

GRAPHS 1 SPECIFICATIONS

(updated 06/22/2005)

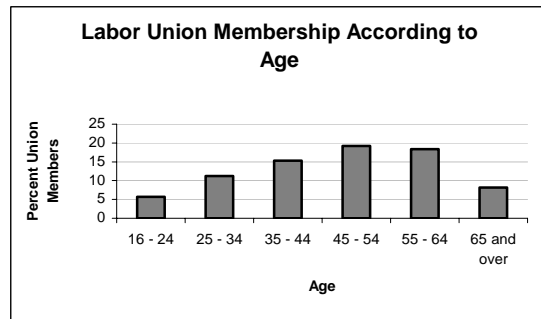
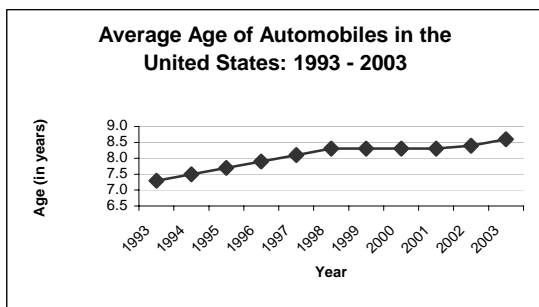
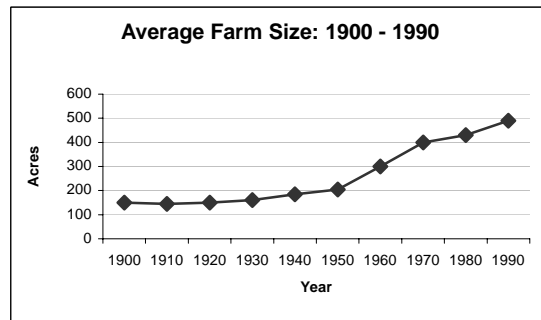
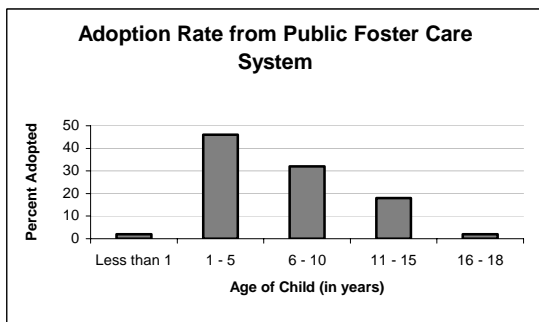
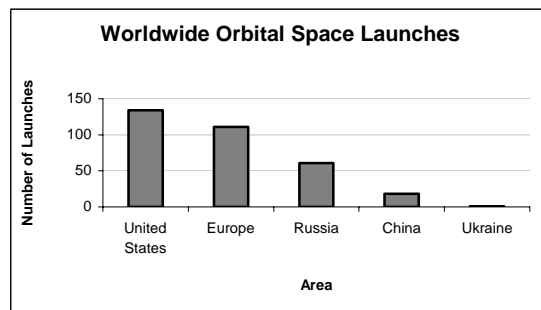
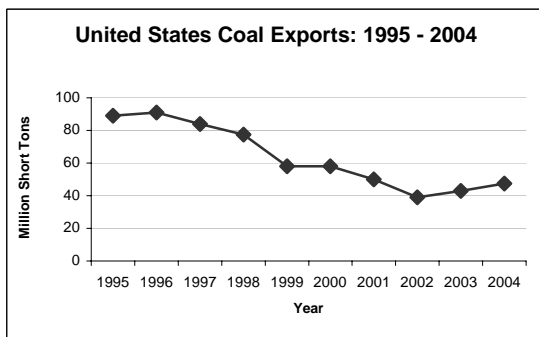
Is retention of graphical information affected differently by test vs. study?

Task:

Study 6 graphs → test or re-study 3 times → test *verbal* retention after 2 days.

