

   b. rough water

   c. large waves

   d. high tide

3. Windsurfing has been part of the Olympics since _____.

   a. 1964

   b. 1976

   c. 1984

   d. 1992

4. In the Olympics there are separate _____ for men and women.

   a. sails

   b. divisions

   c. boards

   d. courses

**Section 5**

1. The earliest sailing ships were _____.

   a. flat rafts

   b. steerboards

   c. yachts

   d. sailboats

2. These ships were steered by a _____.

   a. pilot wheel

   b. compass

   c. steerboard

   d. rudder

3. The _____ side of the ship is called the starboard.

   a. left

   b. right

   c. front

   d. back

4. The term "starboard" came from the word _____.

   a. starfin

   b. steerboard

   c. stepboard

   d. starplank

**Section 6**

1. The America's Cup is a(n) _____ yacht race.

   a. regional

   b. national

   c. international

   d. intercontinental

2. The _____ won the race in 1851.

   a. New York Yacht Club

   b. Atlantic City Yacht Club

   c. Ft. Lauderdale Yacht Club

   d. San Diego Yacht Club

3. The race was won with a _____.

   a. catamaran

   b. yawl

   c. schooner

   d. yacht

4. After 1851, _____ won the next 24 competitions.

   a. the Atlantic City Yacht Club

   b. New Zealand

   c. the San Diego Yacht Club

   d. the United States

**Section 7**

1. From _____America's Cup races were held...

   a. 1850-1879

   b. 1880-1929

   c. 1930-1983

   d. 1984-1996

2. ...off the cost of _____.

