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Bringing the (Signal and) Noise

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Rightbrainedmath.com

Background

- No Formal Statistics Training
- Liberal Arts school
- Less instructional time

THE KHABELE SCHOOL VISUAL ARTS DEPARTMENT PRESENTS

FOREGROUND

ART, PHOTOGRAPHY AND FILM BY
HIGH SCHOOL/MIDDLE SCHOOL STUDENTS



PUMP PROJECT ART COMPLEX
702 SHADY LANE, AUSTIN, TEXAS 78702

OPENING RECEPTION THURSDAY APRIL 3RD
6:00PM - 8:00PM →

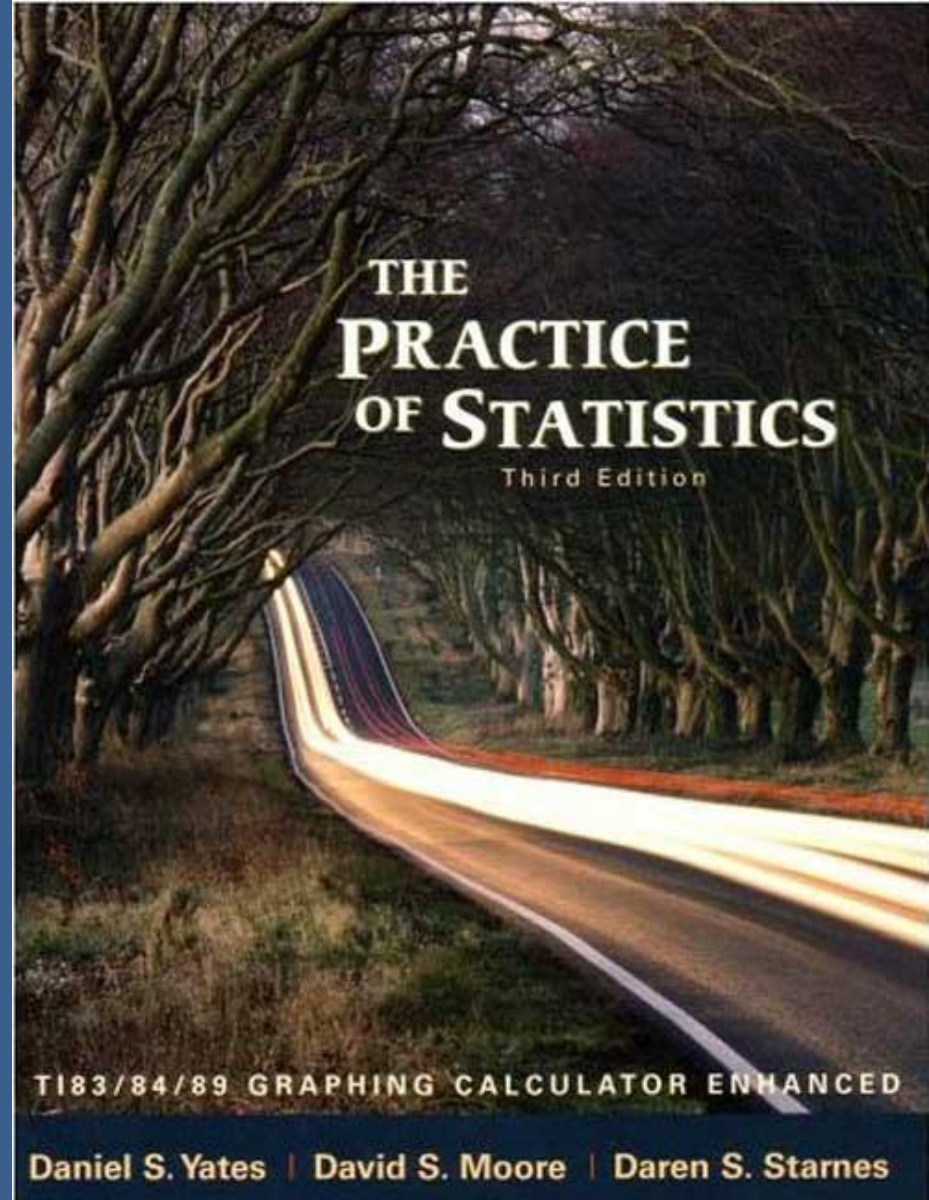
EXHIBITION RUNS THROUGH SATURDAY APRIL 5TH

AP Statistics

Not a Math Class

Technical Reading
and Writing

Love: Stories



THE PRACTICE OF STATISTICS

Third Edition

TI83/84/89 GRAPHING CALCULATOR ENHANCED

Daniel S. Yates | David S. Moore | Daren S. Starnes

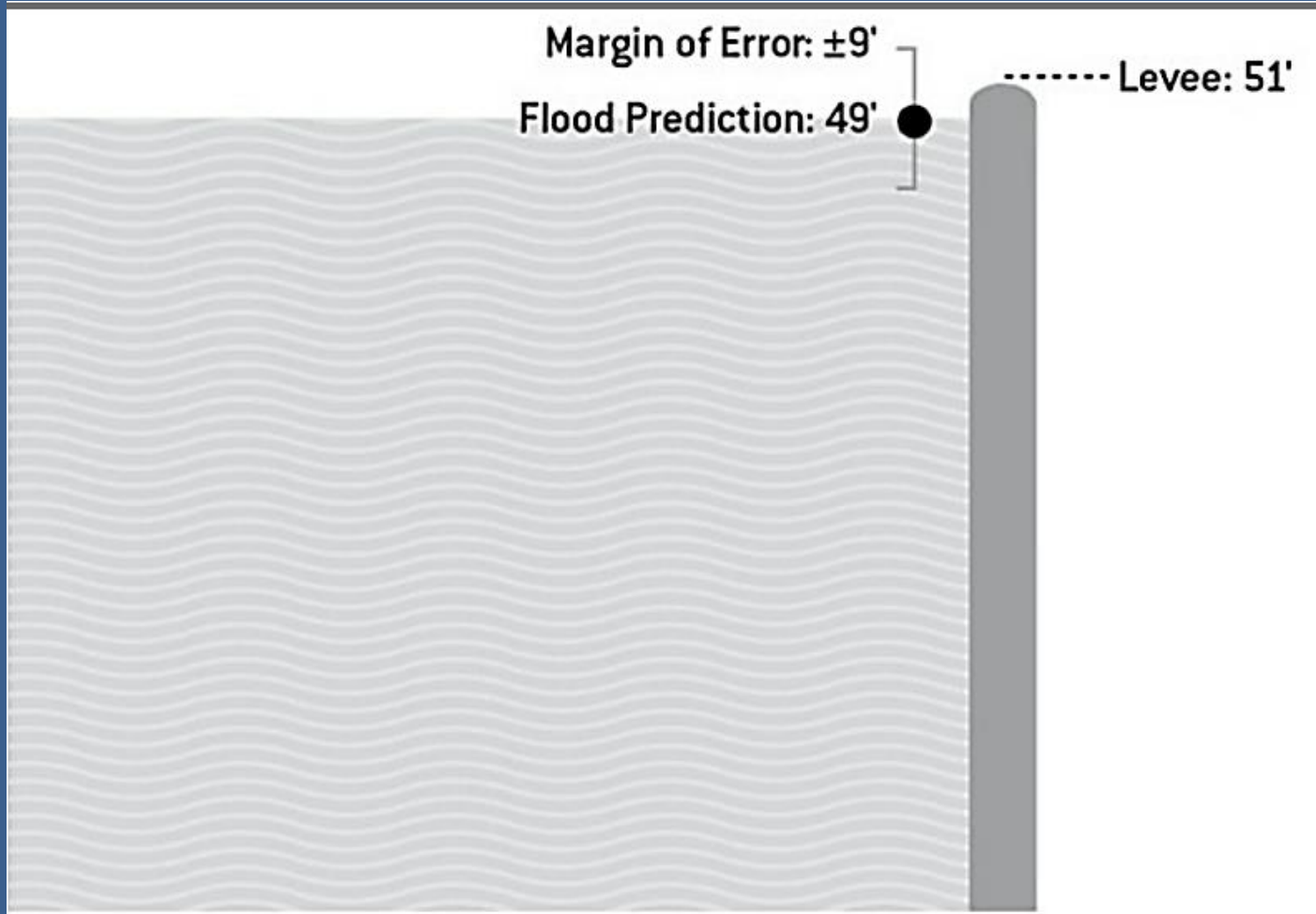
Intention

Def: A confidence interval gives an estimated range of values which has a likelihood to include an unknown population parameter; the estimated range being calculated from a given set of sample data.

Or...

Problem: Suppose we want to estimate the average weight of an adult male in Dekalb County, Georgia. We draw a random sample of 1,000 men from a population of 1,000,000 men and weigh them. We find that the average man in our sample weighs 180 pounds, and the standard deviation of the sample is 30 pounds. What is the 95% confidence interval?