Stimuli:

6 simple graphs, with half randomly assigned to test or study trials for each subject.



Design:

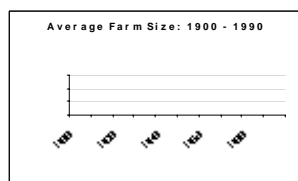
2 within-subjects trial conditions:

1. Test: Graph presented without data → subject attempts to recall pattern of data + feedback
2. Study: Graph presented with data.

Procedure:

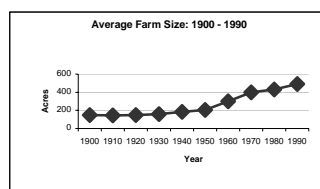
- Presentation phase: Randomly present all 6 graphs for 15 seconds each (with instructions “Study the graph below for about 15 seconds”). Prior to each graph, present blank screen with title and short description of graph, for subject-paced time duration (see p. 3). Assume about 6 seconds to read each description (6 sec for description + 15 sec presentation, x 6 graphs = 2.1 minutes).
- Learning phase: Randomly assign 3 graphs each to Test and Study Trials. Each graph undergoes Test or Study 3 times.
 - Trial 1: Randomly present all 6 graphs, 3 as Test Trials and 3 as Study Trials.
 - Test trial: Present empty graph with no data or axis labels (see example below). Subject attempts to recall 5 components, in order: (1) X-axis label, (2) X-axis units, (3) Y-axis label, (4) Y-axis units, and (5) pattern of data. Outline each component in red for 5 seconds, then provide correct answer feedback for 5 seconds. (Total duration = 50 seconds). Following each graph, insert blank screen with “continue” button.

Example Test Trial:



- Study trial: Present graph with data included (with instructions “Study the graph again for about 50 seconds”). Subjects given 50 seconds to study each graph. Following each graph, insert blank screen with “continue” button.

Example Study Trial:



- Trial 2: Repeat Trial 1 in new random order (with same items assigned to Test and Study Trials).
- Trial 3: Repeat Trial 2 in new random order (with same items assigned to Test and Study Trials).
- Retention phase: 2 days after Learning Phase, test verbal retention of information in graphs. Estimate 20 seconds for each question (36 questions x 20 seconds = 12 minutes).

Total time to complete: Estimate 5 minutes for consent and instructions + Practice Trials (2 min) + Presentation (2 min) + Trial 1 (5 min) + Trial 2 (5 min) + Trial 3 (5 min) + Retention phase (12 min) = **36 min**.

Subjects: 50 web-based lottery subjects, collegiate sample.

Graph descriptions:

United States Coal Exports: 1995 - 2004

This graph shows the number of million short tons of coal that have been exported out of the United States, every year, from 1995 to 2004.

Adoption Rate from Public Foster Care System

This graph shows the percent of children adopted from public foster care, out of five age categories: less than 1 year, 1 to 5 years, 6 to 10 years, 11 to 15 years, and 16 to 18 years.

Average Age of Automobiles in the United States: 1993 - 2003

This graph shows the average age (in years) of automobiles operated in the United States, every year, from 1993 to 2003.

Worldwide Orbital Space Launches

This graph shows the number of space devices launched into orbit in 2003, for five different areas of the world: United States, Europe, Russia, China, and the Ukraine.

Average Farm Size: 1900 - 1990

This graph shows the average number of acres of farmland, every decade, from 1900 to 1990.

Labor Union Membership According to Age

This graph shows the percent of employees who are Labor Union members, out of six age categories: 16 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, and over 65.

Practice graphs:

Price of Fuel in Los Angeles: 2000 – 2004

This graph shows the average price of fuel in Los Angeles, in cents per gallon, from 2000 to 2004.

Online Activities by Internet Users

This graphs shows the percent of Internet users who engage in 5 types of online activities: E-mail, news/weather, games, job searches, and classes.