   a. Rhode Island

   b. Florida

   c. California

   d. Mexico

3. During _____, no races were held.

   a. the Civil War

   b. World War I

   c. World War II

   d. the Korean War

4. After the war, sailboat racers werediscouraged by _____.

   a. lack of manpower

   b. depression

   c. cost of building boats

   d. scarcity of materials

**Section 8**

1. The most spectacular races are sailed by _____ person (people).

   a. 1

   b. 3

   c. 7

   d. 10

2. One dangerous race is the Single-Handed Race _____.

   a. Around the World

   b. from Atlantic to Pacific

   c. from New York to London

   d. Europe to Africa

3. The Transatlantic Race started in 1960 and happens

   a. every 4 years

   b. every 10 years

   c. during the Olympics

   d. every 2 years

4. The winner of the first race was from _____.

   a. Portugal

   b. England

   c. the United States

   d. France

**PYRAMIDS**

Section 1

1. The pyramid's design was based on worship of the _____.

   a. moon

   b. sun

   c. gods

   d. earth

2. Pyramids can be found in Egypt and the _____.

   a. Mohave

   b. Delta

   c. Gobi

   d. Sudan

3. Pyramids evolved from the style of tombs called _____.

   a. mastabas

   b. shokrans

   c. sefaras

   d. olayyels

4. The first pyramid built this way was the _____ Pyramid.

   a. Granite

   b. Red

   c. Black

   d. Step

Section 2

1. A mastaba is a stone structure erected over a _____.

   a. causeway

   b. terrace

   c. tomb

   d. temple

2. Mastaba means "earthen _____" in Arabic.

   a. stone

   b. tomb

   c. wall

   d. bench

3. The largest mastaba has _____ rooms.

   a. 7

   b. 32

   c. 100

   d. 500

4. The nickname of one of the pyramids is the _____ Pyramid.

   a. Steep

   b. Bent

   c. Step

   d. Great

Section 3

1. Imhotep was the first known _____ in Egypt.

   a. pharaoh

   b. artist

   c. architect

   d. priest

2. Imhotep was responsible for the _____ Pyramid.

   a. Great

   b. Step

   c. Tomb

   d. Stone

3. This pyramid has a large _____ as a base.

   a. mastaba

   b. obelisk

   c. temple

   d. room

4. This pyramid has six _____ of different sizes.

   a. rooms

   b. tombs

   c. tunnels

   d. terraces

Section 4

1. Stone pyramids were built as _____.

   a. terraces

   b. causeways

   c. tombs

   d. temples

2. Each pyramid includes _____ and a mortuary temple.

   a. a small temple

   b. a valley temple

   c. a sun temple

   d. a large temple

3. Small pyramids were built for Egyptian _____.

   a. servants

   b. queens

   c. princes

   d. priests

4. Pyramids have elaborate _____ on the walls.

   a. hieroglyphics

   b. ideograms

   c. helba

   d. minarets

Section 5

1. There are three famous pyramids in _____, Egypt.

   a. Alexandria

   b. Giza

   c. Saqqara

   d. Cairo

2. The Great Pyramid is known as the _____ pyramid.

   a. oldest

   b. best preserved

   c. largest

   d. newest

3. The pyramids were built _____ of the Nile River.

   a. north

   b. south

   c. east

   d. west

4. Egyptians believed the home of the dead should face_____.

   a. the setting sun

   b. the rising sun

   c. the king's palace

   d. theNile River

Section 6

1. The Great Pyramid has over 2.3 million _____.

   a. drawings

   b. blocks

   c. visitors

   d. bricks

2. It took _____ years to build the Great Pyramid.

   a. 2

   b. 20

   c. 50

   d. 100

3. The Great Pyramid was built for Pharaoh _____.

   a. Zoser

   b. Hatshepsut

   c. Khufu

   d. Menkure

4. The Great Pyramid was completed in _____.

   a. 6000 BC

   b. 2500 BC

   c. 1000 BC

   d. 100 BC

Section 7

1. The Black Pyramid was built of _____.

   a. granite

   b. limestone

   c. brick

   d. basalt

2. The Black Pyramid was _____ by Amenenhet III.

   a. started

   b. finished

   c. never used

   d. destroyed

3. Many passageways have _____.

   a. collapsed

   b. been rebuilt

   c. no entrance

   d. no exit

4. You have to _____ to enter the burial chamber.

   a. climb

   b. walk

   c. jump

   d. crawl

Section 8

1. The Pyramid of Sahure is _____ inside.

   a. dangerous

   b. clean

   c. complex

   d. humid

2. The _____ is the most interesting thing about the Pyramid of Sahure.

   a. temple

   b. causeway

   c. wall

   d. tomb

3. The Pyramid of Unas has an 1100 yard _____.

   a. bridge

   b. tunnel

   c. causeway

   d. wall

4. The Pyramid of Unas has the oldest religious _____ on its walls.

   a. carvings

   b. pictures

   c. writings

   d. drawings

# Narrative Tests

# Game

**Section 1**

1. Something important happened _____ .

   a. several weeks ago

   b. when I was young

   c. before I was born

   d. four months ago

2. Ben was like my _____ .

   a. twin

   b. father

   c. uncle

   d. brother

3. Ben was good at _____ .

   a. cooking

   b. his work

   c. teaching me

   d. everything

4. Ben helped me _____ .

   a. with homework

   b. play soccer

   c. with my chores

   d. learn to box

**Section 2**

1. When I was 12 years old Ben was _____ .

   a. 11 years old

   b. 20 years old

   c. 14 years old

   d. 6 years old

2. Ben did not play football because _____ .

   a. Mom wouldn't let him

   b. he had to work

   c. he had physical problems

   d. he did not play well

3. Because of Ben, I became a _____ .

   a. football player

   b. teacher

   c. business person

   d. coach

4. Ben worked with _____ .

   a. young children

   b. teenagers

   c. adults

   d. college students

**Section 3**

1. Ben was a _____ .

   a. business person

   b. public figure

   c. leader

   d. philanthropist

2. In his first year, Ben was _____ .

   a. pleased

   b. terrible

   c. disappointed

   d. successful

3. Ben had _____ .

   a. a good education

   b. poor coordination

   c. no money

   d. a lot of enthusiasm

4. People felt _____ because of Ben.

   a. angry

   b. proud

   c. upset

   d. satisfied

**Section 4**

1. Ben always _____ .

   a. focused on the quarterback

   b. picked co-captains

   c. motivated the team

   d. found new players

2. Ben said failure is _____ .

   a. losing a home game

   b. not respecting your team

   c. accepting defeat

   d. missing a touchdown

3. Ben had new _____ .

   a. jerseys for the team

   b. plays to memorize

   c. goals

   d. rules to follow

4. The team succeeded the following year with _____ .

   a. a series of wining games

   b. a new defensive linebacker

   c. six freshman

   d. a new team captain

**Section 5**

1. After winning the third game Ben _____ .

   a. gave me the football

   b. celebrated with the team

   c. became sick

   d. gave a live T.V. interview

2. All night long Ben _____ .

   a. remained in a good mood

   b. went through a series of tests

   c. watched video clips of the game

   d. nursed the injured quarterback

3. Ben could not improve _____ .

   a. with medical treatment

   b. unless he practiced

   c. because he was at the top of his profession

   d. and he wanted to speak with Mom

4. My mother and I were told _____ .

   a. while staying with Ben

   b. the NFL wanted Ben to coach

   c. after we returned from the game

   d. in the locker room

**Section 6**

1. Ben went _____ .

   a. back to work

   b. to the doctor

   c. on vacation

   d. home

2. Ben decided to _____ .

   a. stop coaching

   b. accept what happened to him

   c. stay in the hospital

   d. move into my house

3. The football team _____ .

   a. won their games

   b. visited us

   c. worried about Ben

   d. worked hard in school

4. Mom and I were _____ .

   a. disgusted

   b. upset

   c. pleased

   d. surprised

**Section 7**

1. Before the championship game the team knew Ben was _____ .

   a. tired of coaching

   b. never returning

   c. feeling better

   d. proud of them

2. Ben was barely able to _____ .

   a. coach the game

   b. drive to his house

   c. get to the hospital

   d. encourage the team

3. The officials _____ .

   a. did not want the game to be played

   b. wanted to stop the game

   c. met with Ben before the game

   d. warned the other coach

4. The team _____ .

   a. visited Ben in the hospital

   b. hired a new coach

   c. said goodbye to Ben

   d. won the game

**Section 8**

1. Ben died _____ .

   a. with many friends

   b. while on sick leave

   c. at the game

   d. watching the game at home

2. We remember Ben _____ .

   a. at our family reunions

   b. at the football stadium

   c. when we see his son

   d. throughout the school

3. Our town just completed _____ .

   a. a memorial service

   b. a new stadium

   c. the high school

   d. a statue

4. People remember my brother as_____ .

   a. a caring father

   b. an outstanding educator

   c. a special football player

   d. an exceptional person

# GHOST

**Section 1**

1. The top part of the building _____ .

   a. looked like a castle

   b. was empty for a long time

   c. had broken windows

   d. was used to store equipment

2. The building _____ .

   a. needed to be cleaned

   b. was like a museum

   c. was on the corner

   d. appeared haunted

3. I was feeling _____ .

   a. sick

   b. afraid

   c. depressed

   d. excited

4. My body shivered because _____ .

   a. I felt cold and wet

   b. there were ghosts

   c. something touched me

   d. of the unfamiliar noises

**Section 2**

1. In my room I _____ .

   a. unpacked my clothes

   b. turned on the lights

   c. called home

   d. opened the windows

2. I sat and thought about _____ .

   a. money

   b. my new job

   c. my family

   d. people I used to know

3. Outside it was _____ .

   a. sunny and warm

   b. windy and rainy

   c. cloudy and snowing

