A Surprise and a Conundrum About Human Progress

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Outline

- Introduction
  - Quotes, questions, surprise, conundrum
- Possible explanations
- Data and graphs (lots!) of human progress
- **My requests**
- Class examples
- Conclusion
  - Criticisms, resources, final quote, shameless plug

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Quote 1

"How can we soundly appraise the state of the world? The answer is to *count*. … A quantitative mindset, despite its nerdy aura, is in fact the morally enlightened one, because it treats every human life as having equal value rather than privileging the people who are closest to us or most photogenic." – Steven Pinker

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Question A

- In the last 20 years, the proportion of the world population living in extreme poverty has …?
  - Almost doubled
  - Remained more or less the same
  - Almost halved

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Question B

- What percent of the world's 1-year-old children today have been vaccinated against some disease?
  - 20 percent
  - 50 percent
  - 80 percent

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Question C

- Worldwide, 30-year-old men have spent 10 years in school, on average. How many years have women of the same age spent in school, on average?
  - 9 years
  - 6 years
  - 3 years

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Quote 2

"Over the past twenty years, the proportion of the global population living in extreme poverty has halved. This is absolutely revolutionary. I consider it to be the most important change that has happened in the world in my lifetime." – Hans Rosling

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Question A

- In the last 20 years, the proportion of the world population living in extreme poverty has …?
  - Almost doubled
  - Remained more or less the same
  - ***Almost halved***

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Question B

- What percent of the world's 1-year-old children today have been vaccinated against some disease?
  - 20 percent
  - 50 percent
  - ***80 percent***

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Question C

- Worldwide, 30-year-old men have spent 10 years in school, on average. How many years have women of the same age spent in school, on average?
  - *9 years*
  - 6 years
  - 3 years

Quote 3: Surprise

"Here is a shocker: *The world has made spectacular progress in every single measure of human well-being.*
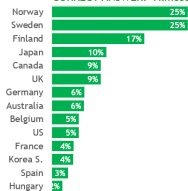

Quote 3: Surprise and conundrum

"Here is a shocker: *The world has made spectacular progress in every single measure of human well-being.*

Here is a second shocker: *Almost no one knows about it.*" – Pinker

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Question A (poverty)

CORRECT ANSWER: *"Almost halved"*

Norway	25%
Sweden	25%
Finland	17%
Japan	10%
Canada	9%
UK	9%
Germany	6%
Australia	6%
Belgium	5%
US	5%
France	4%
Korea S.	4%
Spain	3%
Hungary	2%

Question A (poverty)

CORRECT ANSWER: *"Almost halved"*

Norway	25%
Sweden	25%
Finland	17%
Japan	10%
Canada	9%
UK	9%
Germany	6%
Australia	6%
Belgium	5%
US	5%
France	4%
Korea S.	4%
Spain	3%
Hungary	9% (Average)
Chimps	33%
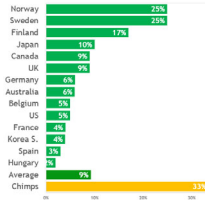
Question B (vaccinations)

CORRECT ANSWER: *"80 percent"*

Sweden	21%
Norway	18%
US	17%
Korea S.	16%
UK	15%
Canada	15%
Australia	14%
Belgium	13%
Hungary	13%
Spain	13%
Finland	12%
France	6%
Germany	6%
Japan	6%
Average	13%
Chimps	33%
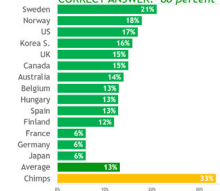
Question C (schooling)

CORRECT ANSWER: *"9 years"*

Korea S.	32%
Hungary	32%
US	26%
Australia	25%
Germany	25%
Japan	21%
Canada	20%
UK	19%
Sweden	18%
France	18%
Spain	13%
Belgium	13%
Finland	10%
Norway	8%
Average	20%
Chimps	33%
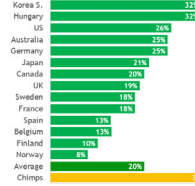
Worse than ignorance

Share of humans with different scores

80% scored worse than chimps

10% scored better than chimps

Number of correct answers

Sources: Novus and Ipsos MORI. See: gapm.io/gms17m

Inspirations for this talk

STEVEN PINKER — ENLIGHTENMENT NOW — THE CASE FOR REASON, SCIENCE, HUMANISM, AND PROGRESS

FACTFULNESS — Hans Rosling with Ola Rosling and Anna Rosling Rönnlund
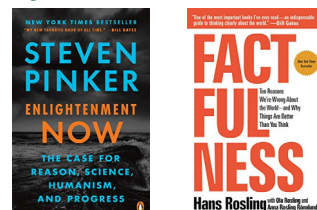
Perception: World is getting worse
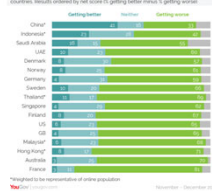
Crime rate: Perception vs. actual
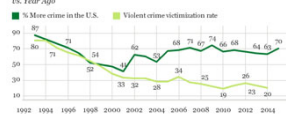
Gun murder rate: perception