Final Test Questions:

United States Coal Exports: 1995 - 2004

1. Out of the following choices, during what year did U. S. coal exports *increase* the most?
 - a) 1995-1996
 - b) 1997-1998
 - c) 2001-2002
 - d) 2002-2003

2. Out of the following choices, during what year did U. S. coal exports *decrease* the most?
 - a) 1998-1999
 - b) 1999-2000
 - c) 2000-2001
 - d) 2001-2002

3. Out of the following choices, in what year was the *highest* amount of coal exported from the U. S.?
 - a) 1995
 - b) 1996
 - c) 1997
 - d) 1998

4. Out of the following choices, in what year was the *lowest* amount of coal exported from the U. S.?
 - a) 2001
 - b) 2002
 - c) 2003
 - d) 2004

5. Approximately how many million short tons of coal were exported from the U. S. in 1995?
 - a) 30
 - b) 50
 - c) 70
 - d) 90

6. Approximately how many million short tons of coal were exported from the U. S. in 2004?
 - a) 30
 - b) 50
 - c) 70
 - d) 90

Adoption Rate from Public Foster Care System

1. From what age category are children *least* likely to be adopted from public foster care?

- a) Less than 1 year
- b) 1-5 years
- c) 6-10 years
- d) 11-15 years

2. From what age category are children *most* likely to be adopted from public foster care?

- a) 1-5 years
- b) 6-10 years
- c) 11-15 years
- d) 16-18 years

3. Which of the following accurately describes the adoption rate for children between the ages of 16 and 18?

- a) Higher than the adoption rate for children between 11 and 15.
- b) About the same as the adoption rate for children between 11 and 15.
- c) Lower than the adoption rate for children less than 1 year.
- d) About the same as the adoption rate for children less than 1 year.

4. Which of the following accurately describes the adoption rate for children between the ages of 6 and 10?

- a) Higher than the adoption rate for children between 1 and 5.
- b) Lower than adoption rate for children between 16 and 18.
- c) Higher than adoption rate for children between 11 and 15.
- d) Lower than adoption rate for children less than 1 year.

5. Approximately what percent of children between the ages of 1 and 5 are adopted from public foster care?

- a) 25 percent
- b) 35 percent
- c) 45 percent
- d) 55 percent

6. Approximately what percent of children between the ages of 16 and 18 are adopted from public foster care?

- a) Less than 5 percent
- b) Between 5 and 10 percent
- c) Between 10 and 15 percent
- d) Between 15 and 20 percent

Average Age of Automobiles in the United States: 1993-2003

1. Out of the following choices, in what year was the average age of U. S. automobiles the *highest*?

- a) 1997
- b) 1999
- c) 2001

d) 2003

2. Out of the following choices, in what year was the average age of U. S. automobiles the *lowest*?

- a) 1993
- b) 1995
- c) 1997
- d) 1999

3. Which of the following accurately describes the average age of U. S. automobiles in 1998?

- a) Higher than in 1999
- b) Lower than in 1997
- c) About the same as in 1999
- d) About the same as in 1997

4. Which of the following accurately describes the average age of U. S. automobiles in 2002?

- a) Lower than in 2000
- b) About the same as in 2001
- c) Higher than in 2001
- d) About the same as in 2003

5. What was the approximate age of automobiles in the U. S. in 1993?

- a) 6.5 years old
- b) 7.5 years old
- c) 8.5 years old
- d) 9.5 years old

6. What was the approximate age of automobiles in the U. S. in 2003?

- a) 6.5 years old
- b) 7.5 years old
- c) 8.5 years old
- d) 9.5 years old

Worldwide Orbital Space Launches

1. Out of the following choices, which area has launched the *highest* number of orbital space devices?

- a) China
- b) Ukraine
- c) Russia
- d) Europe

2. Out of the following choices, which area has launched the *lowest* number of orbital space devices?

- a) United States

- b) Russia
- c) China
- d) Europe

3. Which of the following accurately describes the number of orbital space launches from Europe?

- a) Fewer than the number of space launches from China
- b) More than the number of space launches from the Ukraine
- c) Fewer than the number of space launches from Russia
- d) More than the number of space launches from the United States