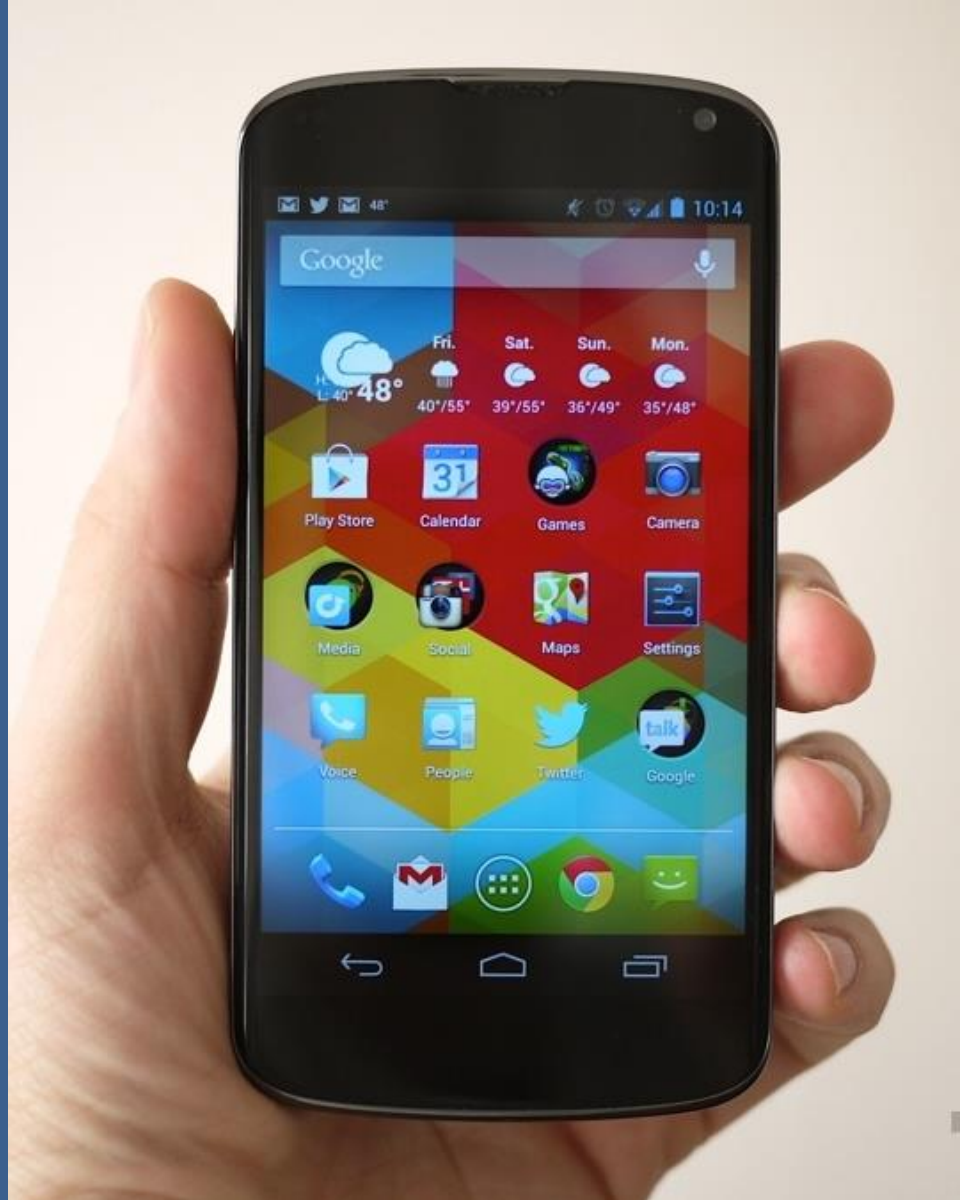
To ...?



“Reading”



Capturing



*the signal and the
and the noise and
the noise and the
noise and the noi
why so many and
predictions fail—
but some don't th
and the noise and
the noise and the
nate silver noise
noise and the noi*

Learning Objectives in S&N

Margin of Error

Confidence Intervals

Modeling and "Best Fit"