Gun murder rate: actual

Intergenerational income mobility

Cheng and Wen (2019, *PNAS*)

Intergenerational income mobility
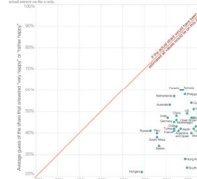

Cheng and Wen (2019, *PNAS*)

Explanations for conundrum (Pinker)

- Optimism gap
- Nature of news
- Negativity bias
  - "Negative news elicits stronger and more sustained reactions than positive news." – Soroka and McAdams (2015)
- Availability bias

Perceived happiness of others

Sentiment analysis of news (Leetaru)

Sentiment analysis of news (Leetaru)
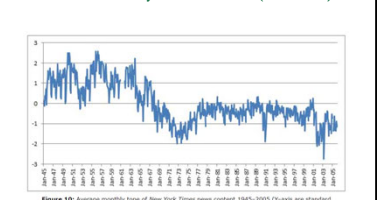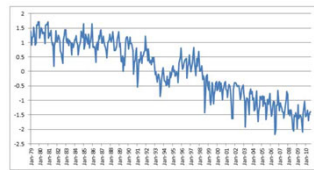

Figure 11: Average monthly tone of *Summary of World Broadcasts* news content, January 1979–July 2010 (Y-axis are standard deviations from mean).

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Question D

- Are there more English words with the letter K as the first letter or with the letter K as the third letter?
  - ❑ First letter
  - ❑ Third letter

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Question D

- Are there more English words with the letter K as the first letter or with the letter K as the third letter?
  - ❑ First letter
  - ❑ *Third letter* (three times as many)

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Availability heuristic/bias

- A mental shortcut that relies on "the ease with which relevant instances come to mind"
  (Tversky and Kahneman, 1973)
- Combines with nature of news and negativity bias

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Explanations for conundrum (Rosling)

The dramatic attention filter

Factfulness starts by realizing that we don't see reality as it is. We all have a built-in attention filter protecting us against information overload. But the filter is highly selective and we end up processing mainly dramatic information.

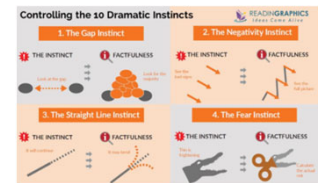From everything that happens   the attention filter   selects the most dramatic.
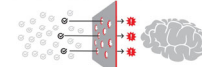
makes the world look more dramatic than it is
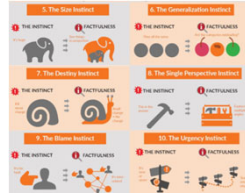
www.gapminder.org/factfulness

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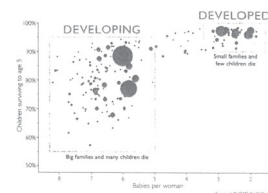
Explanations for conundrum (Rosling)

Controlling the 10 Dramatic Instincts   READINGRAPHICS

| 1. The Gap Instinct | 2. The Negativity Instinct |
| 3. The Straight Line Instinct | 4. The Fear Instinct |

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Explanations for conundrum (Rosling)

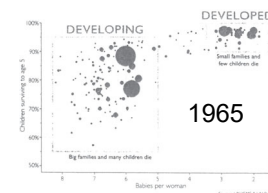| 5. The Size Instinct | 6. The Generalization Instinct |
| 7. The Destiny Instinct | 8. The Single Perspective Instinct |
| 9. The Blame Instinct | 10. The Urgency Instinct |

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Gap instinct

DEVELOPING   DEVELOPED
Small families and few children die
Big families and many children die
Babies per woman

