A TIME-SUBJECT INDEX FOR "*AGAINST ALL ODDS: INSIDE STATISTICS*"

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*Against All Odds: Inside Statistic*s is a collection of twenty-six half hour outstanding video presentations that depict how statistics is used in society. This outstanding series was produced under the guidance of Dr. David Moore of Purdue University. The tapes are available from The Annenberg/CPB Collection, and are also offered free to schools that adopt certain text books. Using short excepts from the thirteen hours of video in the classroom can be a excellent way introduce students of statistics to real problems. Contained in this paper is a detailed listing **of the real world setting, the specific statistical items discussed, and a time index** so that instructors can go directly to a desired story on a tape. As an example of how to use a tape in class, consider showing students the data and graphs that were used by engineers to determine if temperature was related to joint scaring for a particular complicated machine. Then show a video of the result of what happened when all the data were not considered: the space shuttle Challenger exploding! The impact on the class can be quite dramatic.

Those segments of the series that I think can be used effectively in a classroom setting are highlighted. The rating system ranges from ◆ to ◆◆◆◆ is used. These are my ratings; yours will vary. The portions of the tapes in which Teresa Amabile, series hostess from Brandis University, teaches are generally not rated, since she is playing the role of the instructor, the task you will be performing in the classroom. Statistical terms are shown in **bold** type. The names of the experts used in the stories are given.

A VCR and a TV monitor are all that is needed. Knowing where specific segments start and end is greatly enhanced if your VCR has a "real time" counter as opposed to one that counts revolutions of the videocassette reel. Each tape in the series contains two 30 minute programs. All times in this paper are measured from the front of a tape, beginning at *the first video signal on the tape*. This signal is always "1-800-LEARNER", the phone number for information on the tape series. When this first appears, reset your VCR counter to "0:00". The time corresponding to "END OF PROGRAM" indicates the point at which the program credits start. Times on the left indicate the time index at which a segment starts; the times given in brackets show the elapsed time for that particular segment**. Note, because of differences in the productions runs made for duplicating this series, the "gap time" between the two programs on each tape may vary. Your tapes may have different gap times than mine; if so, note the difference and adjust all times on the *even numbered programs* accordingly.**

I am not advocating showing any tape in its entirety as a substitute for live instruction. Because we feel that the tapes are valuable, we indicate on our course syllabi which programs correspond to the lectures. We then make all the tapes in the series available to our students in our video viewing center for "after hours viewing". Although we encourage students to watch the tapes, most do not.

Enjoy the series!

Overview of Stories

Details for each story are given in the next section

PROGRAM 1: What is Statistics?

4:48 Domino's Pizza. ◆◆◆

Note: Each of the following stories in Program 1 is presented in more detail in later programs.

Describing Data

13:53 Lighting strikes in Colorado. Histogram.
14:33 Growth hormones; heights of children.
15:26 Manatee deaths in Florida waters. Scatterplot.
16:05 Baseball players' salaries. Correlation.

Producing Data

16:50 Chesapeake Bay pollution.
17:54 Aspirin and heart attacks.
18:44 Frito-Lay Potato Chips. Sampling.
19:18 Political Polls.
20:35 The Space Shuttle Challenger.
Joint probability.
21:24 Casino gambling.

Conclusion from Data

21:59 Discrimination within the FBI.
23:13 Duracell Batteries.
24:05 Shakespearean poetry.
Salem Witch trials.
25:06 Welfare in Baltimore.
27:06 END OF PROGRAM.

Tape continues

PROGRAM 2: Picturing Distributions

31:58 Charles Menard's 200 year old map/graph
33:55 Lighting strikes in Colorado.
Histograms ◆◆◆
44:02 Scheduling TV Programs. ◆◆◆
52:17 Lowering health care costs.
histograms, stem and leaf plots ▼

End of Tape

PROGRAM 3: Describing Distributions

3:30 National salary & wage data.
5:55 Wage inequities in Colorado ◆
16:07 Hot dogs' composition. ◆◆
21:00 Musical analysis of urine data. ◆◆

Tape continues

PROGRAM 4: Normal Distributions

33:50 Baby "bust" problem. ◆
37:40 Aging of our population. ◆◆◆
46:07 Boston Bean Stalk Social Club.◆
50:38 Baseball statistics. ".400" hitters? ◆◆◆
55:48 Ty Cobb, Ted Williams, and George Brett batting averages. ◆◆

End of Tape

PROGRAM 5: Normal Calculations

3:21 **Standardizing the normal distribution** with heights of American women.
7:07 GM Proving grounds. ◆
11:15 Does a new model car meets emission standards? use only n=5 prototypes?
14:10 Cholesterol values. ◆◆
19:50 Sizes of military uniforms. ◆◆
22:46 New army helmets
24:21 **Normal Quantile Plot.**

Tape continues

PROGRAM 6: Time Series

32:17 Driving times to work in a **control chart.**
34:50 The body's internal clock. T**ime series.** ▼
38:58 National economic statistics.
S**easonal variation**.
40:03 Ozone levels in the atmosphere.
Seasonal var. and negative **trend**. ◆◆
41:03 Boston Marathon. r**unning median**
43:38 Brain's reaction time. ◆
47:27 Wall Street. **Diversification** reduces risk.
Do stock market **exist**?◆◆◆

End of Tape

PROGRAM 7: Models for Growth

3:00 Children growth rates. Sara height.
Alice in wonderland grows BIG, ◆◆◆
9:20 **Linear growth, residual** patterns, **Extrapolation** problems.
14:00 Gypsy moths and **exponential growth**. ◆◆
20:17 Cartoon: The price of a chess board? ◆◆
23:30 Crude oil production. Use of **logarithm.**

Tape continues

PROGRAM 8: Describing Relationships

32:25 Manatees vs. motor boats in Florida. ◆◆◆
37:55 Cavities vs. fluoride levels.
39:31 1970 Draft lottery. **Median trace** ◆◆◆
44:04 Obesity: metabolic rate vs. lean body mass ◆

End of Tape

PROGRAM 9: Correlation

1:36 Taste of chocolate cake and price?
3:45 **Correlation** illustrated with animated graphics. ◆◆
5:42 Identical twins raised apart. ◆◆◆
16:22 Baseball players' salaries. ◆◆
20:53 Education in the 60's.
Coleman Report and Fred Mosteller, ◆

Tape continues

PROGRAM 10: Multi-dimensional Data Analysis

32:28 Chesapeake Bay pollution. ◆◆
45:07 **Chernof faces,** "**Trees**" and "**stars.**
47:42 Bell Core graphics. Speech synthesis,
3-D plots and higher, **brushing**. ◆◆