   d. foggy and cold

4. The sounds in the street _____ .

   a. grew louder

   b. were terrifying

   c. got softer

   d. were unfamiliar

**Section 3**

1. I was feeling _____ .

   a. overwhelmed

   b. ill

   c. sleepy

   d. alone

2. I walked carefully because _____ .

   a. I imagined people were sleeping

   b. my feet hurt

   c. the floor was cold

   d. the room was full of furniture

3. I listened to the _____ .

   a. talking in the streets

   b. people downstairs

   c. weather outside

   d. door creaking

4. I fell asleep after I _____ .

   a. took a shower

   b. read a book

   c. thought for a while

   d. called home

**Section 4**

1. I woke up feeling _____ .

   a. satisfied

   b. frightened

   c. angry

   d. relieved

2. I took the blanket and _____ .

   a. threw it on the floor

   b. covered the window

   c. covered my head

   d. put it in the closet

3. I heard someone _____ .

   a. knock on the door

   b. come towards me

   c. moan an cry

   d. walk away from me

4. Something left the room _____ .

   a. without opening the door

   b. and locked me in

   c. in a hurry

   d. and then came back in

**Section 5**

1. I decided _____ .

   a. to go back to sleep

   b. to put logs on the fire

   c. that I imagined the whole thing

   d. to leave the building

2. The door was _____ .

   a. still locked and bolted

   b. swinging back and forth

   c. halfway closed

   d. off the hinges

3. The pipe fell to the floor because _____ .

   a. the stem broke

   b. I was surprised

   c. someone grabbed it

   d. I bumped the table

4. There were _____ footprints.

   a. 2

   b. 3

   c. 4

   d. 5

**Section 6**

1. The noises were _____ .

   a. in my room

   b. outside my room

   c. everywhere

   d. very loud

2. In my room _____ .

   a. there were windows along one wall

   b. the fireplace was not working

   c. the bathroom was separate from the bedroom

   d. I had a small stove

3. The footsteps were _____ .

   a. from the closet

   b. from the room next to mine

   c. getting closer

   d. from the hallway

4. My building had _____ .

   a. long hallways

   b. spiral staircases

   c. brand new elevators

   d. more than 17 floors

**Section 7**

1. When it became quiet again I _____ .

   a. left the building

   b. went to the fireplace

   c. screamed for help

   d. called the police

2. It was difficult to light a fire _____ .

   a. because I was trembling

   b. without any wood

   c. in my fireplace

   d. because the matches were wet

3. I was thinking about _____ .

   a. who had been in my room

   b. how to escape

   c. how to protect myself

   d. when I could move to another room

4. The fire _____ .

   a. got smaller

   b. became brighter

   c. started to smoke

   d. crackled loudly

**Section 8**

1. My room became _____ .

   a. dark

   b. bright

   c. cold

   d. hot

2. I felt _____ .

   a. a breeze on my face

   b. sick to my stomach

   c. exhausted

   d. heat from the fire

3. It seemed to me that _____ .

   a. someone was calling me

   b. I was still sleeping

   c. I should go back to sleep

   d. something was in my room

4. The Cardiff Giant _____ .

   a. had a complete body

   b. was angry

   c. needed a shower

   d. was uglier than I imagined

# Murder

**Section 1**

1. Ellen Bartrum and Susan Parker are _____ .

   a. partners

   b. sisters

   c. co-workers

   d. friends

2. Susan needed _____ .

   a. a report

   b. money

   c. help

   d. keys

3. Ellen needed to _____ the people who came to see her.

   a. choose

   b. understand

   c. trust

   d. help

4. Ellen had to believe _____ .

   a. her family

   b. in their innocence

   c. the police report

   d. the lock was broken

**Section 2**

1. Susan's husband was _____ .

   a. an administrator

   b. a doctor

   c. a lawyer

   d. a professor

2. Susan was married _____ .

   a. twice before

   b. in a church

   c. for the first time

   d. in high school

3. Susan and her husband seemed to be _____ .

   a. like strangers

   b. in debt

   c. in love

   d. angry with each other

4. After their honeymoon the newlyweds _____ .

   a. adopted a baby girl

   b. started new jobs

   c. moved to a new house

   d. returned their wedding gifts

**Section 3**

1. Susan wasn't happy because _____ .

   a. she had moved away

   b. her baby died

   c. she wasn't acting

   d. Peter worked too much

2. Susan spent her time _____ .

   a. planning for the baby

   b. taking care of Peter

   c. working as a volunteer

   d. acting in local theaters

3. Susan had always wanted _____ .

   a. to be famous

   b. an expensive foreign car

   c. to marry Peter

   d. a child

4. Ellen and Susan called each other _____ .

   a. often

   b. once a year

   c. only during the holidays

   d. every day

## Section 4

1. The police_____ her because of the evidence.

   a. fingerprinted

   b. released

   c. questioned

   d. arrested

2. Susan had been concerned because _____ .

   a. Peter stayed at work

   b. Peter had been ill

   c. Peter was behaving strangely

   d. Peter stopped talking to her

3. Peter was questioned and he _____ .

   a. shouted

   b. remained calm

   c. left the room

   d. suddenly became talkative

4. Susan needed to _____ .

   a. speak to the police

   b. visit Peter in jail

   c. meet with Ellen

   d. get a divorce

**Section 5**

1. Susan saw Peter _____ .

   a. in the office

   b. at a neighbor's house

   c. the day before he died

   d. that afternoon

2. Peter had _____ .

   a. wanted a divorce

   b. an expensive insurance policy

   c. two children

   d. no friends

3. The District Attorney thought_____ .

   a. the case was closed

   b. Susan was the murderer

   c. Susan was telling the truth

   d. the police were wrong

4. The police had a witness_____ .

   a. named Eric Peterson

   b. who saw Susan at Peter's office

   c. named Katherine Richards

   d. who disappeared

**Section 6**

1. Peter had _____ .

   a. a hotel room

   b. an affair

   c. blood on his shirt

   d. a new secretary

2. Peter kept receipts _____ .

   a. at home

   b. in his car

   c. at the office

   d. in his pocket

3. Ellen found the appointment book in _____ .

   a. the car

   b. Peter's closet

   c. the briefcase

   d. a drawer

4. Peter was in the hotel room _____ .

   a. with Susan

   b. with someone

   c. by himself

   d. after 10 p.m.

**Section 7**

1. The hotel clerk had _____ .

   a. been friends with Ellen

   b. sworn that he had seen Susan

   c. talked to Peter during the night

   d. never met Ellen

2. The hotel clerk was _____ .

   a. an alcoholic

   b. cooperating with the police

   c. an ex-convict

   d. Peter's best friend

3. The night before the murder Susan was _____ .

   a. out with friends

   b. by herself

   c. flying home

   d. with her mother

4. It was odd that _____ .

   a. she knew the hotel clerk

   b. the clerk knew the location

   c. the clerk thought he recognized her picture

   d. she had the room key

**Section 8**

1. The picture of Katherine Richards was _____ .

   a. in the hotel room

   b. in Susan's photo album

   c. torn in half

   d. in Peter's office

2. Katherine looked like Susan _____ .

   a. because she wanted to

   b. when they were babies

   c. because they were sisters

   d. when they were in college

3. Katherine wanted Peter to_____ .

   a. be with her

   b. take care of their child

   c. stay married

   d. give her a job

4. The police arrested Katherine _____ .

   a. two weeks later

   b. In the hotel room

   c. when she tried to leave town

   d. at the bus station

**DINNER DATE**

Section 1

1. My mom and dad _____ .

   a. taught me manners

   b. paid for my education

   c. told me not to talk to people I don't know

   d. made me eat my vegetables every day

2. Every day I discuss _____ .

   a. farm tools and equipment

   b. school materials

   c. automotive equipment

   d. kitchen appliances

3. My current job is a _____ .

   a. mechanic

   b. manager

   c. teacher

   d. nutritionist

4. I am about _____ .

   a. 14 years old

   b. 22 years old

   c. 33 years old

   d. 65 years old

**Section 2**

1. I visited _____ .

   a. my friend

   b. the auto repair shop

   c. my mother

   d. a customer

2. I decided to stop _____ .

   a. and go to the bathroom

   b. by the cleaners

   c. and have my car checked

   d. because I was hungry

3. I could see it was _____ .

   a. being painted

   b. getting ready to close

   c. full of people

   d. decorated for the holidays

4. I asked the older woman _____ .

   a. what time it was

   b. to sit with me

   c. where to find the bathroom

   d. if I could hang up her coat

**Section 3**

1. The woman was glad that I _____ .

   a. ate healthy food

   b. remembered her daughter

   c. encouraged her to talk

   d. invited her to dinner

2. She reminded me _____ .

   a. that I was late for an appointment

   b. of a family member

   c. to call my wife

   d. to call Jennifer

3. She loved to _____ .

   a. tell stories

   b. be alone

   c. be with her family

   d. visit different cities

4. She was _____ .

   a. about 40 years old

   b. the same age as me

   c. more than 55 years old

   d. my sister's age

**Section 4**

1. She was unhappy because she _____ .

   a. had no children

   b. needed to leave

   c. was too old for me

   d. had no money

2. She came to the restaurant _____ .

   a. to meet a friend

   b. for a special occasion

   c. to pick up her paycheck

   d. for my anniversary

3. I wanted to _____ .

   a. leave the restaurant

   b. meet her boss

   c. sing "Happy Birthday"