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Gap instinct
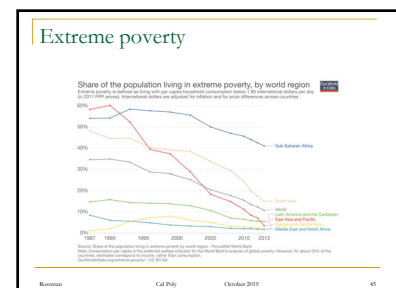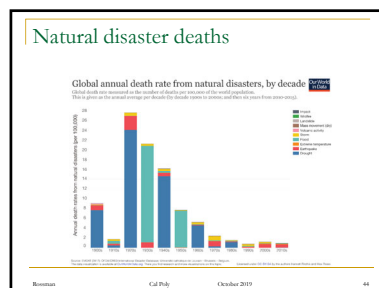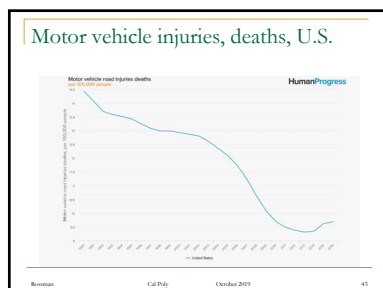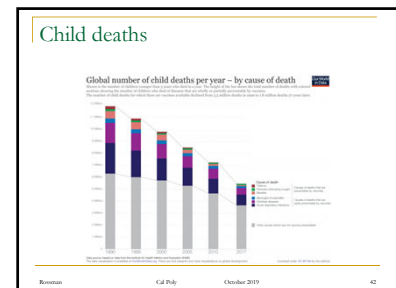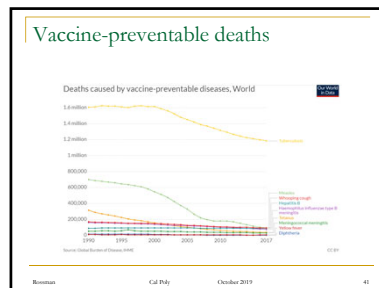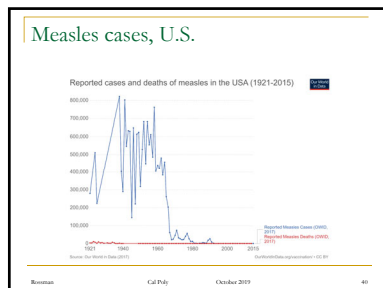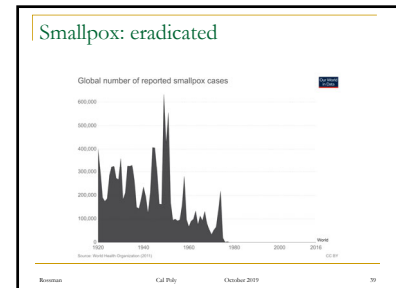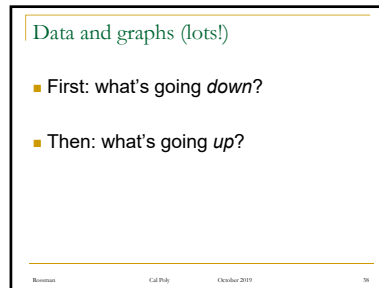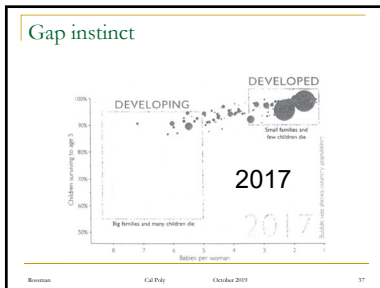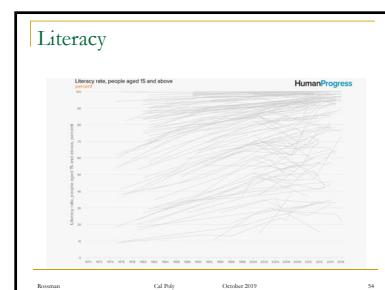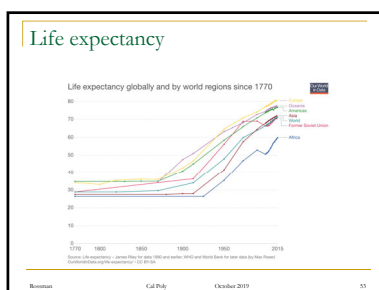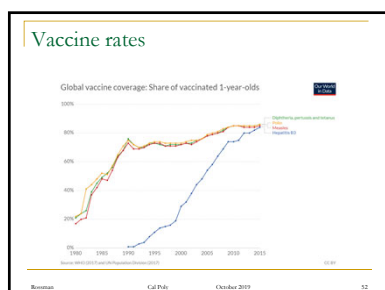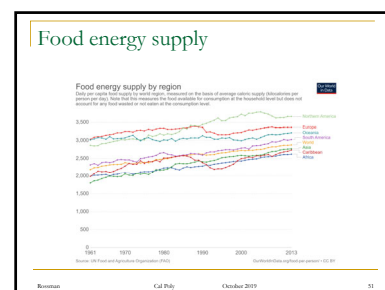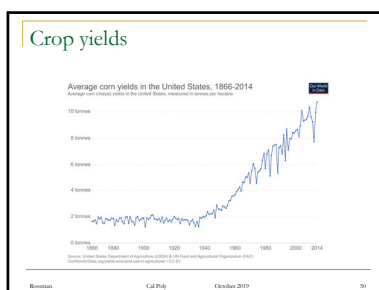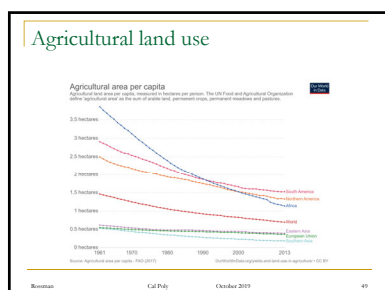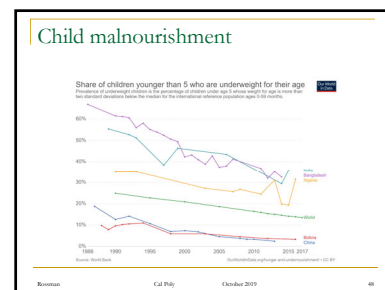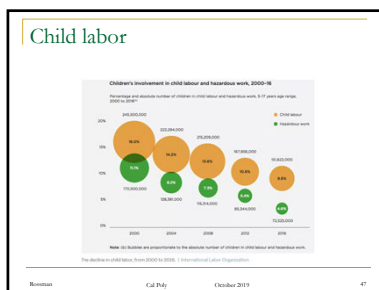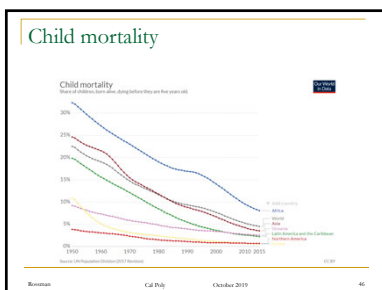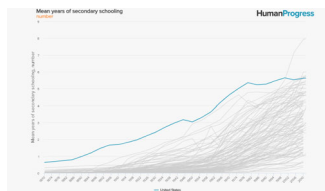
DEVELOPING   DEVELOPED
Small families and few children die