End of Tape

PROGRAM 11: The Question of Causation

3:01 Cartoon: **Causation**, **Common response**, and **coincidence** examples. ◆◆◆◆
5:42 **Simpson's Paradox**. "City University" ◆◆◆◆
11:50 "Good" bad experiment with new borns. ◆◆
12:47 The Wynder-Graham study.
smoking causes cancer. ◆◆◆

Tape continues

PROGRAM 12: Experimental Design

32:46 Observational study of lobsters. ◆
36:14 The Physicians Health Study.
Aspirin and heart attacks? ◆◆◆◆
43:39 Is Ribavirin to good to be true? ◆◆◆
47:22 Disposion of domestic violence.
Milwaukee, Wisconsin police dept. ◆
53:22 A fictional experiment to illustrate bad experimental practices. ◆◆◆◆

End of Tape

PROGRAM 13: Blocking and Sampling

1:39 Dirty laundry, blocked and treated.
4:45 The perfect strawberry. ◆
13:28 Undercounting in the national ◆◆◆
19:45 Shere Hite's *Women and Love*.
20:48 Frito Lay potato chips. Sampling ◆◆◆◆

Tape continues

PROGRAM 14: Samples and Surveys

32:03 A **stratified** national **sample**. *Nice graphics.*
34:41 A fish story. ◆
39:36 Bad interviewer techniques. ◆◆◆
41:21 National Opinion Research Center
(NORC) *(A must see segment.)* ◆◆◆◆
50:30 Sampling distributions: beads in a bowl.
Precision in estimation. ◆◆◆

End of Tape

PROGRAM 15: What is Probability

4:32 Assessing probabilities of injury or death in everyday life. ◆
10:50 A magician shows randomness.◆
17:49 Traffic control in New York City.
Simulation model. ◆◆

Tape continues

PROGRAM 16: Random Variables

33:36 Cheating on an AP Calculus exam. ◆
34:33 Space Shuttle Challenger. ◆◆◆◆
43:02 Points in a profession basketball game.
49:10 Earthquakes in California. ◆
54:45 Distribution of ice cubes used per drink.

End of Tape

PROGRAM 17: Binomial Distributions

3:46 Boston Celtics Basketball. Free throws are **independent** in game situations. ◆◆◆
6:38 Stocks and T-bills. Expected rate of returns.
9:45 A finance class experiment. ◆◆
16:23 **Binomial** distribution.
17:22 Sickle cell anemia. ◆
24:25 Quincunx: Falling balls. ◆◆

Tape continues

PROGRAM 18: The Sample Mean and Control Charts

33:55 Roulette.
35:04 Interviews with gamblers. ◆◆
40:44 The casino always wins. ◆◆◆◆
47:03 Frito Lays Potato Chips.
Statistical Process Control ◆◆◆
53:41 **Dr. W. Edwards Deming.** ◆◆◆◆

End of Tape

PROGRAM 19: Confidence Intervals

3:11 Political Polls. **Margin of error** ◆◆
6:37 Systolic blood pressure. **Confidence interval**.
11:35 Duracell batteries. ◆◆
18:25 Rhesus monkeys in medical studies. ◆
21:21 The feeding behavior of marmosets.

Tape continues

PROGRAM 20: Significance Tests

34:18 Shakespearean Poetry. ◆◆
49:06 Discrimination within the FBI. ◆◆◆

End of Tape

PROGRAM 21: Inference for One Mean

3:03 The t-distributions: 1908, the Guinness Brewery and William Gossett.
5:55 **The National Institute of Standards and Technology**. ◆◆
10:33 CI for the mean of PCB concentrations
13:30 **NutraSweet,** shelf life of a new cola. ◆◆◆
18:19 Paired comparison test of sweetness of cola.
21:08 **Autism.** ◆

Tape continues

PROGRAM 22: Comparing Two Means

33:32 **Welfare in Baltimore**. ◆◆
45:05 **Union Carbide product testing.** ◆◆◆
51:00 **SAT Exams**. Can "coaching" help?
55:40 CI for the difference between the means. ◆◆◆

End of Tape

PROGRAM 23: Inference For Proportions

3:03 **Measuring Unemployment Nationwide**. The Bureau of Labor Statistics. ◆
11:58 **Safety of City Water**. ◆◆◆
20:15 **The Salem Witch Trials**.

Tape continues

PROGRAM 24: Inference for Two-Way Tables

34:11 **Ancient Man**. Are Africanus and Robustus different? ◆◆
43:30 **Breast Cancer**. ◆◆
52:02 **Mendal's Peas.** ◆◆

End of Tape

PROGRAM 25: Inference for Relationships

3:32 **Are galaxies speeding away from earth?** Edwin Hubble's work. ◆◆◆◆
8:05 Regression using Hubble's original data on 24 galaxies.
14:08 **Complications in the Hubble Constant**. Rotating 3-D plot illustrates the "Swiss cheese concept" of universe.◆◆

Tape continues

PROGRAM 26: Case Study

35:49 **How the drug, AZT, was tested and got to market.**
36:57 **Phase 1: Observation Study**
39:22 **Phase 2, a double blind experiment** The Data Safety Monitoring Board **Confirming the data analysis**.
51:30 Getting AZT to patients. **Statistical process control** in manufacturing.
53:07 A patient's perspective. ◆◆◆
Safety and efficiency of a new drug.

End of Tape
End of series.

Details of the Stories

- Reset your VCR counter to 0:00 when the first signal appears on the tape. That signal will be "1-800-Learner".
- Times in left margin = VCR counter times.
- Times in brackets = elapsed times for that story segment.

PROGRAM 1: What is Statistics?

0:00 1-800-Learner,
(Reset your VCR counter to "ZERO" when this signal first appears.)
A listing of series contributors follows: Annenberg/C&B Project, Symbolics, among others.

0:43 *Against All Odds* logo.
(An animated, rotating scatterplot. Each program begins with this.)

1:15 Teresa Amabile, series hostess.
A study on creativity, designed to determine whether or not competitive rewards make a difference, is used to give an overview of the statistical concerns in experimentation.
[0:32]

4:48 STORY: Domino's Pizza.
A study is conducted to determine if deep pan pizza will be a successful new product for their market. Sensory evaluations by professional tasters, consumer reactions, advertising issues, and test marketing are illustrated.
Tom Monnahan, Chairman, Taylor Bond, Sales Info, and Margaret Olson-Cox, Marketing Research Director present the company's concerns.
[7:24] ◆◆◆

12:12 Teresa: How does Statistics fit into the decision process? [1:03]

13:15 Three parts of the puzzle:
1. Describing data,
2. Producing data,
3. Conclusions from data.

Note: Each of the following stories in Program 1 is presented in more detail in later programs.

Describing Data

13:53 STORY: Lighting strikes in Colorado.
A histogram of voluminous data on lightening strikes, illustrates when it is most likely to strike. [0:40]
(See Program 7 for details).