4. Which of the following accurately describes the number of orbital space launches from China?

- a) Fewer than the number of space launches from Europe
- b) More than the number of launches from the United States
- c) Fewer than the number of space launches from the Ukraine
- d) More than the number of space launches from Russia

5. Approximately how many orbital space devices were launched from the United States?

- a) 20
- b) 60
- c) 100
- d) 140

6. Approximately how many orbital space devices were launched from China?

- a) 20
- b) 60
- c) 100
- d) 140

Average Farm Size: 1900-1990

1. Out of the following choices, in what year was the average farm size the *largest*?

- a) 1930
- b) 1950
- c) 1970
- d) 1990

2. Out of the following choices, in what year was the average farm size the *smallest*?

- a) 1900
- b) 1910
- c) 1920
- d) 1930

3. Out of the following choices, during what decade did the average farm size increase the *most*?

- a) 1920-1930

- b) 1930-1940
 - c) 1940-1950
 - d) 1950-1960
4. Out of the following choices, during what decade did the average farm size increase the *least*?
- a) 1950-1960
 - b) 1960-1970
 - c) 1970-1980
 - d) 1980-1990
5. Approximately how many acres was the average farm size in 1900?
- a) 50
 - b) 100
 - c) 150
 - d) 200
6. Approximately how many acres was the average farm size in 1990?
- a) 400
 - b) 500
 - c) 600
 - d) 700

Labor Union Membership According to Age

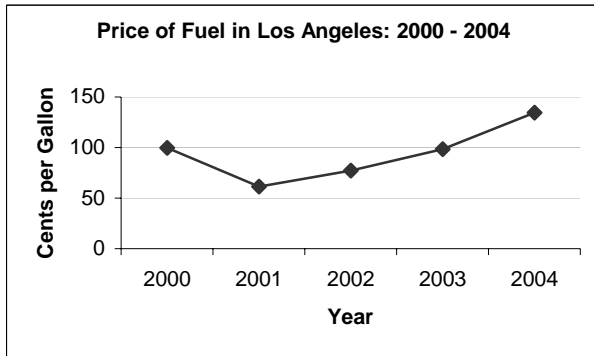
1. Out of the following choices, what age category has the *highest* percentage of Union members?
- a) 35-44
 - b) 45-54
 - c) 55-64
 - d) 65 and over
2. Out of the following choices, what age category has the *lowest* percentage of Union members?
- a) 16-24
 - b) 25-34
 - c) 35-44
 - d) 65 and over
3. Which of the following accurately describes the percentage of Union members between 55 to 64 years of age?
- a) Higher than the percentage of Union members between 25 and 34.
 - b) Lower than the percentage of Union members between 35 and 44.
 - c) Higher than the percentage of Union members between 45 and 54.
 - d) Lower than the percentage of Union members over 65.

4. Which of the following accurately describes the percentage of Union members 65 years of age and older?
- a) Lower than the percentage of Union members between 16 and 24.
 - b) Higher than the percentage of Union members between 25 and 34.
 - c) Lower than the percentage of Union members between 35 and 44.
 - d) Higher than the percentage of Union members between 45 and 54.
5. Approximately what percent of Union members are between the ages of 16 and 24?
- a) 5 percent
 - b) 10 percent
 - c) 15 percent
 - d) 20 percent
6. Approximately what percent of Union members are between the ages of 45 and 54?
- a) 5 percent
 - b) 10 percent
 - c) 15 percent
 - d) 20 percent

Instructions

Instructions 1 - Before beginning experiment:

In this experiment, we are going to try and teach you some graphs. Below is an example of the type of graph you might see.



You will see several of these graphs, presented one at a time for about 15 seconds, and we would like you to try and learn the information presented in them. Specifically, try to learn three things about each graph:

First, what information is provided along the bottom of the graph (X-axis label)? In the example above, the answer is Year, and the specific numbers go from 2000 to 2004.