   d. give her a ride home

4. She told me_____ .

   a. I could take her home

   b. I would receive something special someday

   c. I looked like her son

   d. she was feeling sick

**Section 5**

1. Not too long after that dinner _____ .

   a. Harriet called me

   b. I got married

   c. my son was born

   d. Harriet got married

2. Three years later _____ .

   a. I saw Harriet again

   b. Harriet came to visit

   c. I had my own family

   d. my wife became ill

3. I could not believe that _____ .

   a. Harriet won the lottery

   b. I lost my job

   c. Beth wanted a divorce

   d. I was promoted to a better job

4. While Beth was at home with our child _____ .

   a. she wrote a novel

   b. I got a raise

   c. I became unemployed

   d. my parents moved out

**Section 6**

1. The interview was for _____ .

   a. the same kind of work I had done before

   b. a job for my wife and me

   c. a job in another state

   d. the Vice President's position

2. The Vice President thought I _____ .

   a. knew how to do the job

   b. needed more experience

   c. should apply for a different job

   d. was not ready to work

3. The company _____ .

   a. interviewed other applicants

   b. wanted me to come back

   c. checked my references

   d. thanked me for coming

4. My family decided to _____ .

   a. move to another town

   b. go out and celebrate

   c. ask for another interview

   d. wait for the job offer

**Section 7**

1. When I went back, the Vice President was _____ .

   a. on a trip

   b. in a meeting

   c. in the restaurant

   d. happy to see me

2. The owner of the company was _____ .

   a. the President of the company

   b. in a meeting

   c. on a trip

   d. the Vice President's brother

3. I was surprised to see _____ .

   a. all the new managers

   b. the woman from the restaurant

   c. my former employer

   d. my wife and child

4. They offered me _____ .

   a. a position with the company

   b. a free dinner

   c. an interview with the company

   d. a huge office

**Section 8**

1. She found out _____ .

   a. my salary range

   b. my address

   c. my wife's maiden name

   d. the location of the restaurant

2. She could not wait to _____ .

   a. give me a job

   b. meet my wife

   c. talk about the old neighborhood

   d. introduce me to the employees

3. Harriet decided to _____ .

   a. take me to my new office

   b. take me out to dinner

   c. finish the interview

   d. tell me more stories

4. Since I had been nice to a stranger, I received _____ .

   a. a new job

   b. a fancy dinner

   c. a third interview

   d. a birthday present

# Item Response Distributions

## Frequency Distribution of Item Responses for Salmon Test

### Section 1

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 211 | 71 | 19 | 6 | 87 | 29 | 43 | 15 |
| B | 35 | 12 | 26 | 9 | 124 | 42 | 207 | 70 |
| C | 19 | 6 | 228 | 77 | 67 | 23 | 11 | 4 |
| D | 17 | 6 | 10 | 3 | 8 | 3 | 23 | 8 |
| Blank | 14 | 5 | 13 | 4 | 10 | 3 | 12 | 4 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

### Section 2

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 227 | 77 | 21 | 7 | 29 | 10 | 172 | 58 |
| B | 18 | 6 | 144 | 49 | 57 | 19 | 17 | 6 |
| C | 15 | 5 | 112 | 38 | 27 | 9 | 61 | 21 |
| D | 35 | 12 | 12 | 4 | 176 | 59 | 32 | 11 |
| Blank | 1 | 0 | 7 | 2 | 7 | 2 | 14 | 5 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

### Section 3

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 48 | 16 | 44 | 15 | 169 | 57 | 61 | 21 |
| B | 34 | 11 | 10 | 3 | 39 | 13 | 45 | 15 |
| C | 184 | 62 | 93 | 31 | 59 | 20 | 157 | 53 |
| D | 22 | 7 | 127 | 43 | 17 | 6 | 23 | 8 |
| Blank | 8 | 3 | 22 | 7 | 12 | 4 | 10 | 3 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

### Section 4

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 35 | 12 | 50 | 17 | 236 | 80 | 213 | 72 |
| B | 210 | 71 | 203 | 69 | 11 | 4 | 37 | 13 |
| C | 8 | 3 | 33 | 11 | 26 | 9 | 19 | 6 |
| D | 43 | 15 | 4 | 1 | 20 | 7 | 25 | 8 |
| Blank | 0 | 0 | 6 | 2 | 3 | 1 | 2 | 1 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

### Section 5

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 209 | 71 | 30 | 10 | 149 | 50 | 48 | 16 |
| B | 21 | 7 | 224 | 76 | 62 | 21 | 176 | 59 |
| C | 43 | 15 | 24 | 8 | 73 | 25 | 31 | 10 |
| D | 18 | 6 | 14 | 5 | 8 | 3 | 34 | 11 |
| Blank | 5 | 2 | 4 | 1 | 4 | 1 | 7 | 2 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

### Section 6

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 223 | 75 | 42 | 14 | 39 | 13 | 39 | 13 |
| B | 34 | 11 | 58 | 20 | 54 | 18 | 221 | 75 |
| C | 17 | 6 | 165 | 56 | 37 | 13 | 20 | 7 |
| D | 18 | 6 | 20 | 7 | 153 | 52 | 10 | 3 |
| Blank | 4 | 1 | 11 | 4 | 13 | 4 | 6 | 2 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

### Section 7

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 80 | 27 | 136 | 46 | 189 | 64 | 144 | 49 |
| B | 58 | 20 | 47 | 16 | 52 | 18 | 71 | 24 |
| C | 143 | 48 | 41 | 14 | 27 | 9 | 48 | 16 |
| D | 10 | 3 | 62 | 21 | 22 | 7 | 24 | 8 |
| Blank | 5 | 2 | 10 | 3 | 6 | 2 | 9 | 3 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

### Section 8

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 218 | 74 | 185 | 63 | 39 | 13 | 66 | 22 |
| B | 17 | 6 | 50 | 17 | 184 | 62 | 38 | 13 |
| C | 35 | 12 | 16 | 5 | 41 | 14 | 147 | 50 |
| D | 15 | 5 | 29 | 10 | 15 | 5 | 21 | 7 |
| Blank | 11 | 4 | 16 | 5 | 17 | 6 | 24 | 8 |
| Total | 296 | 100 | 296 | 100 | 296 | 100 | 296 | 100 |