14:33 STORY: Growth hormones.
Charts of the heights of children can be used to determine if synthetic growth hormones can increase the rate of a child's growth.
[0:53]
(See Program 2 for details).

15:26 STORY: Manatee deaths in Florida waters.
Comparing the number of motor boat registrations with number of manatee deaths in a scatterplot indicated a clear positive relationship. Practices were implemented that could help the survival of these water mammals.
(See Program 8 for details).
[0:39]

16:05 STORY: Baseball players' salaries.
The number of home runs is positively correlated with a player's salary.
(See Program 9 for details).
[0:45]

Producing Data

16:50 STORY: Chesapeake Bay pollution.
Experiments lead to results that will help clean up the bay. [1:04]
(See Program 10 for details).

17:54 STORY: Aspirin and heart attacks.
Taking simple aspirin might help reduce the number of heart attack victims.
(See Program 12 for details).
[0:50]

18:44 STORY: Frito-Lay Potato Chips.
Sampling is used at many stages of production to insure a high quality product.
[0:34]
(See Programs 13 and 18 for details).

19:18 STORY: Political Polls.
Polls were used extensively in the 1988 presidential election to measure public opinion. *(See Program 19 for details).*
[1:17]

20:35 STORY: The Space Shuttle Challenger.
Although each o-ring joints had a high probability of working properly, the joint probability that all six would work was much lower. [0:49]

(See Program 16 for details).

21:24 STORY: Casino gambling.
Although individual bettors will have widely ranging results, the house does a profitable business every day of the year. *(See Program 18 for details).*
[0:35]

Conclusion from Data

21:59 STORY: Discrimination within the FBI.
Minority agents were not given opportunities for advancement.
(See Program 20 for details).
[1:14]

23:13 STORY: Duracell Batteries.
How do they determine if their batteries really do have a longer life?
(See Program 19 for details).
[0:52]

24:05 STORY: Shakespearean poetry.
Can statistics help determine if a newly found poem was actually written by Shakespeare?
(See Program 20 for details).

STORY: Salem Witch trials.
The accused witches and their accusers lived in different parts of Salem.
Was there political persecution?
(See Program 23 for details).
[1:01]

25:06 STORY Welfare in Baltimore.
Can women participating in a special training program earn more money than women in the existing program?
(See Program 22 for details).
[0:52]

25:58 Teresa: Closing comments about the big picture of Statistics.
27:06 END OF PROGRAM.

Tape continues

PROGRAM 2: Picturing Distributions

31:26 *Against All Odds* logo
31:58 Teresa: Charles Menard's two hundred year old map/graph shows the decline in the size of Napoleon's army.
Lesson Objectives:
1. Histogram,
2. Shape of distribution,
3. Center and Spread,
4. Stem plot.

33:55 STORY: Lighting strikes in Colorado.
Histograms are used to digest vast amounts of data to help determine when and where lighting is more likely to strike. Raul Lopez, NOAA meteorologist. [2:31]
◆◆◆

36:26 Teresa: Mechanics of constructing a histogram. [2:11]

38:37 Raul Lopez: **Outliers** helped to identify that "first flashes" tend to occur at irregular times due to the geologic structure of the area.
[2:53]

41:30 Teresa: **Shapes of distributions** and the **location of the center**.[2:32]

44:02 STORY: Scheduling TV Programs.
A small independent TV station, WSBK, TV 38 Boston, uses statistics for "counter programming", i.e. targeting the audiences that will not be attracted to the major networks during a particular time slot.[4:36]
◆◆◆

48:38 Teresa: Comparing **histograms** of the ages of TV viewers can help to determine if a sitcom or action series is more likely to attract a certain age group.
[1:43]
◆◆

50:21 Teresa: Important considerations in constructing histograms: equal width intervals and an appropriate **number of classes.** [1:56]

52:17 STORY: Lowering health care costs.
Medical examples are used to illustrate **histograms** having different spreads, and the construction of **stem and leaf plots**.
Peter Van Etten, New England Med. Center.
[5:19]
▼

57:36 END OF PROGRAM.

End of Tape

PROGRAM 3: Describing Distributions

0:00 1-800-Learner, Program tease, etc.
1:11 *Against All Odds* logo.
1:43 Teresa: Pay Inequities.
Lesson Objectives:
1. Mean & median,
2. Box Plots,
3. IQR & Std. Dev.
3:30 Teresa: National salary & wage data.
Graphics used to compare **mean** & **median**.
Why do salaries for men and women differ?
[2:25]
5:55 STORY: Wage inequities.
Concerns in Colorado Springs over comparable pay for men and women in city government. The mayor and city employees discuss the effects.
[5:29] ◆
11:24 Teresa: Mechanics for calculating mean, median, and **five number summary**.
[4:43]
16:07 STORY: Hot dogs' composition.
How do you measure the calories in hot dogs? By measuring protein, fat, and water content. Sidney Shifman,
Food Res. Labs. [2:11] ◆◆
18:18 *Consumer Reports* data used to compare three types of hot dogs by using **Box Plots**. [1:37]
19:55 Teresa: Mechanics for calculating **IQR.**
[1:05]
21:00 STORY: Musical analysis of urine data.
Urine data for a new born baby is set to music. If a particular metabolite value is out of range, a bad note is played.
Prof. Charles Sweeley & Prof John F. Holland, Biochemists, Mich. St. Univ.
[3:57] ◆◆
24:57 Teresa: Mechanics for calculation of **s.**
26:58 Summary: Pictures are important!
27:33 END OF PROGRAM. Credits, Logos, etc.

Tape continues

PROGRAM 4: Normal Distributions

31:55 *Against All Odds* logo.
32:22 Teresa: Lesson Objectives:
1. Density Curves,
2. Normal Curves,
3. The 68 - 95 - 99.7 Rule,
4. Standardization.
33:50 STORY: Baby "bust" problem.
Changes in age **distributions** over time spell trouble for the Social Security System. Prof. William Hsiao,
Harvard School of Public Health.
[3:50] ◆
37:40 Teresa: Aging of our population. Creating **density curves** for US. population for 1930 & 2075. [2:10]
39:50 Location of **median** & **mean** on **density curves**. *(Good graphics.)*
[2:10] ◆◆◆
42:00 Examples of variables that may follow **Normal Distributions** found in Teresa's "home movies": children's heights, class arrival times, test scores, mpg & weight of cars, etc. [2:29] ◆
44:29 Effect of changing μ and σ in the Normal Distribution. [1:38]
46:07 STORY: Boston Bean Stalk Social Club.
A woman's height must be in the top 2 to 3% for membership. [2:11] ◆
48:18 Teresa: Graphical explanation of the **68 - 95 - 99.7 rule**. [2:20]
50:38 STORY: Baseball statistics.
Where are the ".400" hitters today? The mean batting averages remain consistent over time, $\mu = .260$; but σ is getting smaller. (Good baseball clips).
Stephen Jay Gould, Ph.D., Harvard
[5:10] ◆◆◆
55:48 Teresa: Standardizing the normal distributions using Ty Cobb, Ted Williams, and George Brett batting averages.
[1:32] ◆◆
57:20 Teresa: Closing comments.
57:45 END OF PROGRAM