Probability

Distributions

Extrapolation

Precision/Accuracy

Logarithms

Regression

Uncertainty

Causality

Lurking Variables

Significance Tests

Bias

Bayesian Statistics

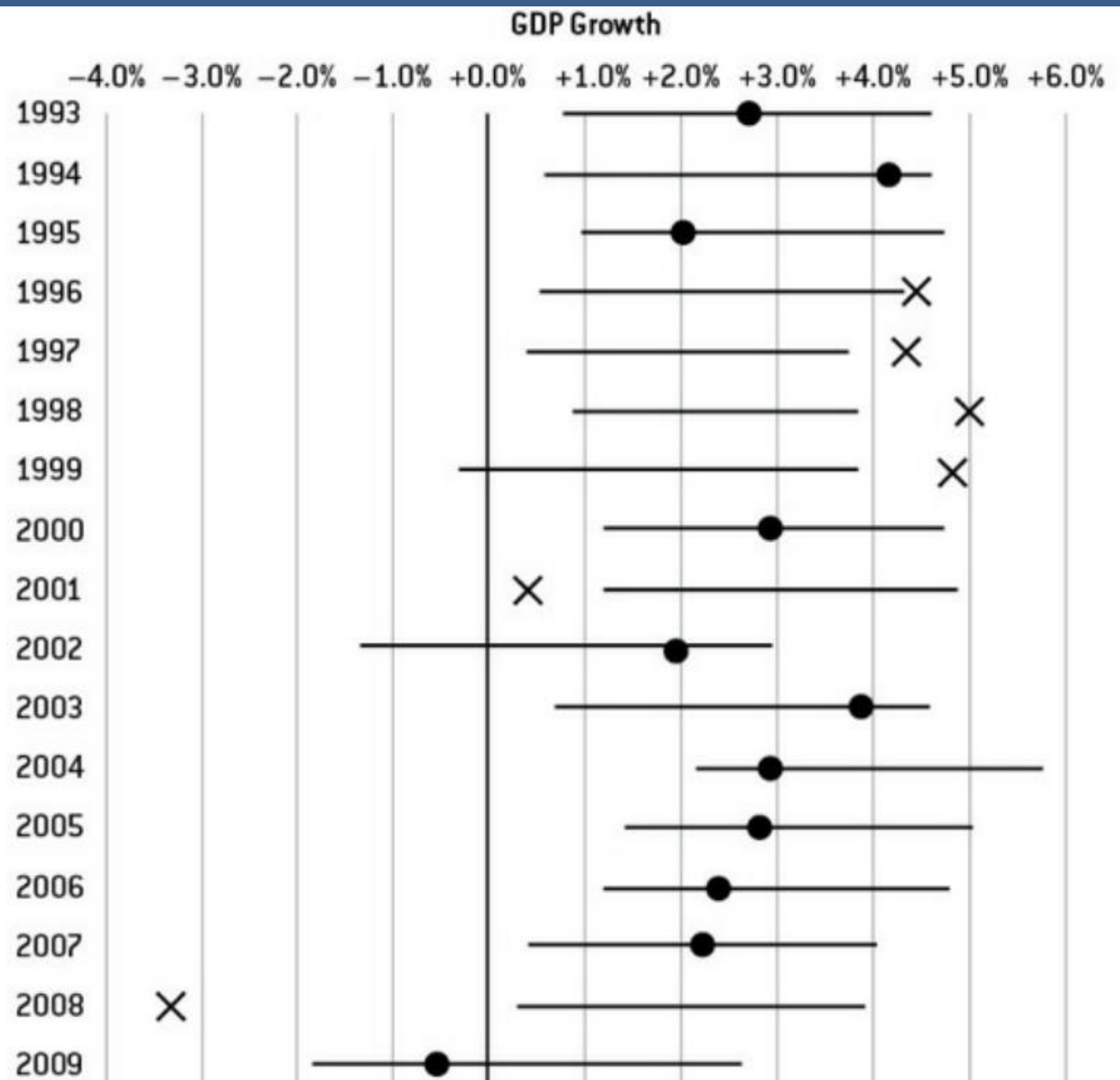
What We Did... Initially

Typical homework

+

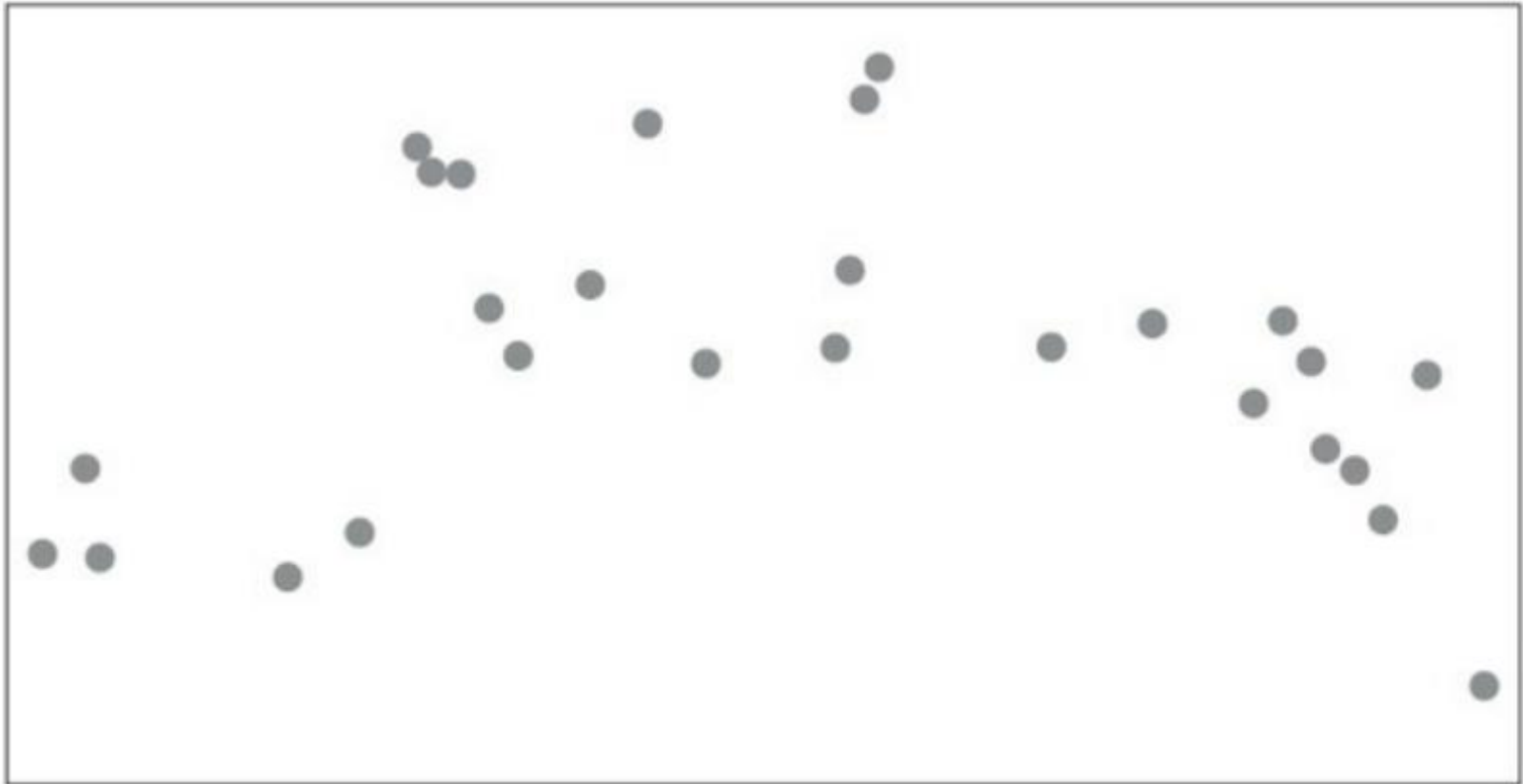
Selected Readings from S&N

S&N Confidence Intervals



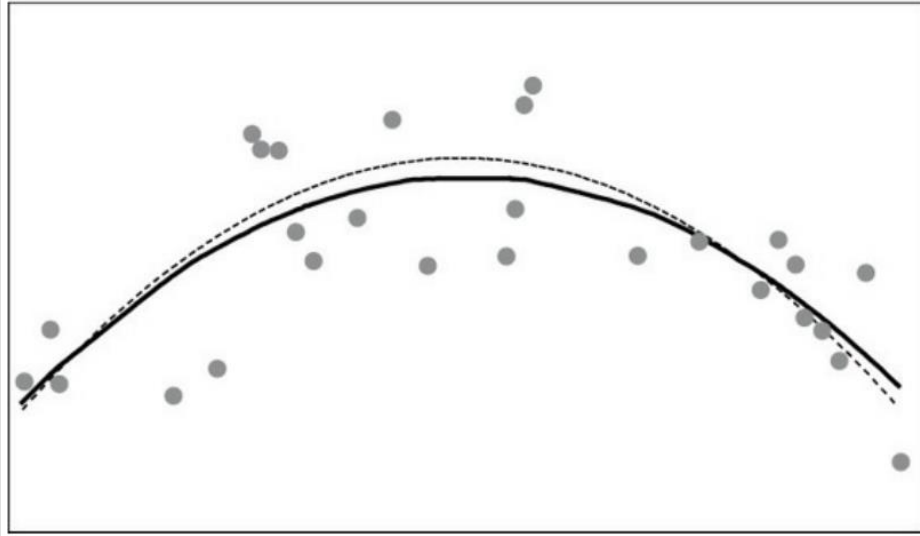
S&N – Modeling Data

FIGURE 5-6A: LIMITED SAMPLE OF DATA

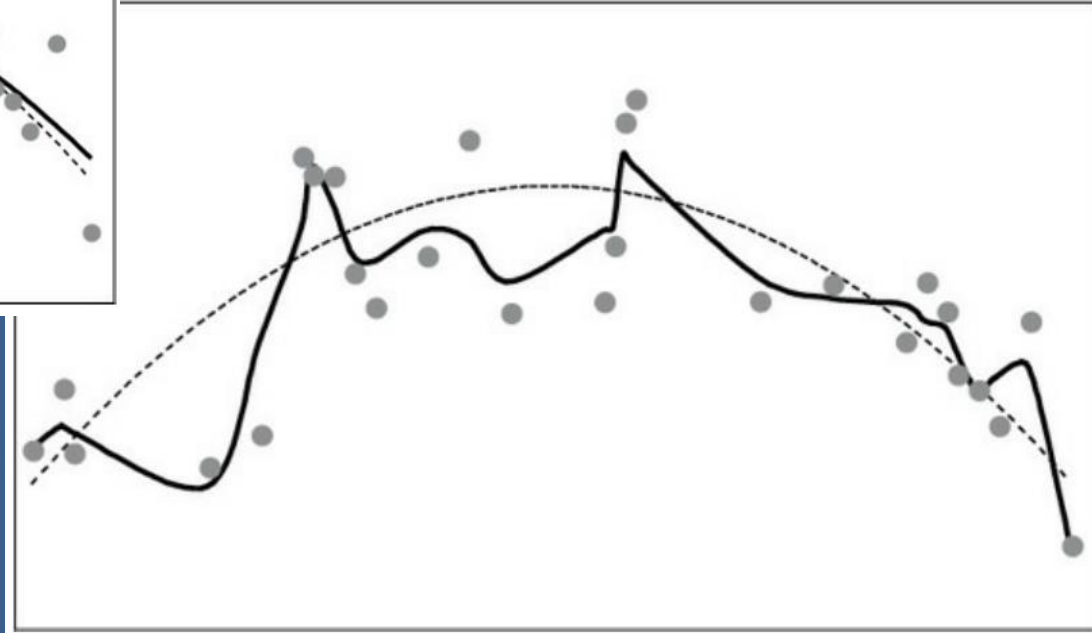


S&N – “Best” Fits

FIGURE 5-6B: WELL-FIT MODEL



6C: OVERFIT MODEL



Best of Intentions

Recession

Earthquakes and Floods

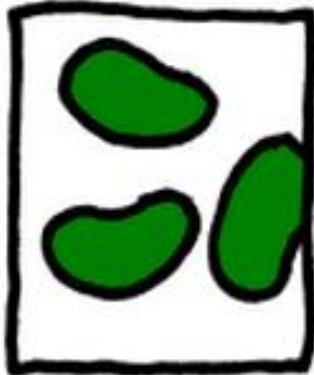
Elections

NEWS

GREEN JELLY
BEANS LINKED
TO ACNE!

95% CONFIDENCE

ONLY 5% CHANCE
OF COINCIDENCE!

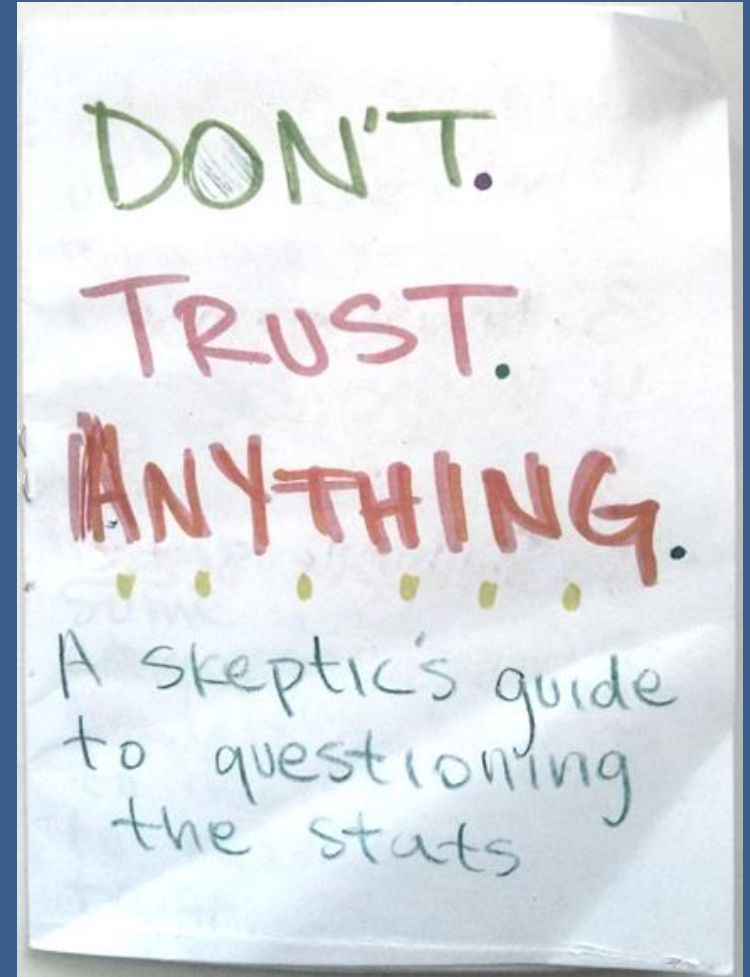


SCIENTISTS...