1965

Big families and many children die
Babies per woman

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Gap instinct

2017

Data and graphs (lots!)

- First: what's going *down*?

- Then: what's going *up*?

Smallpox: eradicated

Measles cases, U.S.

Vaccine-preventable deaths

Child deaths

Motor vehicle injuries, deaths, U.S.

Natural disaster deaths

Extreme poverty

Child mortality

Child labor

Child malnourishment

Agricultural land use

Crop yields

Food energy supply

Vaccine rates

Life expectancy

Literacy

Secondary schooling

Democracy vs. autocracy
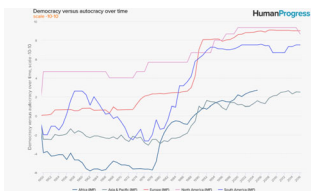
Inter-racial marriage, U.S.
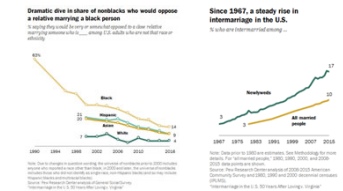
Please forgive a prideful side comment

- Statistics and statisticians deserve some of the credit for these advances
  - Public health
  - Agriculture
- Old-fashioned, 20th-century statistics
  - Experimental design
  - Clinical trials
  - Statistical inference

My requests

- Teachers: Use data, examples, activities, and assignments that make students aware of human progress.

- Students: Make yourselves aware of human progress, and share your knowledge with peers.

Example 1: Health vs. wealth

Students watch Rosling's video on "200 countries, 200 years in 4 minutes"

https://www.youtube.com/watch?v=jbkSRLYSojo

Example 1: Health vs. wealth

Example 1: Health vs. wealth

- Identify the observational units in this graph.
- Identify all of the variables in this graph.
- Classify each variable as categorical or numerical.
- Describe the association between income per person and life expectancy.
- Describe what the graph reveals about any relationship between regions of the world and health/wealth.

Example 2: Life expectancy in …

- Describe what this graph reveals.
- Make an educated guess for the country.

Example 2: Life expectancy in …

Life expectancy in South Africa (1960-2016)
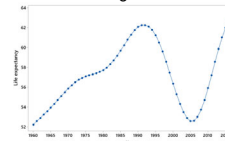
- Explain what happened in the 1990s.