End of Tape

PROGRAM 5: Normal Calculations

0:00 1-800-Learner.
1:11 *Against All Odds* logo.
1:43 Teresa: Sizes of clothes.
Lesson Objectives:
1. Relative Frequencies,
2. Percentile,
3. Quantile Plots.
3:21 Teresa: **Standardizing the normal distribution** illustrated with heights of American women. [1:30]
4:51 The standard normal table.
Finding probability from z.
7:07 STORY: GM Proving grounds.
Tests for nitrous oxide emissions using a dynamometer. x= grams/mile. Percent of new cars that fail must be less than 40%.
Harold Haskew, GM Engineer and Tom Lorenzen, GM Statistician.
[4:08] ◆
11:15 Teresa: GM must decide if a new model car meets emission standards using only n=5 prototypes? [1:09]
12:24 STORY continued: Actual test drives.
[1:21]
13:45 Teresa: Calculating the area between two values of cholesterol. [0:25]
14:10 STORY: Cholesterol values.
A campaign is targeted at the borderline risk group; those having readings of 200 to 250. How can these individuals reduce their heart attack risk?
William Castelli, MD. [4:07] ◆◆
18:17 Teresa: What percentage are in the borderline risk group for cholesterol if $\mu = 213$ and $\sigma = 48.4$? [1:33]
19:50 STORY: Sizes of military uniforms.
Anthropologists measured many characteristics of US soldiers in order to determine the needed distribution of sizes for new uniforms and equipment.
Robert Walker & Bruce Bradtmiller, Anthropologists. [2:56] ◆◆
22:46 Teresa: Calculating sizes for new helmets. The normal table backwards. [1:35]
24:21 Teresa: **Normal Quantile Plot.**
How do you determine if a population is normal? [2:09]
26:30 Teresa: Closing Comments.
27:03 END OF PROGRAM.

Tape continues

PROGRAM 6: Time Series

30:20 *Against All Odds* logo.
30:56 Teresa: Lesson Objectives:
1. Cycles and Trends,
2. Seasonal Variation,
3. Smoothing Data,
4. Seeing Isn't Believing.
32:17 Teresa: Driving times to work shown in a **control chart.** [2:33]
34:50 STORY: The body's internal clock.
Comparing the body's cycle to the day-night cycle using **time series.**
Charles Czeislser, MD, Brigham & Women's Hosp. [2:22] ◆
37:12 Teresa: Graphics illustrating **cycles.**
[0:51]
38:03 The "light-dark" cycle. Bright light therapy.
[0:55]
38:58 Teresa: National economic statistics contain **seasonal variation**. [1:05]
40:03 Teresa: Ozone levels in the atmosphere.
Seasonal variation and negative **trend**.
[1:00] ◆◆
41:03 Teresa: Boston Marathon.
Smoothing out cycles and trends using r**unning median** on winning times in the Boston Marathon. [2:35]
43:38 STORY: Brain's reaction time.
Measuring the time until a surprise reaction while a subject reads unusual sentences.
Gregory McCarthy, Ph.D. Psychologist.
[2:19] ◆
45:57 Teresa: A **plot of means** for several trials smoothes the data to show the estimated reaction time. [1:30]
47:27 STORY: Wall Street.
Predictions on the floor of the New York Stock Exchange.
48:55 Dr. Burton Malkeil, Yale:
Why **diversification** reduces risk.
50:10 Teresa: Can **cycles** in the stock market be predicted? Peter Eliades answers "Yes."
51:51 Dr. Burton Malkeil answers "No."
[7:29] ◆◆◆
54:56 Teresa: How is a pattern discovered?
Does it repeat after we discover it?
[1:34] ◆
56:30 END OF PROGRAM.

End of Tape

PROGRAM 7: Models for Growth

0:00 1-800-Learner, etc.

1:09 *Against All Odds* logo
1:40 Teresa: Flowers growing.
Lesson Objectives:
1. Linear Growth,
2. Exponential Growth,
3. Exponential Beats Linear Growth.
3:00 STORY: Children growth rates.
Alice in wonderland grows BIG.
Growth hormones were used for five-year old Sara when her **growth rate** was determined to be deficient.
Edward Reiter, MD, Bay State Med. Center.
[4:57] ◆◆◆
7:57 14-year old Jason has similar problem but with different results.
John Crigler, MD, Endocrinology Div. Children's Hospital. [1:23]
9:20 Teresa: **Linear growth** defined.
Ticket sales for a movie. Eye-balling the slope. **Residual** patterns can suggest curvature. **Extrapolation** problems.
[4:40]
14:00 STORY: Gypsy moth infestations result from **exponential growth**. Radiation of adult males may help to reduce the effects of the problem. Chuck Schwalbe, Dir. USDA Otis Lab. and
Andrew Liebhold, Ph.D., Entomologist, Univ. of Mass. [5:58] ◆◆
19:58 Teresa: Exponential growth: multiply by a fixed amount. [0:19]
20:17 STORY: (Cartoon) The price of a chess board? "A grain of rice on the first square, double for the next, and so on."
[1:23] ◆◆
21:40 Teresa: Exponential growth will always surpass linear growth.[1:50]
23:30 Crude oil production for 100 years. Use the **logarithm** to re-express exponential growth to linear growth. [1:10]
24:40 Use residuals to "see" the problem.
[1:50]
26:30 Teresa: Summary comments.
27:03 END OF PROGRAM

Tape continues

30:57 Teresa: Lesson Objectives:
1. Scatterplot,
2. Categorical Variety,
3. Regression Line.
32:25 STORY: Manatees versus motor boats in Florida waterways. Tom O'Shea, Wildlife Biologist. [2:33] ◆◆◆
34:58 Teresa: **Scatterplots** of the number of manatee deaths and motor boat registrations.
[2:57]
37:55 Teresa: Cavities vs. fluoride levels.
Scatterplot with points identified by cities being either small or large.
[1:36]
39:31 1970 Draft lottery problem.
Median trace helps identify the non-random pattern. [2:40] ◆◆◆
42:11 Teresa: **Least squares regression line** illustrated with graphics.[1:53] ◆
44:04 STORY: Obesity problems.
Resting metabolic rate versus lean body mass. C. Wayne Callaway, MD Endocrinologist and Stanley Heshka, Ph.D. St. Luke's Roosevelt Hospital.
[3:17] ◆
47:21 Teresa: Mechanics for calculating the **regression line**. [3:28]
50:49 STORY continued: Predicted values tend to be higher than actual metabolism rate. The dieting process lowers the metabolic rate.
[2:55]
53:44 Teresa: Cautions to consider in regression.
56:15 END OF PROGRAM.