Promote
Literacy

Getting In

1. Encourage cynicism
2. Enable doubters
3. Emulate Peer Reviewers



Capturing Illiteracy



SHARK AFTER DARK LIVE

2008

2010

2012

SHARK
WEEK

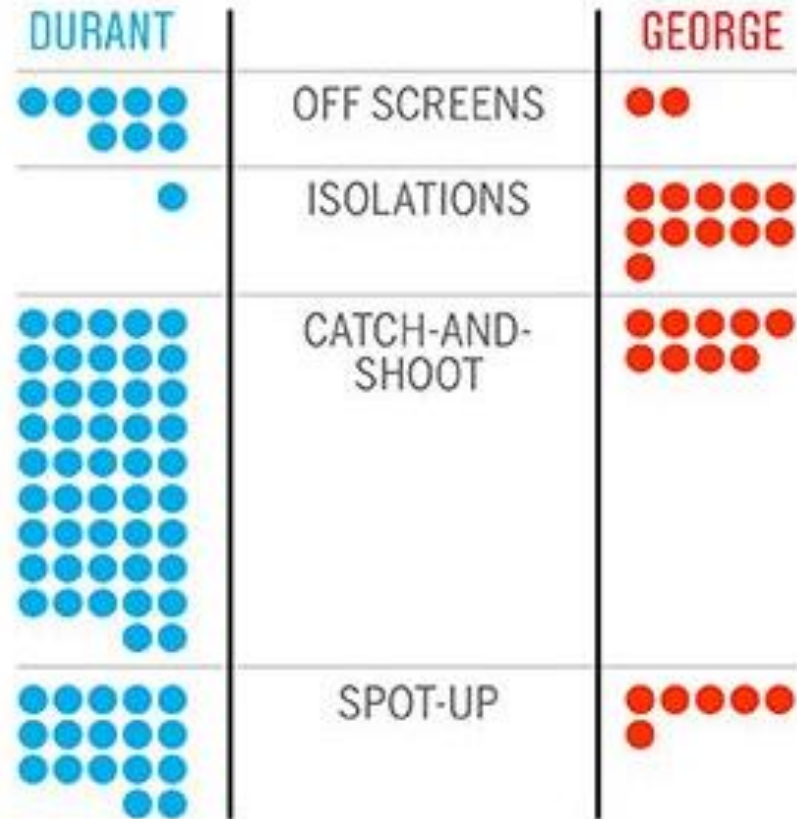


Statistical Illiteracy

At best: *Misguided*

PAUL GEORGE VS. KEVIN DURANT

NBA RANK IN PPP BY PLAY TYPE
MINIMUM 100 POSSESSIONS



Statistical Illiteracy

Violinists can't tell new violins from old, study shows

Mary Bowerman, USATODAY 3:03 p.m. EDT April 7, 2014

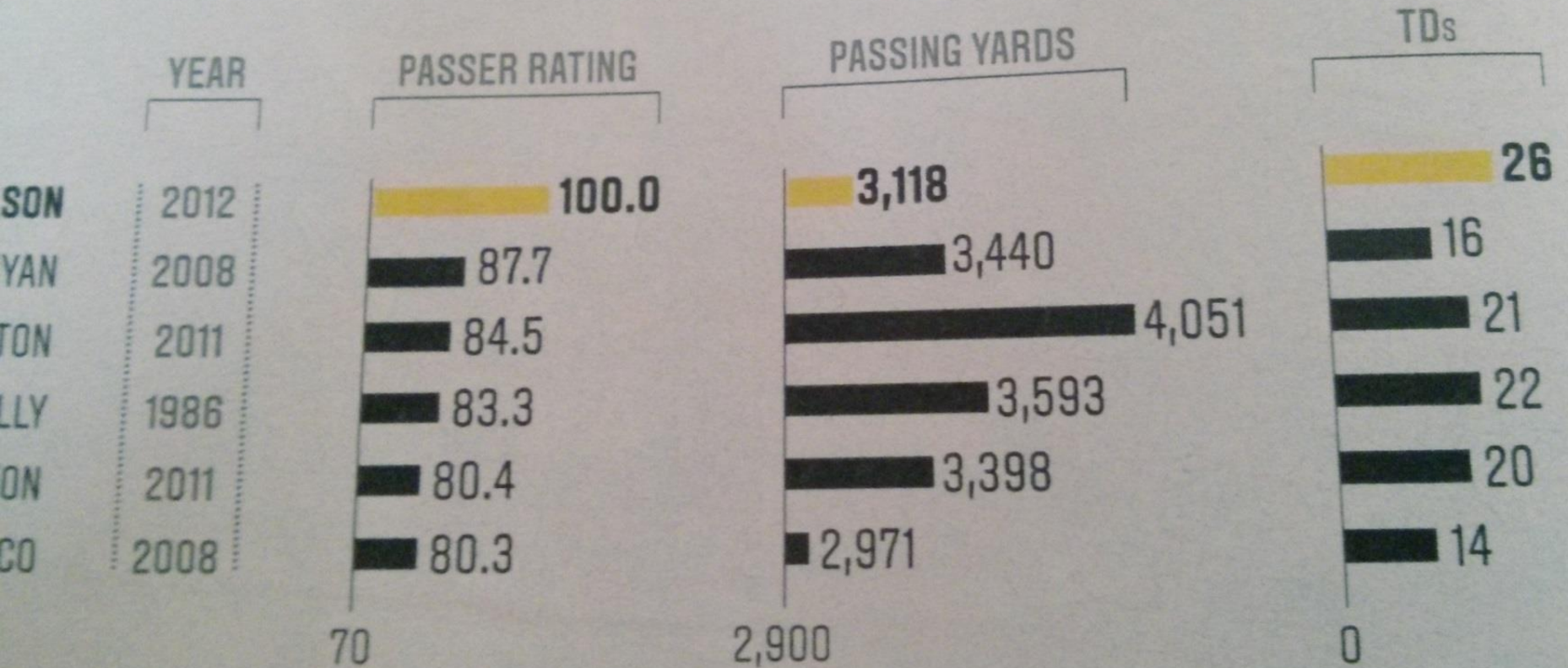


At Times:
Inflammatory

Kids who were breastfed longer have higher IQs, new study shows

BY BARBARA MANTEL

Statistical Illiteracy

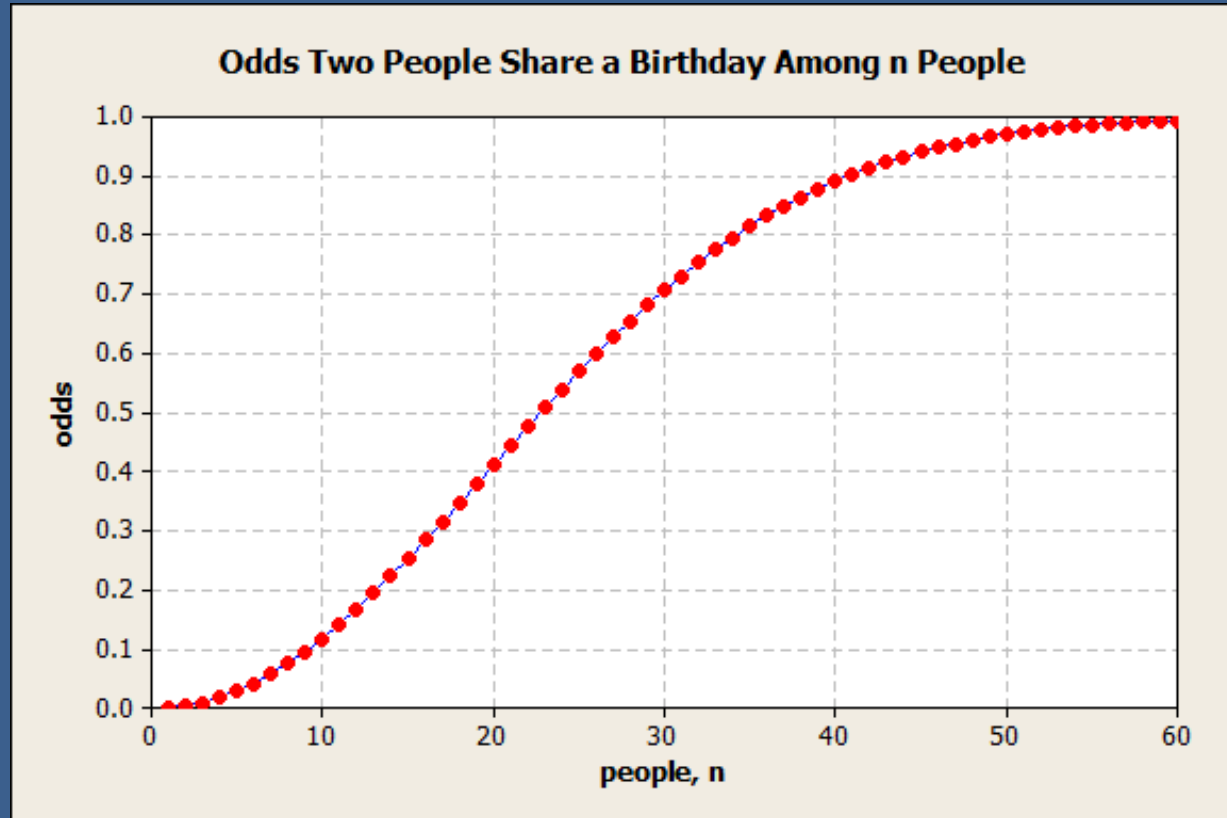