## Frequency Distribution of Item Responses for Space Test

### Section 1

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 77 | 27 | 237 | 82 | 16 | 6 | 163 | 56 |
| B | 55 | 19 | 20 | 7 | 171 | 59 | 47 | 16 |
| C | 70 | 24 | 14 | 5 | 73 | 25 | 49 | 17 |
| D | 84 | 29 | 11 | 4 | 11 | 4 | 13 | 4 |
| Blank | 4 | 1 | 8 | 3 | 19 | 7 | 18 | 6 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

### Section 2

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 19 | 7 | 149 | 51 | 240 | 83 | 100 | 34 |
| B | 21 | 7 | 86 | 30 | 21 | 7 | 17 | 6 |
| C | 202 | 70 | 13 | 4 | 16 | 6 | 8 | 3 |
| D | 35 | 12 | 25 | 9 | 1 | 0 | 152 | 52 |
| Blank | 13 | 4 | 17 | 6 | 12 | 4 | 13 | 4 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

### Section 3

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 44 | 15 | 9 | 3 | 41 | 14 | 21 | 7 |
| B | 37 | 13 | 81 | 28 | 236 | 81 | 207 | 71 |
| C | 30 | 10 | 180 | 62 | 2 | 1 | 13 | 4 |
| D | 157 | 54 | 10 | 3 | 2 | 1 | 32 | 11 |
| Blank | 22 | 8 | 10 | 3 | 9 | 3 | 17 | 6 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

### Section 4

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 8 | 3 | 35 | 12 | 229 | 79 | 15 | 5 |
| B | 249 | 86 | 4 | 1 | 5 | 2 | 185 | 64 |
| C | 17 | 6 | 1 | 0 | 3 | 1 | 50 | 17 |
| D | 14 | 5 | 246 | 85 | 46 | 16 | 23 | 8 |
| Blank | 2 | 1 | 4 | 1 | 7 | 2 | 17 | 6 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

### Section 5

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 88 | 30 | 13 | 4 | 48 | 17 | 11 | 4 |
| B | 191 | 66 | 164 | 57 | 151 | 52 | 28 | 10 |
| C | 4 | 1 | 89 | 31 | 24 | 8 | 19 | 7 |
| D | 7 | 2 | 16 | 6 | 60 | 21 | 225 | 78 |
| Blank | 0 | 0 | 8 | 3 | 7 | 2 | 7 | 2 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

### Section 6

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 46 | 16 | 179 | 62 | 145 | 50 | 37 | 13 |
| B | 206 | 71 | 67 | 23 | 17 | 6 | 178 | 61 |
| C | 14 | 5 | 22 | 8 | 107 | 37 | 40 | 14 |
| D | 10 | 3 | 9 | 3 | 12 | 4 | 11 | 4 |
| Blank | 14 | 5 | 13 | 4 | 9 | 3 | 24 | 8 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

### Section 7

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 189 | 65 | 47 | 16 | 24 | 8 | 181 | 62 |
| B | 32 | 11 | 23 | 8 | 34 | 12 | 11 | 4 |
| C | 35 | 12 | 158 | 54 | 169 | 58 | 56 | 19 |
| D | 15 | 5 | 43 | 15 | 38 | 13 | 21 | 7 |
| Blank | 19 | 7 | 19 | 7 | 25 | 9 | 21 | 7 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

### Section 8

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 159 | 55 | 72 | 25 | 8 | 3 | 60 | 21 |
| B | 4 | 1 | 120 | 41 | 229 | 79 | 60 | 21 |
| C | 51 | 18 | 36 | 12 | 10 | 3 | 113 | 39 |
| D | 52 | 18 | 40 | 14 | 27 | 9 | 32 | 11 |
| Blank | 24 | 8 | 22 | 8 | 16 | 6 | 25 | 9 |
| Total | 290 | 100 | 290 | 100 | 290 | 100 | 290 | 100 |

## Frequency Distribution of Item Responses for Sailing Test

### Section 1

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 18 | 7 | 95 | 39 | 59 | 24 | 12 | 5 |
| B | 18 | 7 | 143 | 58 | 72 | 29 | 171 | 70 |
| C | 130 | 53 | 3 | 1 | 82 | 33 | 32 | 13 |
| D | 80 | 33 | 4 | 2 | 31 | 13 | 30 | 12 |
| Blank | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 0 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

### Section 2

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 88 | 36 | 26 | 11 | 140 | 57 | 30 | 12 |
| B | 72 | 29 | 40 | 16 | 40 | 16 | 169 | 69 |
| C | 14 | 6 | 165 | 67 | 51 | 21 | 23 | 9 |
| D | 70 | 28 | 14 | 6 | 12 | 5 | 21 | 9 |
| Blank | 2 | 1 | 1 | 0 | 3 | 1 | 3 | 1 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

### Section 3

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 14 | 6 | 30 | 12 | 18 | 7 | 53 | 22 |
| B | 98 | 40 | 55 | 22 | 186 | 76 | 39 | 16 |
| C | 103 | 42 | 149 | 61 | 32 | 13 | 122 | 50 |
| D | 28 | 11 | 10 | 4 | 9 | 4 | 30 | 12 |
| Blank | 3 | 1 | 2 | 1 | 1 | 0 | 2 | 1 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

### Section 4

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 64 | 26 | 152 | 62 | 30 | 12 | 32 | 13 |
| B | 105 | 43 | 29 | 12 | 89 | 36 | 169 | 69 |
| C | 57 | 23 | 44 | 18 | 101 | 41 | 28 | 11 |
| D | 17 | 7 | 18 | 7 | 22 | 9 | 13 | 5 |
| Blank | 3 | 1 | 3 | 1 | 4 | 2 | 4 | 2 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

### Section 5

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 97 | 39 | 34 | 14 | 35 | 14 | 19 | 8 |
| B | 105 | 43 | 42 | 17 | 158 | 64 | 166 | 67 |
| C | 18 | 7 | 133 | 54 | 30 | 12 | 36 | 15 |
| D | 25 | 10 | 36 | 15 | 22 | 9 | 25 | 10 |
| Blank | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

### Section 6

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 14 | 6 | 165 | 67 | 28 | 11 | 43 | 17 |
| B | 30 | 12 | 37 | 15 | 23 | 9 | 17 | 7 |
| C | 160 | 65 | 27 | 11 | 122 | 50 | 26 | 11 |
| D | 41 | 17 | 15 | 6 | 72 | 29 | 157 | 64 |
| Blank | 1 | 0 | 2 | 1 | 1 | 0 | 3 | 1 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