End of Tape

PROGRAM 8: Describing Relationships

30:25 *Against All Odds* logo.

PROGRAM 9: Correlation

0:00 1-800-Learner.
1:06 *Against All Odds* logo

1:36 Teresa: Is there an the association between taste of chocolate cake and its price?

3:45 **Correlation** illustrated with animated graphics. [1:14] ◆◆

4:59 Lesson Objectives:
1. Interpreting correlation,
2. Deriving r,
3. Correlation and regression.

5:42 STORY: Identical twins raised apart.
The annual "twins" convention in Minneapolis. Thomas Bouchard & Nancy Segal, Minn. Study of Twins Reared Apart, Prof. David Lykken, Univ. of Minn.
[4:03] ◆◆◆

9:45 Teresa: Scatterplot for twins raised apart.
[1:43]

11:28 STORY continued: Explanation of associations. [1:30]

12:58 Teresa: Mechanics for calculating **r.**
[2:47] ◆

15:45 Illustration of r for a parabolic curve.

16:22 STORY: Baseball players' salaries.
The lively baseball controversy. The association between home runs and strikeouts, and between salaries and home runs. Daniel Seligman, *Fortune Magazine*.
[3:28] ◆◆

18:22 Calculation of r for Home Runs vs. Salary.[1:28]

19:50 **r-square**, the percentage of variation of y explained by x. [1:03]

20:53 STORY: Education in the 60's.
A social science study in the '60s, the Coleman Report, compared black and white schools. What variables were related, and how strong were the relationships? Harold Howe, Commission of Education, '66-'68 and Fred Mosteller, Harvard Statistician.
[2:30] ◆

23:23 Teresa: simplified example of the study.

24:29 STORY continued: Interpretation by the experts involved in the study.
[3:18] ◆

26:48 Teresa: Closing Comments.

27:27 END OF PROGRAM.

Tape continues

PROGRAM 10: Multi-dimensional Data Analysis

30:30 *Against All Odds* logo

31:02 Teresa: Chesapeake Bay.
Lesson Objectives:
1. Review.
2. Multi-dimensional data.
3. Human/Computer Interaction.

32:28 STORY: Chesapeake Bay pollution.
How healthy is the Chesapeake Bay? Measurements of organisms are made on samples of bottom of mud, and of dissolved oxygen levels in the water.
A. Fred Holland, Ph.D. & Anna Shaughessy, Biologists, and Hal Wilson, Statistician, Versar, Inc., Michael Hirshfield, Maryland Dept. of Natural Resources.[9:52] ◆◆

42:40 Measuring the effect of a paint factory.

45:07 Teresa: Some multi-dimensional plots:
Chernof faces are used for determining if dollar bills are counterfeit. "**Trees**" and "**stars**" are used to display data.
[2:35]

47:42 STORY: Bell Core graphics.
Computer and graphical techniques used by Bell Core: Speech synthesis, three dimension plots and higher, **brushing** techniques. Paul Tukey, Bell Core.
[8:22] ◆◆

56:04 Teresa: Closing Comments.

56:48 END OF PROGRAM.

End of Tape

PROGRAM 11: The Question of Causation

0:00 1-800-Learner, etc.
1:05 *Against All Odds* logo
1:36 Teresa:
Lesson Objectives
1. Analyzing Association.
2. Simpson's Paradox.
3. Causation.
3:01 STORY: (Cartoon) **Causation**, **Common response**, and **coincidence** examples.
[1:57] ◆◆◆◆
4:55 Teresa: Lurking variables.
[0:47]
5:42 STORY: Example of **Simpson's Paradox**. "City University" seems to have sex discrimination for admissions to its two professional schools.
6:52 Teresa: Data for the City University problem.
8:11 City University's Business School compared to its Law School.
10:08 Teresa: Interpretation of the Simpson Paradox. [4:26] ◆◆◆◆
11:50 Teresa: An intentionally unrealistic experiment with new born babies used to test effect of smoking on cancer.
[0:57] ◆◆
12:47 STORY: The Wynder-Graham study. This classic work first suggested that smoking causes cancer.
How can causation be established?
Richard Overholt, MD, Ernest Wynder, MD, Dwight Harken, MD, Irwin Miller, Statistician, Lawrence Garfinkel, Dietrich Hoffman, MD, all of the American Health Foundation; Prof Allan Brandt, Harvard, and Donald Shopland, 1964 Surgeon General's Report.
(Excellent but lengthy.)
[13:22] ◆◆◆
26:09 Teresa: Comments on causation.
27:00 END OF PROGRAM.

Tape continues

30:30 *Against All Odds* logo
31:02 Teresa: Lesson Objectives:
1. Experiment,
2. Confounding,
3. Randomized Comparative Exper.
32:46 STORY: Observational study of the behavior of lobsters. Diane Cowan & Jelle Atena, Boston Univ. Marine Program.
[2:41] ◆
35:27 Teresa: Explanation of an experiment.
[0:47]
36:14 STORY: The Physicians Health Study. Could taking aspirin reduce the occurrences of heart attacks? A controlled **double blind experiment** using a **treatment** and a **placebo**. Ethical concerns are discussed. Bernard Katz, MD, Charles Hennekens, MD, Dir. of Physicians Health Study.
40:10 Teresa: Subjects were randomly placed in two groups to avoid **confounding**.
41:31 STORY continued: A 47% reduction in heart attacks resulted for those receiving aspirin. [7:06] ◆◆◆◆
43:20 Teresa: Two groups must be equivalent in order to avoid bias. [0:19]
43:39 STORY: Is Ribavirin to good to be true? A study for patients having a pre-AIDS condition yielded bias results because the healthiest patients received the drug; while the sickest, the placebo.
[1:01] ◆◆◆
44:40 Teresa: The study failed to randomly assign subjects to the two groups.
[0:35]
45:15 Teresa: Illustration of how to randomize.
[2:07] ◆
47:22 STORY: Disposion of domestic violence. A Milwaukee, Wisconsin police department experiment to determine the best method to handle domestic violence cases. Larry Sherman, Ph.D.
[6:00] ◆
53:22 STORY: A fictional experiment to illustrate bad experimental practices.
[2:19] ◆◆◆◆
55:41 Teresa: Recap of good experimental practices.
56:44 END OF PROGRAM.