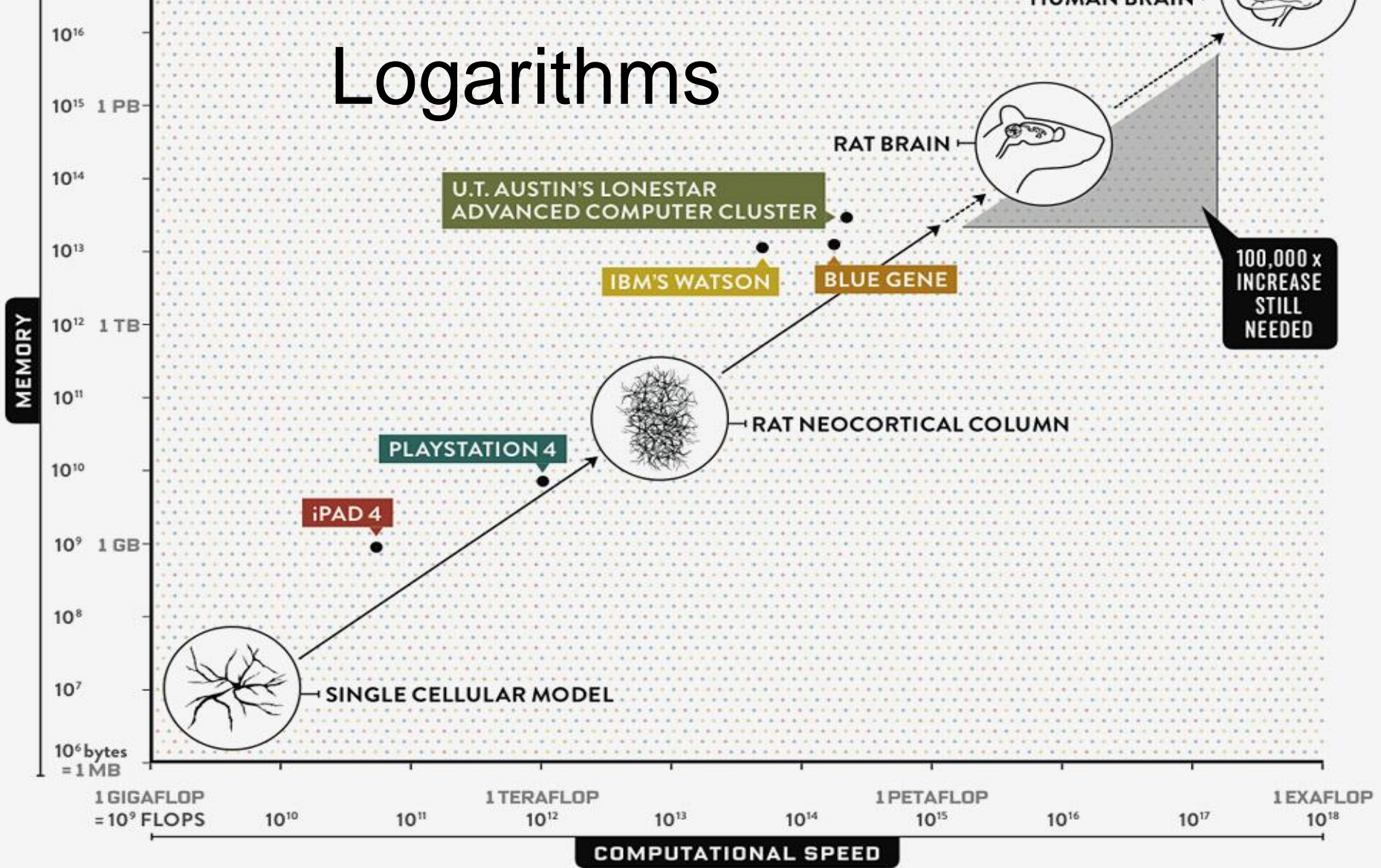
Statistical Illiteracy

At Worst:
Ethically
Irresponsible

Questioning Assumptions



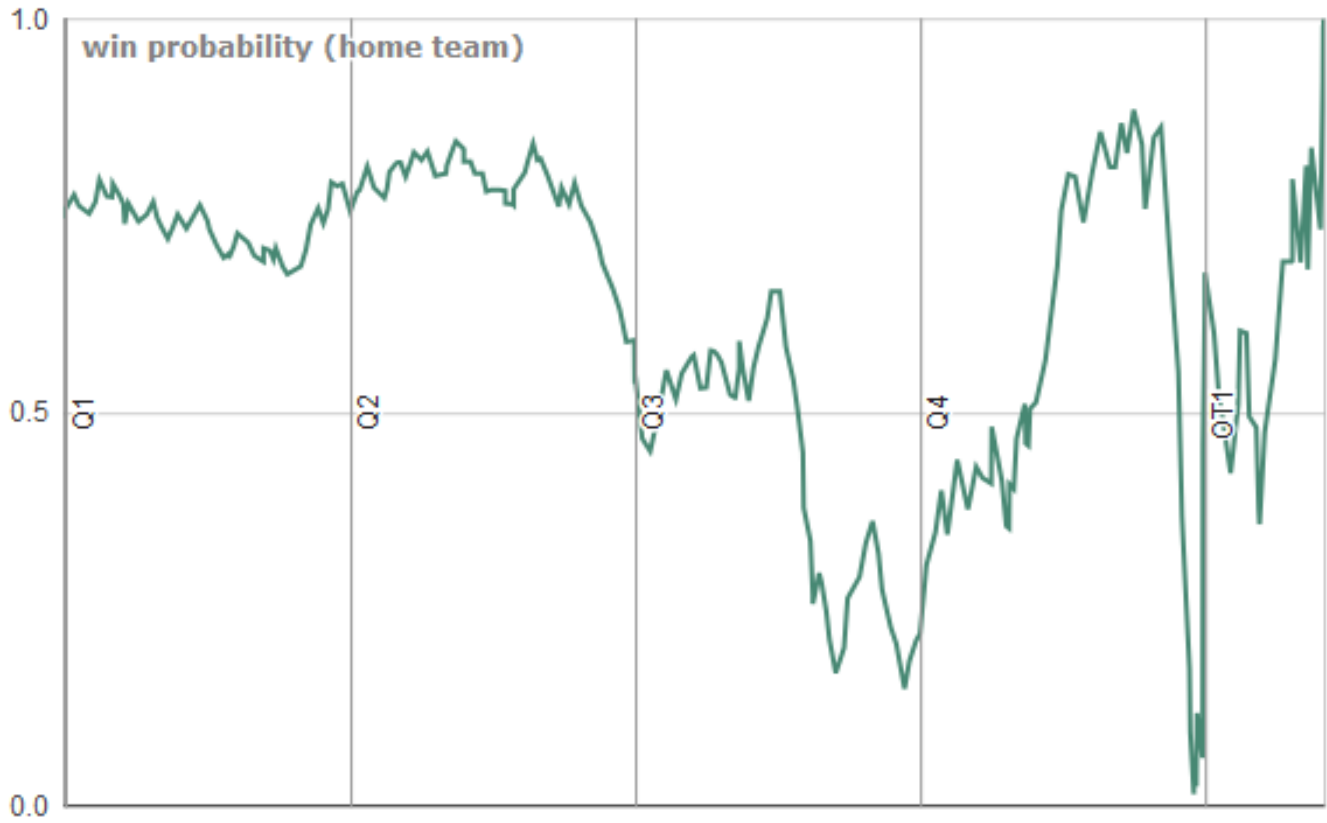
Logarithms



Probability

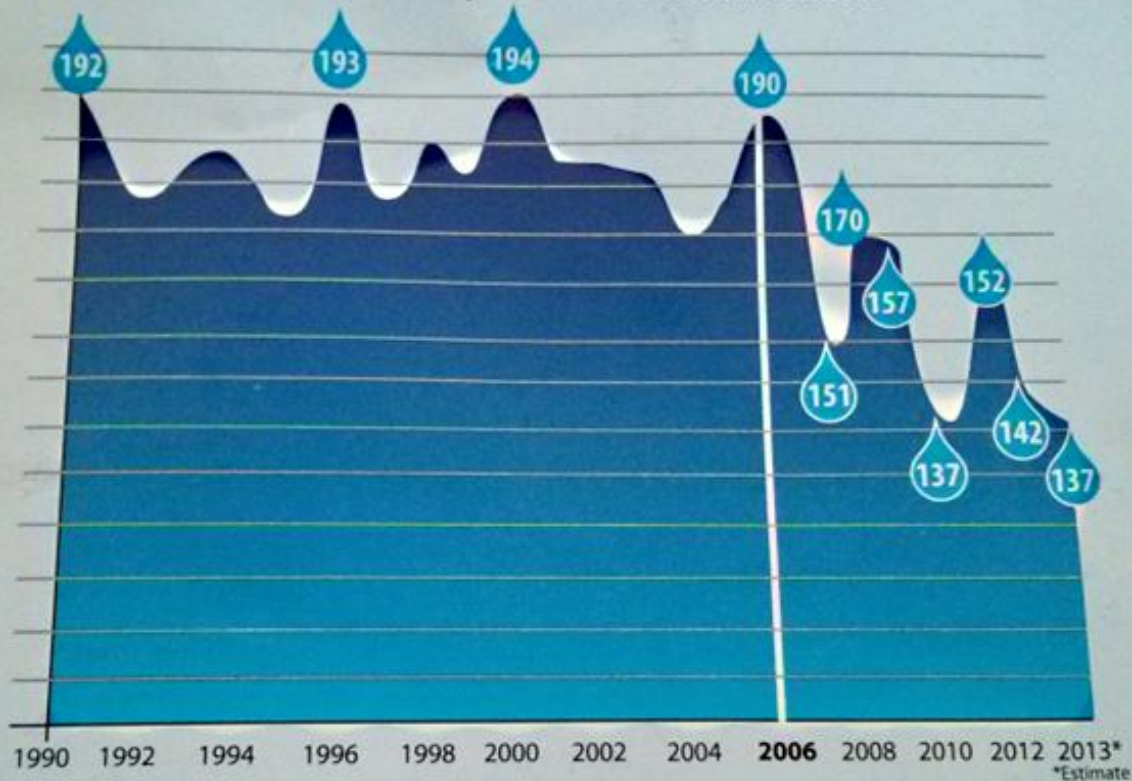
San Antonio Spurs	100
Miami Heat	103

Excitement	8.9
Comeback	66



Gallons Per Capita Per Day

Gallons Per Capita Per Day is down 13% since Fiscal Year 2006



Thank you Austin

Austin has a goal of reaching **140 gallons used per person per day by 2020**. The numbers in the water drops above represent gallons per capita per day (GPCD). Implementation of rigorous conservation efforts and strong citizen response have resulted in the GPCD dropping.