### Section 7

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 23 | 9 | 185 | 75 | 14 | 6 | 21 | 9 |
| B | 41 | 17 | 38 | 15 | 55 | 22 | 38 | 15 |
| C | 163 | 66 | 11 | 4 | 165 | 67 | 157 | 64 |
| D | 18 | 7 | 10 | 4 | 8 | 3 | 27 | 11 |
| Blank | 1 | 0 | 2 | 1 | 4 | 2 | 3 | 1 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

### Section 8

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 175 | 71 | 158 | 64 | 158 | 64 | 8 | 3 |
| B | 19 | 8 | 51 | 21 | 16 | 7 | 146 | 59 |
| C | 20 | 8 | 24 | 10 | 56 | 23 | 79 | 32 |
| D | 32 | 13 | 11 | 4 | 15 | 6 | 12 | 5 |
| Blank | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 |
| Total | 246 | 100 | 246 | 100 | 246 | 100 | 246 | 100 |

## Frequency Distribution of Item Responses for Pyramid Test

### Section 1

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 14 | 6 | 26 | 11 | 198 | 81 | 34 | 14 |
| B | 128 | 52 | 20 | 8 | 24 | 10 | 47 | 19 |
| C | 79 | 32 | 66 | 27 | 15 | 6 | 31 | 13 |
| D | 24 | 10 | 132 | 54 | 3 | 1 | 129 | 53 |
| Blank | 0 | 0 | 1 | 0 | 5 | 2 | 4 | 2 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

### Section 2

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 34 | 14 | 43 | 18 | 10 | 4 | 10 | 4 |
| B | 16 | 7 | 48 | 20 | 188 | 77 | 163 | 67 |
| C | 154 | 63 | 29 | 12 | 20 | 8 | 41 | 17 |
| D | 30 | 12 | 115 | 47 | 12 | 5 | 25 | 10 |
| Blank | 11 | 4 | 10 | 4 | 15 | 6 | 6 | 2 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

### Section 3

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 43 | 18 | 34 | 14 | 175 | 71 | 50 | 20 |
| B | 3 | 1 | 161 | 66 | 19 | 8 | 48 | 20 |
| C | 187 | 76 | 21 | 9 | 32 | 13 | 18 | 7 |
| D | 6 | 2 | 22 | 9 | 7 | 3 | 119 | 49 |
| Blank | 6 | 2 | 7 | 3 | 12 | 5 | 10 | 4 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

### Section 4

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 25 | 10 | 97 | 40 | 18 | 7 | 197 | 80 |
| B | 56 | 23 | 99 | 40 | 180 | 73 | 20 | 8 |
| C | 112 | 46 | 16 | 7 | 25 | 10 | 6 | 2 |
| D | 38 | 16 | 20 | 8 | 10 | 4 | 11 | 4 |
| Blank | 14 | 6 | 13 | 5 | 12 | 5 | 11 | 4 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

### Section 5

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 11 | 4 | 97 | 40 | 50 | 20 | 126 | 51 |
| B | 163 | 67 | 47 | 19 | 55 | 22 | 70 | 29 |
| C | 31 | 13 | 85 | 35 | 43 | 18 | 17 | 7 |
| D | 32 | 13 | 12 | 5 | 88 | 36 | 22 | 9 |
| Blank | 8 | 3 | 4 | 2 | 9 | 4 | 10 | 4 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

### Section 6

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 9 | 4 | 11 | 4 | 20 | 8 | 14 | 6 |
| B | 154 | 63 | 130 | 53 | 37 | 15 | 179 | 73 |
| C | 48 | 20 | 54 | 22 | 156 | 64 | 25 | 10 |
| D | 29 | 12 | 41 | 17 | 20 | 8 | 8 | 3 |
| Blank | 5 | 2 | 9 | 4 | 12 | 5 | 19 | 8 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

### Section 7

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 33 | 13 | 44 | 18 | 186 | 76 | 38 | 16 |
| B | 47 | 19 | 28 | 11 | 31 | 13 | 21 | 9 |
| C | 147 | 60 | 131 | 53 | 12 | 5 | 16 | 7 |
| D | 12 | 5 | 35 | 14 | 13 | 5 | 169 | 69 |
| Blank | 6 | 2 | 7 | 3 | 3 | 1 | 1 | 0 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

### Section 8

| | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| Response | N | % | N | % | N | % | N | % |
| A | 182 | 74 | 73 | 30 | 18 | 7 | 25 | 10 |
| B | 8 | 3 | 46 | 19 | 117 | 48 | 29 | 12 |
| C | 21 | 9 | 70 | 29 | 73 | 30 | 87 | 36 |
| D | 11 | 4 | 32 | 13 | 14 | 6 | 79 | 32 |
| Blank | 23 | 9 | 24 | 10 | 23 | 9 | 25 | 10 |
| Total | 245 | 100 | 245 | 100 | 245 | 100 | 245 | 100 |

## Frequency Distribution of Item Responses for Game Test

### Section 1

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 12 | 4 | 20 | 6 | 20 | 6 | 239 | 73 |
| B | 240 | 73 | 184 | 56 | 28 | 9 | 40 | 12 |
| C | 66 | 20 | 7 | 2 | 224 | 68 | 35 | 11 |
| D | 3 | 1 | 112 | 34 | 50 | 15 | 4 | 1 |
| Blank | 7 | 2 | 5 | 2 | 6 | 2 | 10 | 3 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

### Section 2

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 29 | 9 | 42 | 13 | 62 | 19 | 84 | 26 |
| B | 129 | 39 | 56 | 17 | 77 | 23 | 119 | 36 |
| C | 157 | 48 | 205 | 63 | 154 | 47 | 56 | 17 |
| D | 11 | 3 | 20 | 6 | 31 | 9 | 64 | 20 |
| Blank | 2 | 1 | 5 | 2 | 4 | 1 | 5 | 2 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

### Section 3

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 25 | 8 | 92 | 28 | 69 | 21 | 25 | 8 |
| B | 54 | 16 | 21 | 6 | 35 | 11 | 247 | 75 |
| C | 198 | 60 | 48 | 15 | 15 | 5 | 16 | 5 |
| D | 46 | 14 | 157 | 48 | 197 | 60 | 34 | 10 |
| Blank | 5 | 2 | 10 | 3 | 12 | 4 | 6 | 2 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

### Section 4

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 35 | 11 | 38 | 12 | 39 | 12 | 215 | 66 |
| B | 17 | 5 | 60 | 18 | 42 | 13 | 27 | 8 |
| C | 244 | 74 | 198 | 60 | 192 | 59 | 38 | 12 |
| D | 28 | 9 | 29 | 9 | 52 | 16 | 40 | 12 |
| Blank | 4 | 1 | 3 | 1 | 3 | 1 | 8 | 2 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