End of Tape

PROGRAM 12: Experimental Design

PROGRAM 13: Blocking and Sampling

0:00 1-800-Learner.
1:07 *Against All Odds* logo.
1:39 Teresa: Dirty laundry is blocked (cotton, synthetics) and treated (warm or cold water).
Lesson Objectives:
1. Blocking
2. Sampling
3. Census
4:45 STORY: The perfect strawberry.
Horticulturists use a randomized complete block design to determine the best berry for market.
Olivia Mageau, Horticulturist, & Gene Galletta, Ph.D., Geneticist.
8:43 Teresa: Reasons for blocking.
9:57 STORY continued: The evaluation of the berry data. [6:53] ◆
11:38 Teresa: Reasons for multi-factor experiments.[1:50]
13:28 STORY: Undercounting in the national census. This illustrates the difficulties of getting an exact count. Barbara Bailer, Statistician, & Peter Bounpane, US Census Bureau.[5:08] ◆◆◆
18:36 Teresa: Why a sample instead of a census?
19:45 Shere Hite's *Women and Love*. 1987.
An example extremely biased sampling due to voluntary response.
[2:12]
20:48 STORY: Frito Lay potato chips.
Sampling is used at many steps in the production of potato chips to insure a high quality product. [5:49] ◆◆◆◆
26:37 Teresa: Closing Comments.
27:08 END OF PROGRAM.

Tape continues

PROGRAM 14: Samples and Surveys

30:45 *Against All Odds* logo
31:15 Teresa:
Lesson Objectives:
1. Stratified Random Sample,
2. Getting It Right,
3. Sampling Distribution.
32:03 Teresa: A **stratified** national **sample**.
Graphics nicely illustrate the process.
[2:38]
34:41 STORY: A fish story.
A survey of fishermen and the types of fish caught is used to determine if some species are endangered. John Witzig, Nat'l Marine Fisheries Service.
[3:29] ◆
38:10 Teresa: Problems in surveying people.
The *Literary Digest* and the George Gallup predicted the 1936 presidential election results. Why was George closer?
[1:26] ◆
39:36 STORY: Examples of bad interviewer techniques. [1:45] ◆◆◆
41:21 STORY: National Opinion Research Center (NORC) sampling procedures. Statistically sound **sample selection**, careful **question design**, and skillful interviewing are illustrated effectively.
James Davis and Tom Smith, Dirs, General Social Survey, and Leigh Brandon, NORC.
(A must see segment.)
[9:09] ◆◆◆◆
50:30 Teresa: Sampling distributions illustrated using beads in a bowl. Large n implies more **precision in estimation**.
(Nicely done.) [5:57] ◆◆◆
56:27 Teresa: Closing Comments.
56:51 END OF PROGRAM

End of Tape

PROGRAM 15: What is Probability

0:00 1-800-LEARNER
1:06 *Against All Odds* logo.
1:40 Teresa:
Lesson Objective:
1. Relative Frequency,
2. Randomness,
3. Sample Space,
4. Probability Rules.

4:32 STORY: Assessing probabilities of injury or death in everyday life.
What are the chances of dying in an automobile accident at some point in your life? Baruch Fischhoff, Carnegie Mellon.
[4:54] ◆

9:26 Teresa: Relative frequency of heads in many flips of a coin. [1:24]

10:50 STORY: Percy Diaconis, magician & professor, discusses the concepts of randomness. [3:50] ◆

14:40 Teresa: Demonstration of sample spaces and the basic rules of probability.
[3:09]

17:49 STORY: Traffic control in New York City.
A probability based traffic simulation model is used to avoid "stillback" and "gridlock" at key intersections.
Mark Yedlin. [6:00] ◆◆

23:49 Teresa: Simplified example of traffic control used to illustrate basic rules of probability.
[3:23]

27:12 END OF PROGRAM.

Tape continues

PROGRAM 16: Random Variables

31:38 *Against All Odds* logo
32:10 Teresa:
Lesson Objective:
1. Multiplication Rule,
2. Random Variables,
3. Mean and standard deviation of random variables.

33:36 STORY: In the movie *Stand and Deliver*, several students are accused of cheating for giving the same wrong answer on an AP Calculus exam. The events were not independent. [0:57] ◆

34:33 STORY: Space Shuttle Challenger.
Defects in NASA reliability program contributed the catastrophic failure.
Note: P(one joint fails) = .023).

37:53 Teresa: Using the multiplication rule for finding the joint probability of all 6 field joints not failing.

39:15 STORY continued: The backup o-ring for each field joint did not behavior independently of the primary. Cold weather contributed to failure.
(The short version in PROGRAM 1 may be more effective). [8:29] ◆◆◆◆

43:02 Teresa: Addition rules for disjoint events and independent events. The two types of random variables discrete and continuous. Points in a profession basketball game.
[6:08]

49:10 STORY: Earthquakes in California.
Estimating the probability of occurrence along the San Andreas fault. Lucille Jones and Kerry Sieh, US Geological Survey.
[5:35] ◆

54:45 Teresa: Distribution of the number of ice cubes used per drink and the mechanics of calculating the mean and standard deviation.
[2:49]

57:34 END OF PROGRAM.

End of Tape

PROGRAM 17: Binomial Distributions

0:00 1-800-Learner
1:03 *Against All Odds* logo
1:33 Teresa: Insurance company concerns.
Lesson Objective:
1. Law of Large Numbers
2. Rules for means and variances of random variables.
3. Binomial distribution
4. Binomial means and standard dev.

2:22 Teresa: **Law of Large Numbers**.
3:46 STORY: Boston Celtics Basketball.
The myth of "small numbers" illustrated with "streak shooting". Tom Gilovich, Cornell Univ, did research that showed that even free throw shots are **independent events** in game situations.
[2:52] ◆◆◆
6:38 Teresa: Stocks and T-bills.
Expected rate of returns are used to illustrate the rules for the **means of random variables**. [3:07]
9:45 STORY: A finance class experiment.
A class at Cretan College learns the reasons for maintaining diversification of investments. [4:53] ◆◆
14:38 Teresa: Variance implies **risk**. Rules for **variances of random variables**.
[1:43]
16:23 Teresa: **Binomial** distribution.
[0:59]
17:22 STORY: Sickle cell anemia.
Example of dichotomous outcomes each having a fixed probability of occurring. Dr. Orah Platt, Boston's Children Hospital, and Dr. Marilyn Gaston, Nat'l Institute of Health. [4:40] ◆
22:02 Teresa: Calculating probabilities of X children having sickle cell anemia in a group of n = 6. [2:23]
24:25 STORY: Quincunx.
Balls falling through rows of pegs illustrate that the binomial can look like a normal distribution.
[1:19] ◆◆
25:44 Teresa illustrates conditions when the normal **approximations** work.
[1:19]
27:03 END OF PROGRAM.