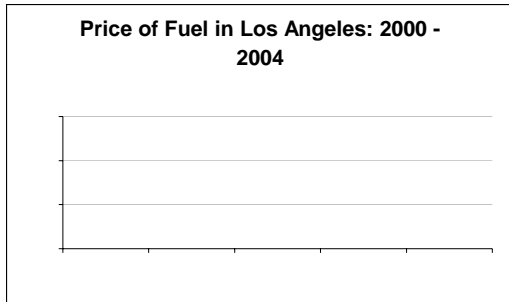
Second, what information is provided along the left-hand side of the graph (Y-axis label)? In the example above, the answer is Cents per Gallon, and the specific numbers go from 0 to 150.

Finally, what does the shape of the graph look like? In the example above, there is a U-shaped pattern, with fuel prices decreasing from 2000 to 2001, and then increasing every year from 2001 to 2004, ending up higher in 2004 than they were in 2000.

Try to learn all this information as you study each of the graphs presented. Click 'continue' for more instructions.

Instructions 2 – Before beginning experiment:

After you see all of the graphs, we will show them to you again. Some of the graphs will be presented in the same way as before, only this time you will have about 30 seconds to study each graph. Other graphs will be presented without any information, and we would like you to try and remember this information. Below is an example.



We will ask you to remember one part of the graph at a time. You don't have to type anything in, just try to form a clear idea in your mind of the information we are asking you about. To cue your memory for each part of the graph, we will show you a blinking red box next to five different places on the graph:

1. A blinking red box at the **very bottom** of the graph means you should remember the X-axis label: **Year**.
2. A blinking red box along the **bottom line** of the graph means you should remember the specific units of the X-axis: **2001 to 2004**.
3. A blinking red box on the **far left-hand side** means you should remember the Y-axis label: **Cents per Gallon**.
4. A blinking red box on the **left-hand line** of the graph means you should remember the specific units of the Y-axis: **0 to 150**.
5. A blinking red box in the **center of the graph** means you should try to remember the **shape of the graph** by "visualizing" what it looked like. In this case, there is a U-shaped pattern, with fuel prices decreasing from 2000 to 2001, and then increasing every year from 2001 to 2004, ending up higher in 2004 than in 2000.

You will have 5 seconds to try and remember each part of the graph, and then we will provide you with the correct answer. You will see the correct answer for 5 seconds, and then be asked to remember the next part of the graph. You might find that this goes rather quickly, so please try your best to remember each part of the graph within the 5-second time interval.

Click 'continue' for a couple of practice trials.

(Go through Trial 1 and one Test Trial or Study Trial for graphs "Fuel" and "Online Activities")

Instructions 3 - After practice trial: That's the end of the practice trials. You may click 'Back' to review the instructions again, or click 'Continue' when you are ready to begin the experiment.

Instructions 4 – In-between Presentation and Test/Study Trials, in-between Trial 1 and 2, and Trial 2 and 3:

Now you will see the same graphs again. This time, some of the graphs will be presented again for you to study for about 30 seconds. Other graphs will be presented without information in them, and we would like you to try and remember this information, as in the practice session.

Click 'continue' to begin.

Instructions 5 – Before beginning Session 2

Now we are going to quiz you over the graphs you learned 2 days ago. Starting on the next screen, you will see a series of multiple-choice questions, similar to the example below:

Price of Fuel in Los Angeles

During which of the following years were fuel prices the *highest* in Los Angeles?

- a) 2001
- b) 2002
- c) 2003
- d) 2004

Based on the example graph from 2 days ago, the correct answer is **d) 2004**.

As in the example above, the title of the relevant graph will appear with each question you see. When you see the graph title, try to remember the information from the graph, and answer the question by clicking one of the four options.

Although some of the questions may be difficult, note that there are no trick questions. The correct answer is always included, and there is only one correct answer.

Click 'continue' to begin.