Averaging
and Rates

Extrapolation

..... *the*

SPORTS GENE

.....

.....

INSIDE THE SCIENCE OF
EXTRAORDINARY
ATHLETIC PERFORMANCE

.....

DAVID EPSTEIN

SENIOR WRITER, SPORTS ILLUSTRATED

.....



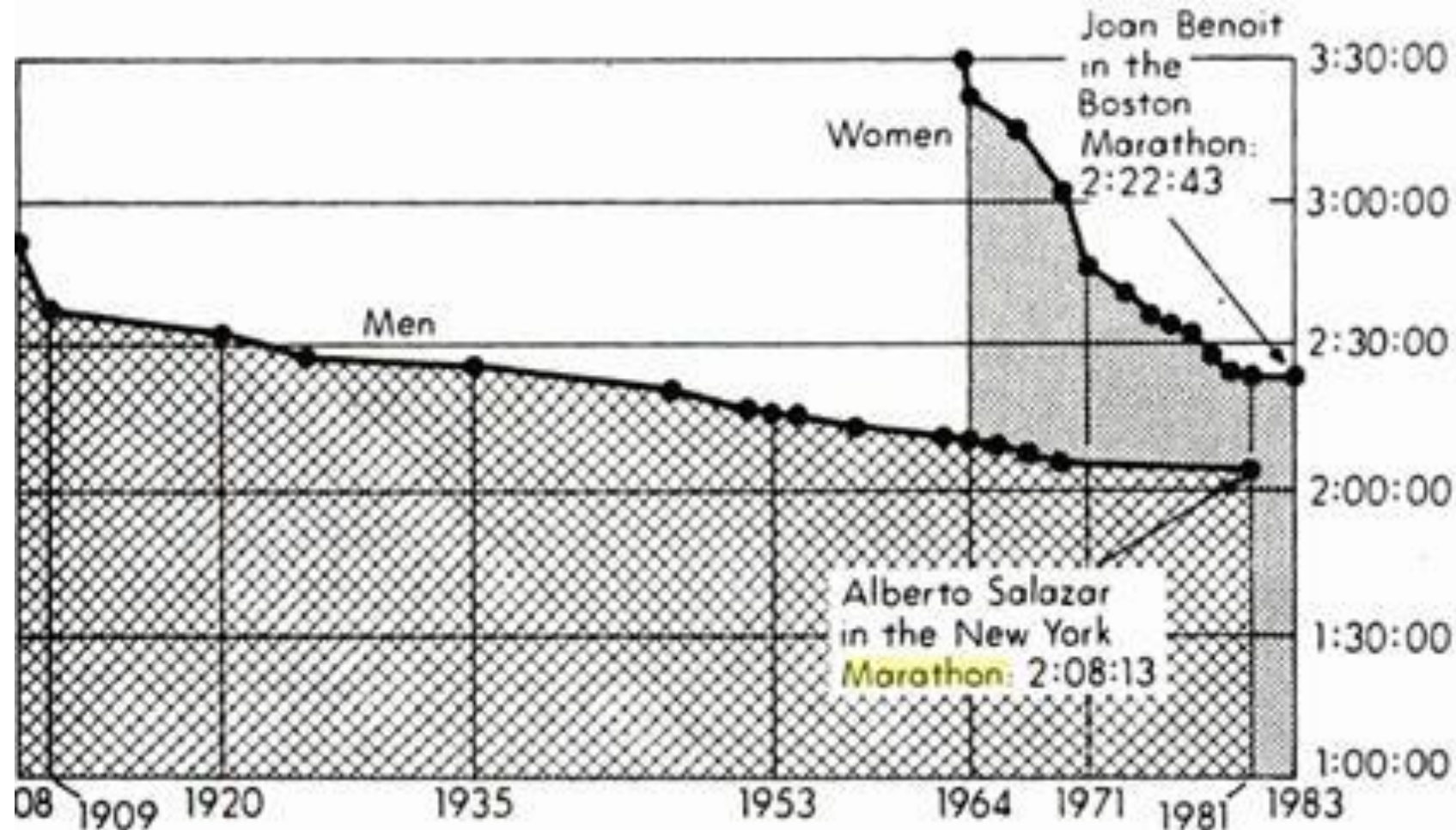


FIGURE 7.1

History of the World Record in the **Marathon**

NOTE: Jane Gross, "Women Athletes Topple Sports Myths," *New York Times*, 12 Aug. 1984, p. 22E. Reprinted by permission of the Amateur Athletic Union of USA. The **marathon** is 26 miles, 385 yards long. Finishing times are given in hours, minutes, and seconds.

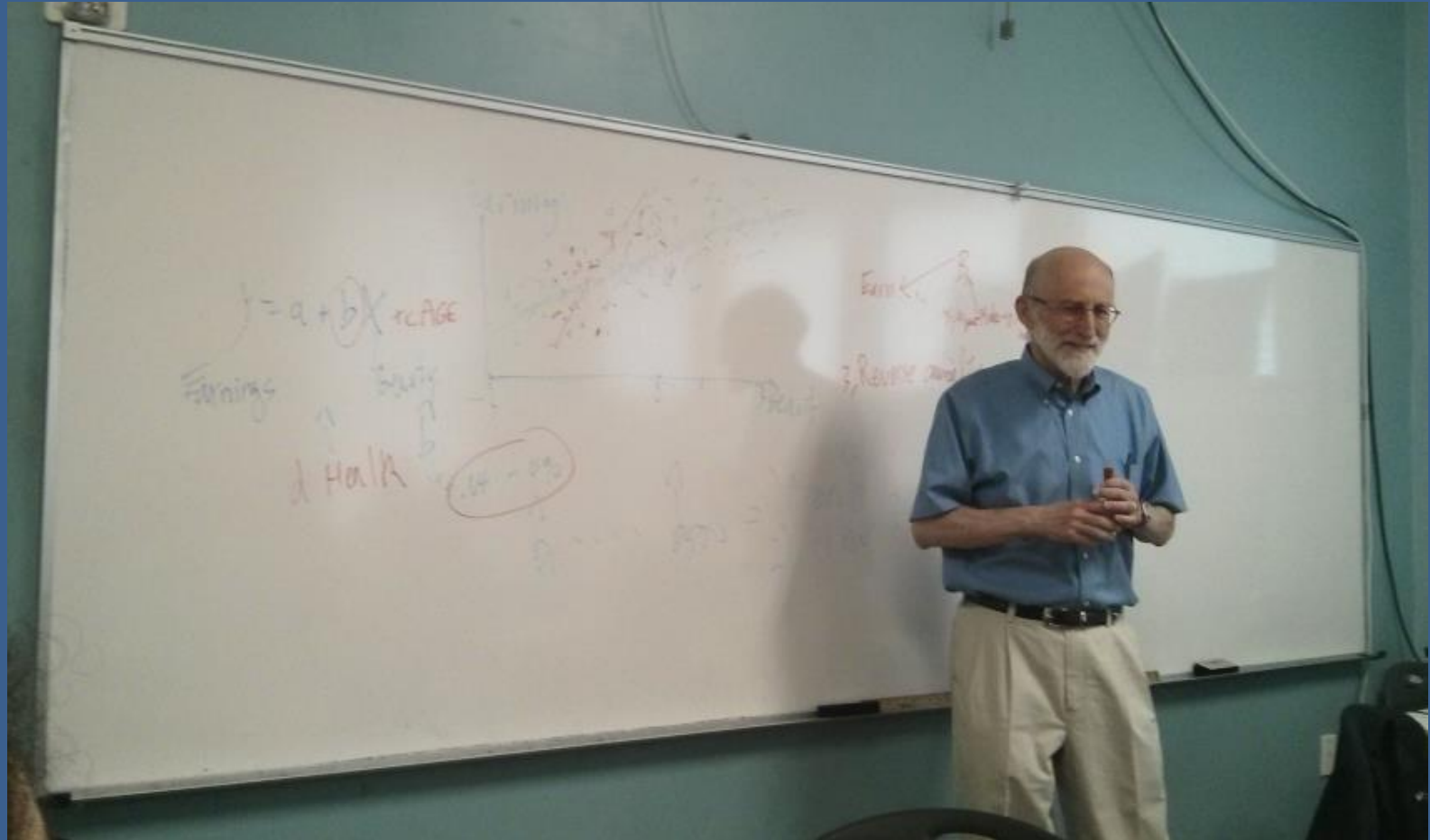
Freakonomics

Granite	Fantastic
State-of-the-Art	Spacious
Corian	!
Maple	Charming
Gourmet	Great Neighborhood