Tape continues

PROGRAM 18: The Sample Mean and Control Charts

32:13 *Against All Odds* logo
32:44 Teresa: Gambling.
Lesson Objective:
1. Sample means,
2. Central limit theorem,
3. Control charts.

33:55 Teresa: Roulette.
Finding the mean winnings when betting on "red" many times. [1:09]
35:04 STORY: Interviews with gamblers.
How and why casinos keep players coming back. Steven Norton & John Belisle, Resorts International.
[5:40] ◆◆
40:44 Teresa: **Central limit theorem**.
Illustrated from the gamblers point of view with 50 $1 bets; then from the casino's side with 1000 and 100,000 $1 bets.
[6:19] ◆◆◆◆
47:03 STORY: Frito Lays Potato Chips.
How and why **Statistical Process Control** is used in the production of chips. Anthony Gallonio and Don Strickert, Quality Assurance.
[3:09] ◆◆◆
50:12 Teresa: **Control charts**.
Construction and used of control charts for the salt content of potato chips.
52:39 Decision rules for control charts.
[3:29]
53:41 STORY: **Dr. W. Edwards Deming.**
How Japan reversed its economy by using Dr. Deming's ideas of quality.
What American management MUST do to survive. Prof. Robert Hayes, Harvard Business School, and Frank Fagan, SQC Analyst. *(A must see segment.)*
[3:55] ◆◆◆◆
57:36 Teresa: Closing comments.
58:05 END OF PROGRAM.

End of Tape

PROGRAM 19: Confidence Intervals

0:00 1-800-Learner

1:05 *Against All Odds* logo.

1:37 Teresa:
Lesson Objectives:
1. Confidence Intervals,
2. Trade-off,
3. Sample Size.

3:11 STORY: Political Polls.
Polls were used extensively in the 1988 Presidential election polls. What are polls, and why do their results vary? What is the **margin of error**?
Daniel Yankelovich, Public opinion analyst, and Waren Mitofsky, CBS News Election Unit. [3:26] ◆◆

6:37 Teresa: Systolic blood pressure used to construct a **confidence interval**.
What assumptions are made? Mechanics of finding the **margin of error**. Meaning of being **"95% confident"**.
[4:58]

11:35 STORY: Duracell batteries.
A demonstration of how the lives of batteries are actually measured. Richard Cataldi and Larry Morgan, Ultra Technologies. [2:38] ◆◆

14:13 Teresa: How the normal table is used to find any degree of confidence. What effect does the sample size have on the width of the confidence interval?
[4:12]

18:25 STORY: The use of Rhesus monkeys in medical studies. **Sample sizes** should be conservative in order to not waste large numbers of animals. Prof. Melinda Novak, U. Mass, and Andrew Petto, New England Primate Research Center.
[2:56] ◆

21:21 The feeding behavior of marmosets.
[2:46]

24:07 Teresa: Mechanics of calculating the sample size needed given a desired width and amount of confidence. Warnings regarding the use of C. I.'s.
[3:03]

27:10 END OF PROGRAM

Tape continues

PROGRAM 20: Significance Tests

31:09 *Against All Odds* logo.

31:39 Teresa: Are Seat belts effective?
Lesson Objective:
1. Significance tests,
2. P-value,
3. Statistically significant.

Null and Alternative hypotheses.

34:18 STORY: Shakespearean Poetry.
Testing a hypothesis to determine if a newly found poem was actually written by William Shakespeare. Ron Thisted, Univ of Chicago. [6:42] ◆◆

41:00 Teresa: Mechanics of a hypothesis test.
The calculation and interpretation of the p-value for the Z-distribution.
[8:06]

49:06 STORY: Discrimination within the FBI.
Minority agents were not given an opportunity for advancement. A comparison of the points of view of the statistical experts from both sides of the suit is given. Matt Perez, FBI, Gary Lafree, Univ of New Mexico, and Rebecca Klemm, Klemm Analysis Group.
[6:54] ◆◆◆

56:00 Teresa: Closing comments.
Data must be meaningful to achieve meaningful results.

57:26 END OF PROGRAM

End of Tape

PROGRAM 21: Inference for One Mean

0:00 1-800-Learner, etc.

1:04 *Against All Odds* Logo.

1:36 Teresa: Over specialized gadgets.
Lesson Objectives:
1. t-Procedures,
2. t-Distributions,
3. Paired Comparisons.

2:40 Facing the fact that σ is usually never known, z statistics are usually just "over specialized" gadgets.

3:03 The t-distributions. 1908, the Guinness Brewery and William Gossett. [1:15]

4:18 Comparing the t distributions to the standard normal. [1:37]

5:55 STORY: **The National Institute of Standards and Technology (NIST)**.
Stanley Rasberry and Susannah Schiller, NIST. Customers of NIST purchase materials that they use as "standard" reference materials. NIST certifies that bottles contain what the label says. NIST uses **stratified samples** of bottles to construct confidence interval estimates for the properties of the materials.
[4:38] ◆◆

10:33 Teresa: Construction of a Confidence Interval for the mean level of PCB concentrations based on a sample of 10 bottles. [2:17]

12:50 Teresa: Paired Comparisons. [0:40]

13:30 STORY: **NutraSweet.**
Taste tests are used to test shelf life of a new cola that contains this artificial sweetener..
Product testing is a constant on-going process.
Thomas Carr, Research Statistician, Suzanne Pecore, Sensory Evaluation,
Barry Howler, Application Technology.
[4:49] ◆◆◆

18:19 Teresa: A paired comparison test of the sweetness of the cola. [2:01]

20:20 Benefits of t-tests. [0:48]

21:08 STORY: **Autism.**
The Vineland test for social development.
Dr. Fred Volkmar, Yale Child Study Center.
[4:10] ◆

25:18 Teresa: Confidence Interval for Age Equivalent Scores based on t-distribution. [1:50]

27:08 END OF PROGRAM

Tape continues

PROGRAM 22: Comparing Two Means

31:40 *Against All Odds* logo.

32:12 Teresa: Lesson Objectives:
1. Two-sample problems,
2. C.I. for Two Means,
3. Significance Test for two means.

33:32 STORY: **Welfare in Baltimore**.
Can women participating in a special training program, called OPTIONS, earn more money than women in the existing welfare jobs program called WIN?
The result played a role in a congressional overhaul of welfare. Daniel Friedlander, M.D.R.C.
[5:42] ◆◆

39:14 Teresa: The mechanics of two independent sample tests and confidence interval.
[5:51]

45:05 STORY: **Union Carbide product testing.**
Is there a difference in the bounce of a new environmentally safe foam and a std foam?
Union Carbide tested the new product, Ultra-cell, several ways:
support test, combustion test, stretch test, fatigue test, & "bounce" test.
Stanley-Hager, Research Scientist and Charles Hendrix, Statistician.
[3:45] ◆◆◆

48:50 Teresa: The mechanics of the two independent sample t-test.
[2:10]

51:00 STORY: **SAT Exams**.
Can "coaching classes" improve one's performance on the SAT?
Donald Powers, E.T.S. and
John Katzman, The Princeton Review
[4:40]

55:40 Teresa: The mechanics of the finding a CI for the difference between the means of the coached group and the non-coached group. The 95% CI is (-15, +91).
[2:23] ◆◆◆

58:03 END OF PROGRAM

End of Tape

PROGRAM 23: Inference For Proportions

0:00 1-800-Learner, etc.
1:07 *Against All Odds* Logo
1:38 Teresa: Lesson Objectives:
1. Inference on proportions,
2. CI and Significant Tests,
3. Two proportions.