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Example 3: CO₂ emissions

- Energy-related CO_2 emissions (in millions of metric tons) in the U.S. from 1990-2005

- Source: https://www.eia.gov/environment/emissions/carbon/

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Example 3: CO₂ emissions

- Describe what graph reveals.
- Determine least squares line.

CO2 emissions = - 134931 + 70.32 year

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Example 3: CO₂ emissions

- Interpret the slope coefficient of the line.
- Use the line to predict CO_2 emissions for the year 2016.

Predicted CO_2 emissions in year 2016
= -134,931 + 70.32×2016 ≈ 6834 mmt

Actual CO_2 emissions in year 2016: 5170 mmt

- Determine percentage error of the prediction
(6834 – 5170) / 5170 × 100% ≈ 32.2%

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Example 3: CO₂ emissions

- What went wrong??
Beware of extrapolation

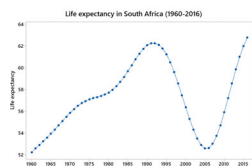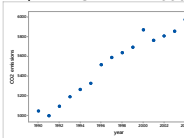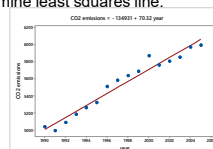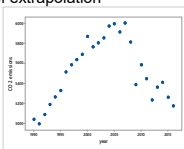Rossman   Cal Poly   October 2019   68

Example 4: Global poverty question

Data from a recent class of mine (n = 83)
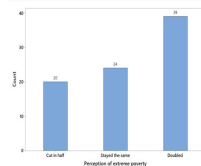
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Example 4: Global poverty question

- Do the sample data provide strong evidence that less than one-third of all students at the university would answer correctly (i.e., that students do worse than chimpanzees would)?

- Simulation-based inference

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Example 4: Global poverty question
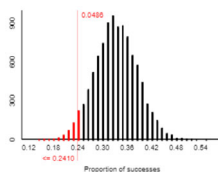
- Moderately strong evidence (p-value ≈ .0486) that less than one-third would answer correctly

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Example 5: Global poverty question

- U.S. survey: 5% of 1005 answered correctly
- Do the sample data provide strong evidence that less than one-third of all Americans would answer correctly?
- Test statistic: $z = \frac{.05 - .3333}{\sqrt{\frac{.3333 \times .6667}{1005}}} \approx -19.1$ (!!!)
- Overwhelming evidence that Americans do worse than random guessing on this question

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Example 6: Global poverty question

- U.S. survey: 59% of 1005 answered "doubled"
- Estimate the proportion of all U.S. adults who would answer "doubled" with 95% confidence
  .59 ± .030: (.560, .620)
- Interpret this interval.
  - We are 95% confident that between 56% and 62% of all U.S. adults would give the most wrong answer to this question.

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Disclaimer

I also believe that:
- Enormous progress remains to be made.
- Teachers should also present data, examples, activities, and assignments that expose problems and inequities.
  - Students can be motivated to address societal challenges by such exposure.

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Criticisms

FEATURES ▸ MARCH 27, 2019
Why You Shouldn't Listen to Self-Serving Optimists Like Hans Rosling and Steven Pinker
There's a reason Bill Gates loves Pinker and Rosling—their analyses obscure inequality.
BY ROLAND PAULSEN
- inthesetimes.com

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Criticisms

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Why Do People Love to Hate Steven Pinker?
By proclaiming the gospel of human progress, the Harvard psychologist has made a lot of enemies.
- *The Chronicle Review*

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Household income (inflation-adjusted)

Figure 2.
Real Median Household Income by Race and Hispanic Origin: 1967 to 2018

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For more information

- Steven Pinker, *Enlightenment Now*
- Hans Rosling, *Factfulness*
- www.gapminder.org
- ourworldindata.org
- humanprogress.org

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Quote 4

"If you could choose a moment in history to be born, and you didn't know ahead of time who you were going to be, you'd choose *now*. Because the world has never been less violent, healthier, better educated, more tolerant, with more opportunity for more people, and more connected than it is today."

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Quote 4

"If you could choose a moment in history to be born, and you didn't know ahead of time who you were going to be, you'd choose *now*. Because the world has never been less violent, healthier, better educated, more tolerant, with more opportunity for more people, and more connected than it is today."
– President Barack Obama, July 20, 2016

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Thanks!

- Shameless plug for my blog about teaching introductory statistics: askgoodquestions.blog
  - These slides can be found there under "Presentations"
- Contact me with questions and comments: arossman@calpoly.edu

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