The Daily Show



Bootstrapping and Ugly People



Podcasts

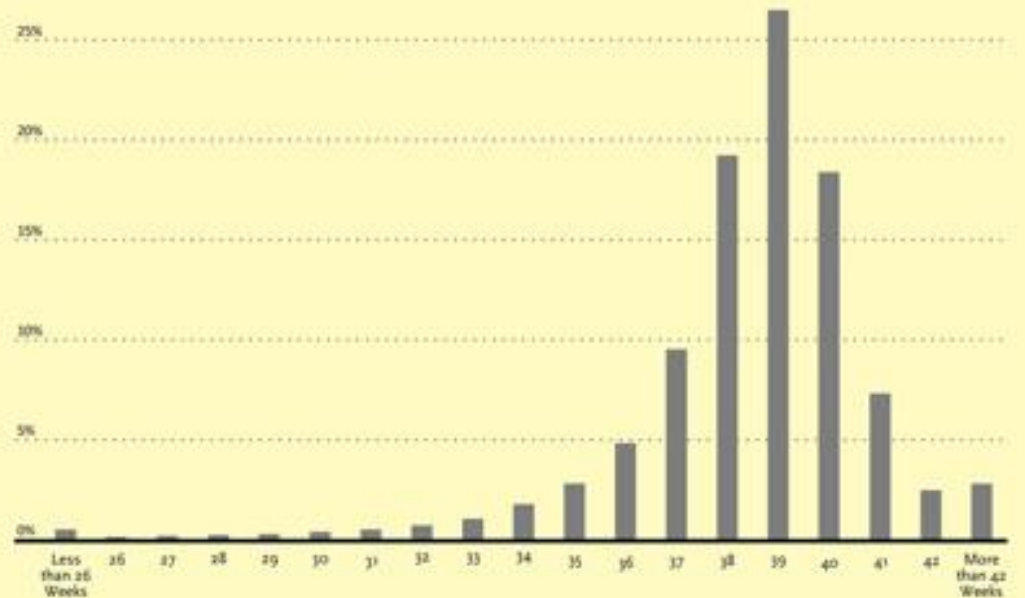
EMILY OSTER EXPECTING BETTER

Why the Conventional Pregnancy Wisdom Is Wrong—and What You Really Need to Know

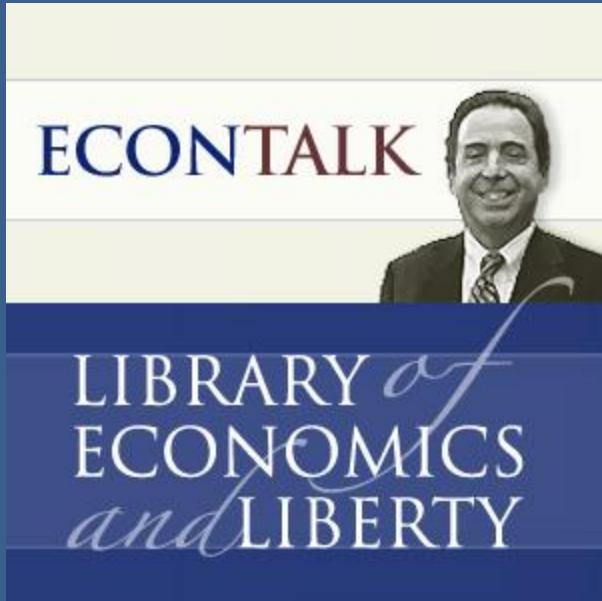
YOU ARE NOT ACTUALLY GOING TO BE PREGNANT FOREVER. MORE BABIES ARE BORN DURING THE 39TH WEEK OF PREGNANCY.

BIRTHS BY PREGNANCY WEEK

30% PERCENT OF BIRTHS OCCUR IN THIS WEEK



Podcasts



“This warming that we've seen in the last 40 years, *I would say with 95% confidence*, [...] has been caused by greenhouse gases building up.”

Podcasts

- Roberts: So, in your book, you suggest that over the next 100 years— [...] the temperature would grow in a ***range of 2.5-9 degrees*** Fahrenheit.
- Guest: Well, if you choose the range large enough it's ***easy to be confident***.