3:03 STORY: **Measuring Unemployment Nationwide**. The Bureau of Labor Statistics takes samples of individual households to get data on national unemployment. Sub group estimates are also of interest, but are available at a loss precision.
Janet Norwood, Director of Bureau of Labor Statistics, Sen. William Proxmive, Joint Economic Committee, and Lawrence Cahoon, Census Bureau.
[4:58] ◆

8:01 Teresa: Mechanics of constructing a CI for a proportion, and a test of significance.
[3:57]

11:58 STORY: **Safety of City Water**.
Did water from contaminated wells in one side of Woubourn, Mass. lead to a higher incidence of health problems that in other parts of the city?
Marvin Zellen, Harvard School of Public Health. [4:52] ◆◆◆

16:50 Teresa: Mechanics of CI for the difference of proportions for two independent samples.
[3:25]

20:15 STORY: **The Salem Witch Trials**.
The accused witches and their accusers lived in different parts of Salem.
Was there political persecution?
George Cobb, Mount Holyoke College.
[3:39]

23:54 Teresa: Mechanics of a significant test for proportions of two independent samples.
[3:23]

27:17 END OF PROGRAM

Tape continues

PROGRAM 24: Inference for Two-Way Tables

31:20 *Against All Odds* logo.
31:51 Teresa: Feline Illness.
Lesson Objectives:
1. Two-Way Tables,
2. Relationships between categorical variables,
3. Chi square test.

34:11 STORY: **Ancient Man**.
Are two categories of prehistoric creatures, Africanus and Robustus, different? Measurements made from discovered skulls regarding dental "scratches & pits" indicates differences. Dr. Fred Grine, Anthropologist, SUNY-Stony Brook. [4:28] ◆◆

38:39 Teresa: Mechanics for the Chi Square tests.
[4:51]

43:30 STORY: **Breast Cancer**.
Is there a relationship between the patient's age category and the type of treatment given? Vincent Mor, Brown University, and Alan Weitberg, Roger William's Cancer Center. [4:23] ◆◆

47:53 Teresa: Calculating a P-value for the Chi Square distribution.
[4:09]

52:02 STORY: **Mendal's Peas.**
Were the results too good to be true? R. A. Fisher said, "Yes"; Prof. Robert Bernstein, scientific historian, says no. The problem was due to "how to classify" borderline items.
[4:51] ◆◆

56:53 Teresa: Closing Comments.
57:18 END OF PROGRAM.

End of Tape

PROGRAM 25: Inference for Relationships

0:00 1-800-Learner, etc.
1:03 *Against All Odds* logo.
1:38 Teresa: The Big Bang.
Lesson Objectives:
1. Inference from linear regression,
2. Simple Linear Regression Model,
3. CI and significant tests.

3:32 STORY: **Of astronomical Interest: Are galaxies speeding away from earth?** Edwin Hubble's early 20th century work used linear regression, with speed vs. distance, to help establish the "Big Bang" theory. The "Hubble constant" is the slope. Robert Kirshner, Harvard/Smithsonian Center for Astrophysics.
[4:33] ◆◆◆◆

8:05 Teresa: Regression calculations using Hubble's original data on 24 galaxies.
[6:03]

14:08 STORY: **Complications in the Hubble Constant**. John Huchra, Astronomer at Harvard, discovered that galaxies were not randomly distributed throughout the universe. Rotating 3-D plot illustrates the "Swiss cheese concept" of universe.
[2:42] ◆◆

16:50 Teresa: Confidence Interval and significant tests using the original Hubble data.
[3:13]

20:03 STORY: Data from ultra-sound waves pictures of a fetus are used to determine if birth defects may be present. Prediction intervals are used to spot unusual physical measurement.
[3:10] ◆◆

23:13 Teresa: Calculation of confidence bands and prediction intervals for a regression line.
[3:47]

27:00 END OF PROGRAM

Tape continues

PROGRAM 26: Case Study

33:49 *Against All Odds* logo.
34:22 Teresa: A Drug to treat AIDS.
Lesson Objectives:
See how statistics were applied to a "real problem".

35:49 STORY: **How the drug, AZT, was tested and got to market.**

36:57 1985, **Phase 1: Observation Study** Samuel Broder, Director, National Cancer Institute; David Barry, MD, Burroughs Wellcome Drug Co.; and Robert Schooley, Mass. General Hosp.
[2:25]

39:22 Spring, 1986 **Phase 2:** A randomized controlled **double blind experiment**. Summer 1986. The Data Safety Monitoring Board convenes. Gail Rogers, Statistician, and Sandra Lehrman, MD, Burroughs Wellcome. Also Robert Machete, Statistician, Data Safety Monitoring Board.
[4:11]

43:33 Sept. 10, 1986 **Emergency Meeting**. "Is there a statistically significant difference between AZT and placebo?
[4:20]

47:53 Sept. 11-19, 1986**.** **Confirming the data analysis**. Robert O' Neill, Statistician, FDA
[3:37]

51:30 Fall 1986. Getting AZT to patients. **Statistical process control** in manufacturing. A. R. Peters, QC., Burroughs Wellcome Co.
[1:37]

53:07 A patient's perspective.
[4:55] ◆◆◆

58:02 Teresa: Final Comments. **Safety and efficiency** of a new drug.

60:00 END OF PROGRAM. [1:58]

End of Tape
End of series.

The volume of work in this video series is awesome and the quality is outstanding. Our profession would be well served if all college students watched these programs. As professors teaching Statistics classes, we can use excerpts from these tapes in class to introduce students to situations in society where Statistics plays a key roll.

Who decided that aspirin
can reduce the number of
heart attacks?
How?
Does it work for anybody?

Have Deming speak
to your class.
"It's so simple . . . ."

Do cycles exist in
the stock market?
See two experts go
head to head.

Can your really trust
a NORC survey?
Can you trust just
any ol' survey?

How can sampling result in better
tasting potato chips?

Free throws. Does making the
first improve your chances of
making the second?
The Boston Celtics know
the answer.

What factors contributed to
the space shuttle Challenger
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