### Section 5

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 45 | 14 | 47 | 14 | 182 | 55 | 193 | 59 |
| B | 37 | 11 | 221 | 67 | 70 | 21 | 17 | 5 |
| C | 230 | 70 | 29 | 9 | 45 | 14 | 64 | 20 |
| D | 14 | 4 | 25 | 8 | 23 | 7 | 44 | 13 |
| Blank | 2 | 1 | 6 | 2 | 8 | 2 | 10 | 3 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

### Section 6

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 219 | 67 | 34 | 10 | 166 | 51 | 37 | 11 |
| B | 61 | 19 | 229 | 70 | 36 | 11 | 165 | 50 |
| C | 9 | 3 | 51 | 16 | 87 | 27 | 75 | 23 |
| D | 39 | 12 | 10 | 3 | 38 | 12 | 46 | 14 |
| Blank | 0 | 0 | 4 | 1 | 1 | 0 | 5 | 2 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

### Section 7

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 52 | 16 | 125 | 38 | 158 | 48 | 27 | 8 |
| B | 86 | 26 | 44 | 13 | 87 | 27 | 21 | 6 |
| C | 36 | 11 | 117 | 36 | 64 | 20 | 71 | 22 |
| D | 153 | 47 | 40 | 12 | 17 | 5 | 206 | 63 |
| Blank | 1 | 0 | 2 | 1 | 2 | 1 | 3 | 1 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

### Section 8

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 152 | 46 | 21 | 6 | 121 | 37 | 20 | 6 |
| B | 54 | 16 | 216 | 66 | 182 | 55 | 54 | 16 |
| C | 83 | 25 | 21 | 6 | 15 | 5 | 105 | 32 |
| D | 25 | 8 | 64 | 20 | 7 | 2 | 145 | 44 |
| Blank | 14 | 4 | 6 | 2 | 3 | 1 | 4 | 1 |
| Total | 328 | 100 | 328 | 100 | 328 | 100 | 328 | 100 |

## Frequency Distribution of Item Responses for Ghost Test

### Section 1

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 44 | 22 | 57 | 29 | 16 | 8 | 36 | 18 |
| B | 124 | 63 | 25 | 13 | 133 | 67 | 79 | 40 |
| C | 11 | 6 | 21 | 11 | 23 | 12 | 65 | 33 |
| D | 14 | 7 | 87 | 44 | 22 | 11 | 13 | 7 |
| Blank | 5 | 3 | 8 | 4 | 4 | 2 | 5 | 3 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

### Section 2

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 43 | 22 | 11 | 6 | 15 | 8 | 51 | 26 |
| B | 87 | 44 | 20 | 10 | 107 | 54 | 35 | 18 |
| C | 20 | 10 | 50 | 25 | 23 | 12 | 68 | 34 |
| D | 36 | 18 | 105 | 53 | 42 | 21 | 32 | 16 |
| Blank | 12 | 6 | 12 | 6 | 11 | 6 | 12 | 6 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

### Section 3

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 29 | 15 | 129 | 65 | 21 | 11 | 18 | 9 |
| B | 9 | 5 | 18 | 9 | 22 | 11 | 43 | 22 |
| C | 65 | 33 | 28 | 14 | 101 | 51 | 121 | 61 |
| D | 95 | 48 | 19 | 10 | 50 | 25 | 14 | 7 |
| Blank | 0 | 0 | 4 | 2 | 4 | 2 | 2 | 1 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

### Section 4

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 15 | 8 | 21 | 11 | 40 | 20 | 105 | 53 |
| B | 147 | 74 | 12 | 6 | 68 | 34 | 33 | 17 |
| C | 14 | 7 | 142 | 72 | 15 | 8 | 26 | 13 |
| D | 16 | 8 | 13 | 7 | 66 | 33 | 19 | 10 |
| Blank | 6 | 3 | 10 | 5 | 9 | 5 | 15 | 8 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

### Section 5

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 39 | 20 | 147 | 74 | 37 | 19 | 121 | 61 |
| B | 73 | 37 | 16 | 8 | 83 | 42 | 18 | 9 |
| C | 66 | 33 | 21 | 11 | 43 | 22 | 22 | 11 |
| D | 13 | 7 | 10 | 5 | 20 | 10 | 9 | 5 |
| Blank | 7 | 4 | 4 | 2 | 15 | 8 | 28 | 14 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

### Section 6

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 49 | 25 | 118 | 60 | 14 | 7 | 134 | 68 |
| B | 81 | 41 | 25 | 13 | 28 | 14 | 26 | 13 |
| C | 27 | 14 | 26 | 13 | 59 | 30 | 3 | 2 |
| D | 37 | 19 | 15 | 8 | 84 | 42 | 15 | 8 |
| Blank | 4 | 2 | 14 | 7 | 13 | 7 | 20 | 10 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

### Section 7

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 18 | 9 | 106 | 54 | 115 | 58 | 128 | 65 |
| B | 164 | 83 | 23 | 12 | 23 | 12 | 17 | 9 |
| C | 9 | 5 | 42 | 21 | 35 | 18 | 31 | 16 |
| D | 3 | 2 | 16 | 8 | 19 | 10 | 17 | 9 |
| Blank | 4 | 2 | 11 | 6 | 6 | 3 | 5 | 3 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

### Section 8

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 106 | 54 | 149 | 75 | 31 | 16 | 124 | 63 |
| B | 28 | 14 | 15 | 8 | 19 | 10 | 12 | 6 |
| C | 48 | 24 | 17 | 9 | 18 | 9 | 10 | 5 |
| D | 10 | 5 | 11 | 6 | 123 | 62 | 38 | 19 |
| Blank | 6 | 3 | 6 | 3 | 7 | 4 | 14 | 7 |
| Total | 198 | 100 | 198 | 100 | 198 | 100 | 198 | 100 |

## Frequency Distribution of Item Responses for Murder Test

### Section 1

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 33 | 12 | 7 | 3 | 17 | 6 | 44 | 16 |
| B | 15 | 6 | 27 | 10 | 43 | 16 | 192 | 71 |
| C | 37 | 14 | 216 | 80 | 163 | 60 | 15 | 6 |
| D | 186 | 69 | 21 | 8 | 48 | 18 | 16 | 6 |
| Blank | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

### Section 2

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 46 | 17 | 38 | 14 | 11 | 4 | 20 | 7 |
| B | 128 | 47 | 33 | 12 | 20 | 7 | 36 | 13 |
| C | 70 | 26 | 180 | 66 | 225 | 83 | 187 | 69 |
| D | 14 | 5 | 14 | 5 | 4 | 1 | 18 | 7 |
| Blank | 13 | 5 | 6 | 2 | 11 | 4 | 10 | 4 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