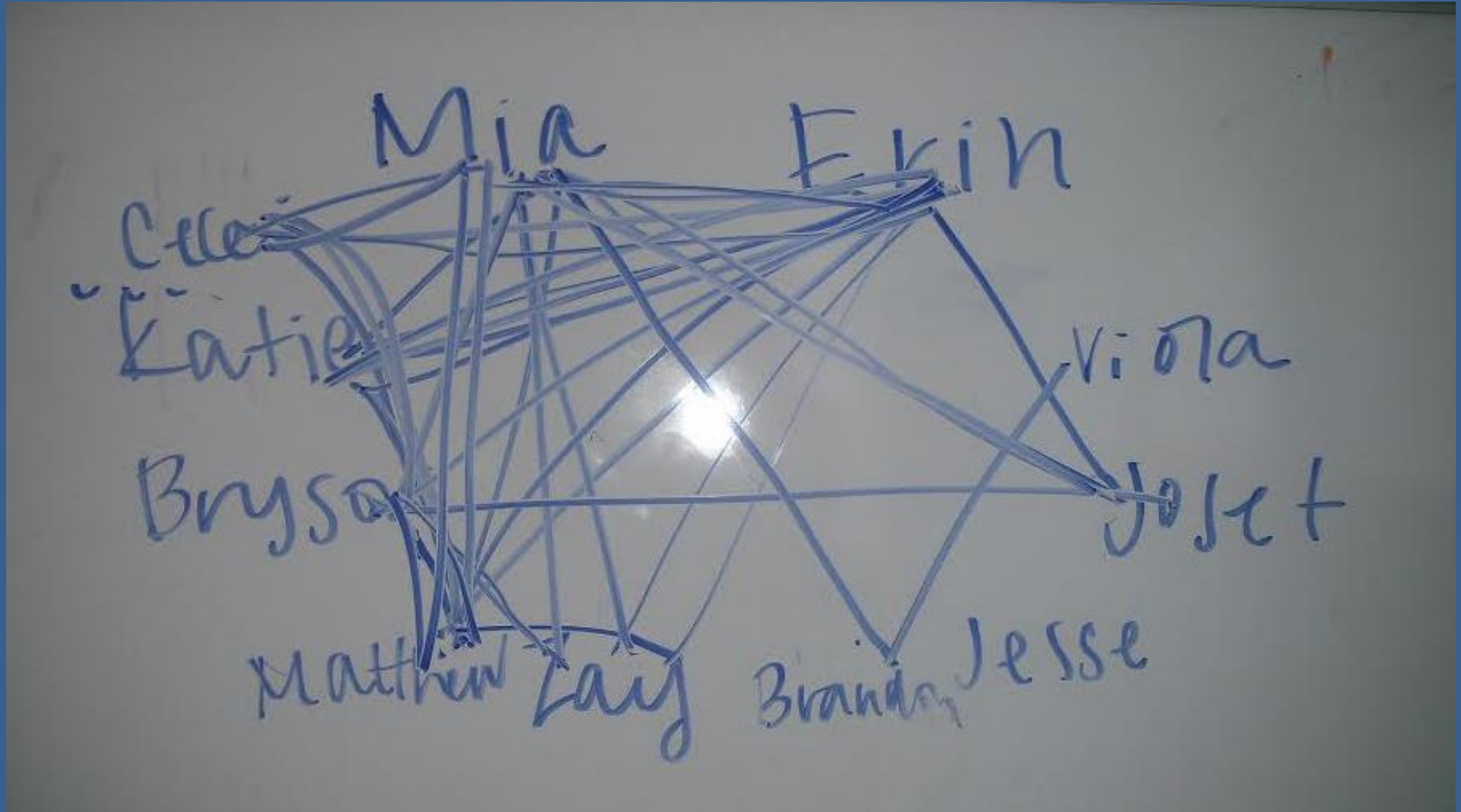
Leading Discussions

Give leading questions before reading

Let go of your ego

Let interpretations vary

Tracking Conversations



Observation to Creation

Google correlate

google.com/trends/correlate

Google Trends

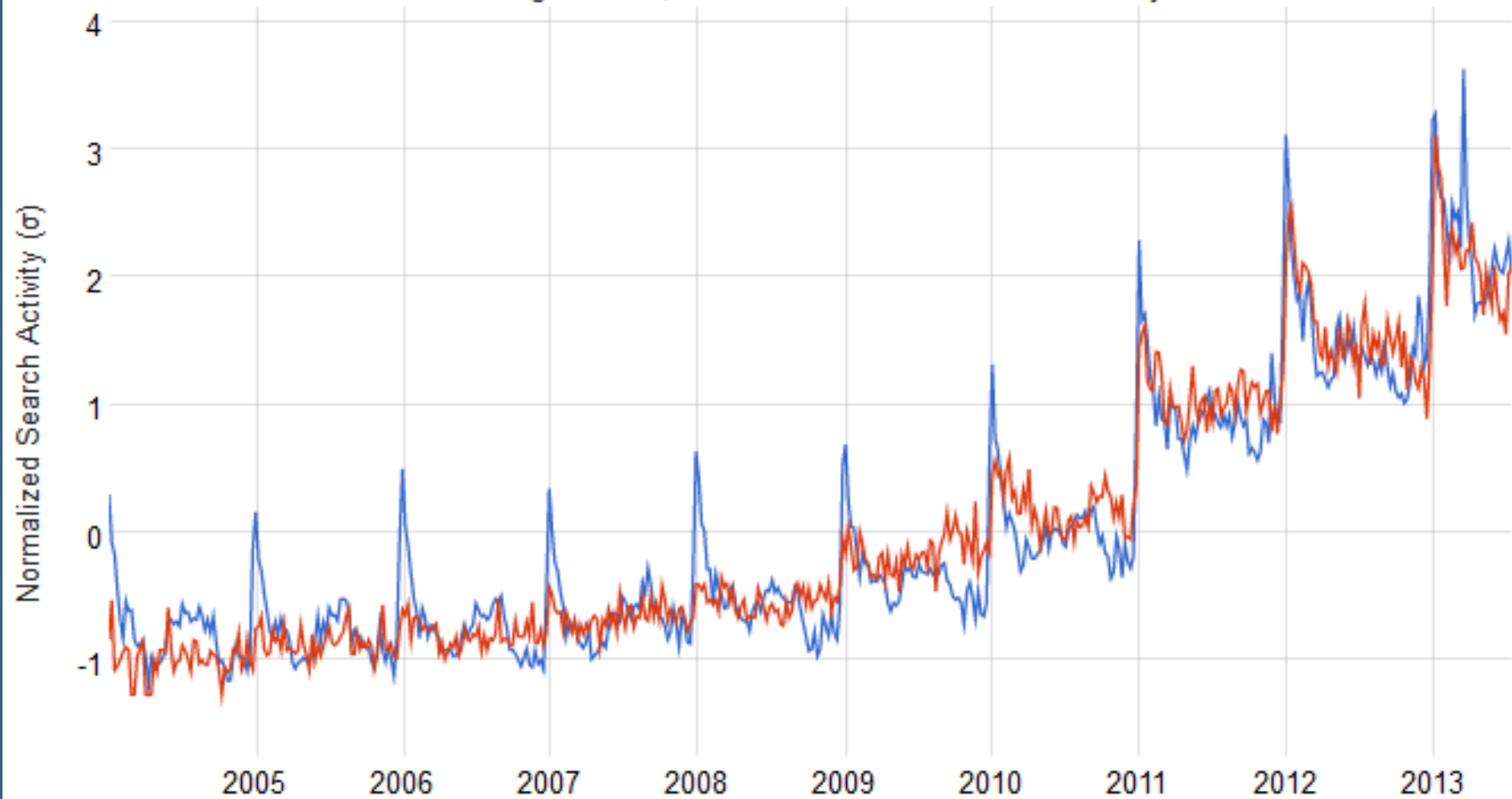
google.com/trends/

United States Web Search activity for **yoga** and **steam broccoli** ($r=0.9508$)

Line chart Scatter plot

yoga steam broccoli

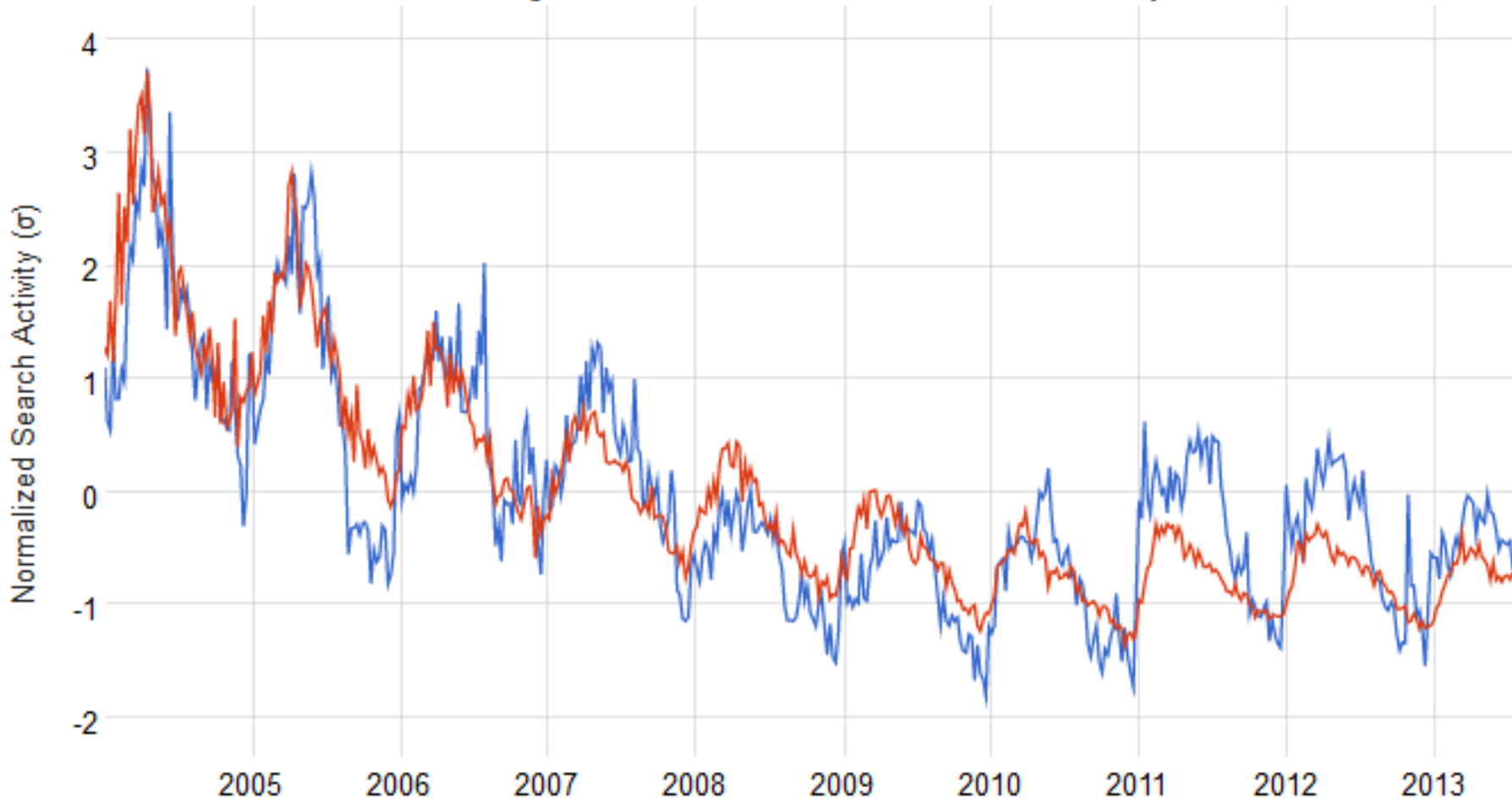
Hint: Drag to Zoom, and then correlate over that time only.



United States Web Search activity for **liposuction** and **chrome rims** ($r=0.8780$)

Line chart Scatter plot
liposuction chrome rims

Hint: Drag to Zoom, and then correlate over that time only.



Google Trends

global warming

Search term

kim kardashian

Search term

+ Add term

Interest over time ?

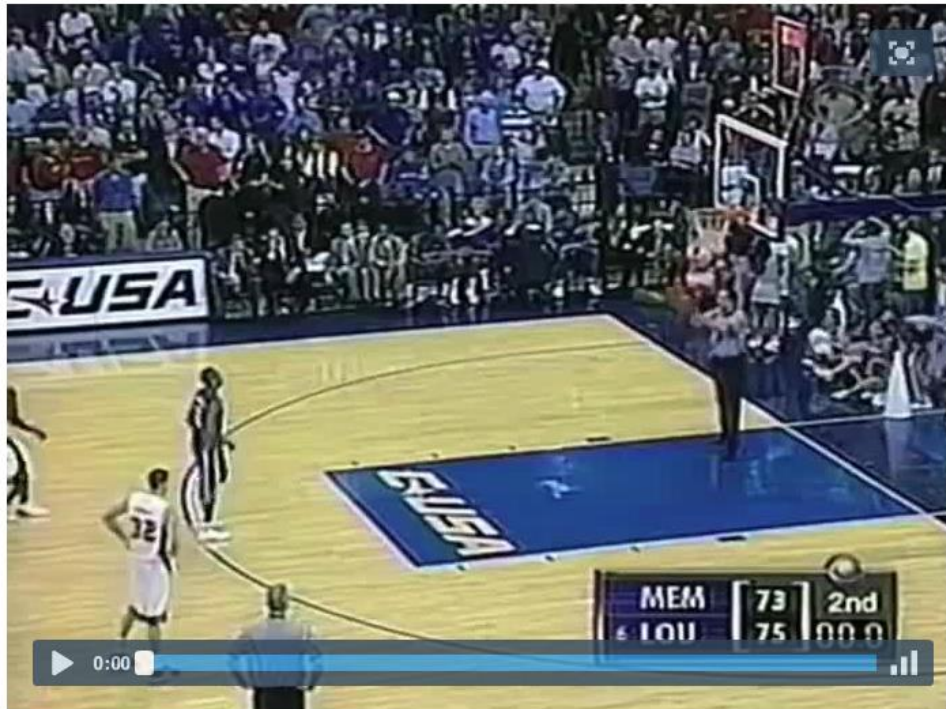
News headlines Forecast ?



Videos – Mathalicious

In the finals of the 2005 Conference USA basketball tournament, and with his team down by two points, Memphis Tigers guard Darius Washington was fouled while attempting a three-pointer at the buzzer. He missed the shot and headed to the line for three foul shots.

Watch the video of Darius preparing to take his first shot. Before he shoots, what is the probability that Memphis will win the game? Lose the game? Send it into overtime?



Recap

Share Stories

Enable Skeptics

Promote Literacy

Read These

The Signal and
the Noise

Expecting Better
Moneyball

David and Goliath
The Sports Gene

Freakonomics

The Black Swan

Fooled by

Randomness

Average is Over

Traffic

On the netz

Gapminder.org

Podcasts: EconTalk, Freakonomics,
RadioLab

Delicious.com

Fivethirtyeight.com

reddit.com/r/dataisbeautiful/