### Section 3

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 35 | 13 | 32 | 12 | 192 | 71 | 117 | 43 |
| B | 8 | 3 | 33 | 12 | 25 | 9 | 70 | 26 |
| C | 201 | 74 | 150 | 55 | 38 | 14 | 32 | 12 |
| D | 20 | 7 | 44 | 16 | 12 | 4 | 41 | 15 |
| Blank | 7 | 3 | 12 | 4 | 4 | 1 | 11 | 4 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

### Section 4

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 11 | 4 | 48 | 18 | 135 | 50 | 91 | 34 |
| B | 28 | 10 | 12 | 4 | 60 | 22 | 42 | 15 |
| C | 76 | 28 | 185 | 68 | 55 | 20 | 117 | 43 |
| D | 153 | 56 | 19 | 7 | 14 | 5 | 16 | 6 |
| Blank | 3 | 1 | 7 | 3 | 7 | 3 | 5 | 2 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

### Section 5

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 64 | 24 | 43 | 16 | 41 | 15 | 16 | 6 |
| B | 39 | 14 | 191 | 70 | 162 | 60 | 210 | 77 |
| C | 134 | 49 | 11 | 4 | 49 | 18 | 10 | 4 |
| D | 25 | 9 | 13 | 5 | 13 | 5 | 26 | 10 |
| Blank | 9 | 3 | 13 | 5 | 6 | 2 | 9 | 3 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

### Section 6

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 171 | 63 | 36 | 13 | 26 | 10 | 39 | 14 |
| B | 59 | 22 | 41 | 15 | 29 | 11 | 125 | 46 |
| C | 17 | 6 | 154 | 57 | 62 | 23 | 59 | 22 |
| D | 15 | 6 | 28 | 10 | 142 | 52 | 37 | 14 |
| Blank | 9 | 3 | 12 | 4 | 12 | 4 | 11 | 4 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

### Section 7

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 26 | 10 | 23 | 8 | 81 | 30 | 34 | 13 |
| B | 190 | 70 | 170 | 63 | 165 | 61 | 15 | 6 |
| C | 41 | 15 | 38 | 14 | 4 | 1 | 181 | 67 |
| D | 6 | 2 | 27 | 10 | 7 | 3 | 32 | 12 |
| Blank | 8 | 3 | 13 | 5 | 14 | 5 | 9 | 3 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

### Section 8

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 71 | 26 | 150 | 55 | 174 | 64 | 43 | 16 |
| B | 63 | 23 | 28 | 10 | 21 | 8 | 45 | 17 |
| C | 30 | 11 | 63 | 23 | 45 | 17 | 151 | 56 |
| D | 96 | 35 | 18 | 7 | 18 | 7 | 15 | 6 |
| Blank | 11 | 4 | 12 | 4 | 13 | 5 | 17 | 6 |
| Total | 271 | 100 | 271 | 100 | 271 | 100 | 271 | 100 |

## Frequency Distribution of Item Responses for Dinner Test

### Section 1

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 23 | 9 | 16 | 6 | 11 | 4 | 14 | 6 |
| B | 2 | 1 | 16 | 6 | 195 | 77 | 64 | 25 |
| C | 220 | 87 | 11 | 4 | 30 | 12 | 127 | 50 |
| D | 7 | 3 | 203 | 81 | 7 | 3 | 25 | 10 |
| Blank | 0 | 0 | 6 | 2 | 9 | 4 | 22 | 9 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

### Section 2

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 37 | 15 | 11 | 4 | 10 | 4 | 9 | 4 |
| B | 30 | 12 | 10 | 4 | 17 | 7 | 214 | 85 |
| C | 41 | 16 | 5 | 2 | 205 | 81 | 4 | 2 |
| D | 135 | 54 | 215 | 85 | 4 | 2 | 9 | 4 |
| Blank | 9 | 4 | 11 | 4 | 16 | 6 | 16 | 6 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

### Section 3

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 3 | 1 | 12 | 5 | 215 | 85 | 22 | 9 |
| B | 15 | 6 | 221 | 88 | 5 | 2 | 14 | 6 |
| C | 174 | 69 | 8 | 3 | 13 | 5 | 201 | 80 |
| D | 56 | 22 | 5 | 2 | 13 | 5 | 8 | 3 |
| Blank | 4 | 2 | 6 | 2 | 6 | 2 | 7 | 3 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

### Section 4

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 196 | 78 | 41 | 16 | 17 | 7 | 33 | 13 |
| B | 5 | 2 | 182 | 72 | 3 | 1 | 188 | 75 |
| C | 11 | 4 | 8 | 3 | 56 | 22 | 10 | 4 |
| D | 36 | 14 | 14 | 6 | 171 | 68 | 6 | 2 |
| Blank | 4 | 2 | 7 | 3 | 5 | 2 | 15 | 6 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

### Section 5

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 17 | 7 | 12 | 5 | 6 | 2 | 4 | 2 |
| B | 179 | 71 | 16 | 6 | 230 | 91 | 15 | 6 |
| C | 11 | 4 | 210 | 83 | 3 | 1 | 223 | 88 |
| D | 36 | 14 | 10 | 4 | 9 | 4 | 3 | 1 |
| Blank | 9 | 4 | 4 | 2 | 4 | 2 | 7 | 3 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

### Section 6

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 169 | 67 | 189 | 75 | 23 | 9 | 5 | 2 |
| B | 19 | 8 | 13 | 5 | 150 | 60 | 28 | 11 |
| C | 28 | 11 | 26 | 10 | 47 | 19 | 29 | 12 |
| D | 30 | 12 | 17 | 7 | 26 | 10 | 178 | 71 |
| Blank | 6 | 2 | 7 | 3 | 6 | 2 | 12 | 5 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

### Section 7

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 8 | 3 | 223 | 88 | 13 | 5 | 215 | 85 |
| B | 22 | 9 | 13 | 5 | 194 | 77 | 6 | 2 |
| C | 6 | 2 | 2 | 1 | 20 | 8 | 18 | 7 |
| D | 215 | 85 | 13 | 5 | 17 | 7 | 9 | 4 |
| Blank | 1 | 0 | 1 | 0 | 8 | 3 | 4 | 2 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

### Section 8

| Response | Item 1 | | Item 2 | | Item 3 | | Item 4 | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| A | 10 | 4 | 207 | 82 | 20 | 8 | 215 | 85 |
| B | 196 | 78 | 17 | 7 | 208 | 83 | 22 | 9 |
| C | 8 | 3 | 7 | 3 | 17 | 7 | 3 | 1 |
| D | 35 | 14 | 16 | 6 | 4 | 2 | 9 | 4 |
| Blank | 3 | 1 | 5 | 2 | 3 | 1 | 3 | 1 |
| Total | 252 | 100 | 252 | 100 | 252 | 100 | 252 | 100 |

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