# Change in mathematical thinking

- Changes in work, technology, commerce and social life.

- Pattern: Data is more prevalent in all aspects of life than ever before. We collect more and use it more than ever.

  - Individual level example: running biomechanical data
  - Work level example: standardized testing
 - Commerce and social life: spending trends, browsing trends

Intersection with technology
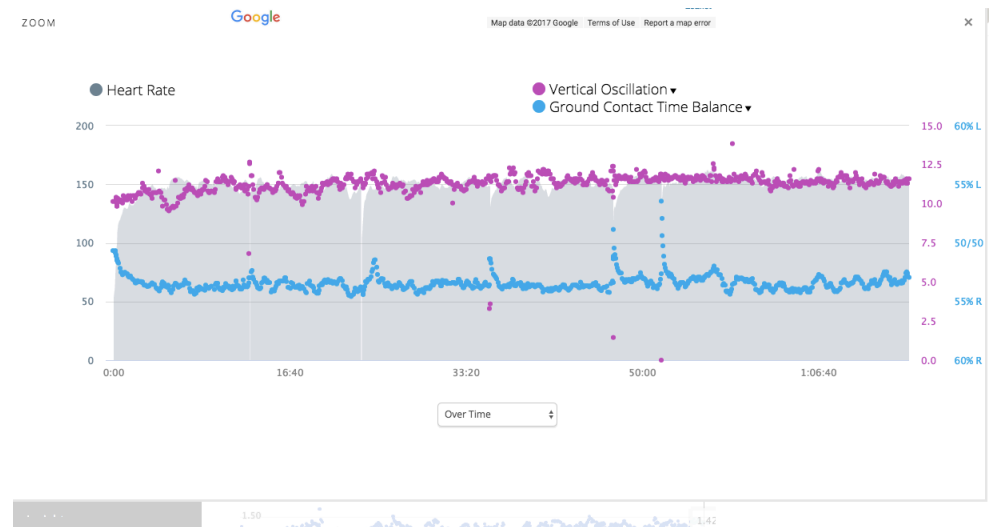
Big data and the Data driven Society

- "Data used to be scarce and now it is everywhere." (UN Data Forum – Data Literacy: What, Why and How? Dr. Delia North)
- Claim of Big Data: Large open data sets can be used to create a better world. (Lohr, 2013)
  - UN Statistical Commission
    - UN World Data Forum – January 2017
  - UN 2030 agenda for sustainable development
    - Data drives decision making, tracking progress and accountability along the 17 indicators (United Nations, 2015)

Life expectancy, years ⓘ

Income per person, GDP/capita in $/year adjusted for inflation & prices ⓘ ⚠ DATA DOUBTS
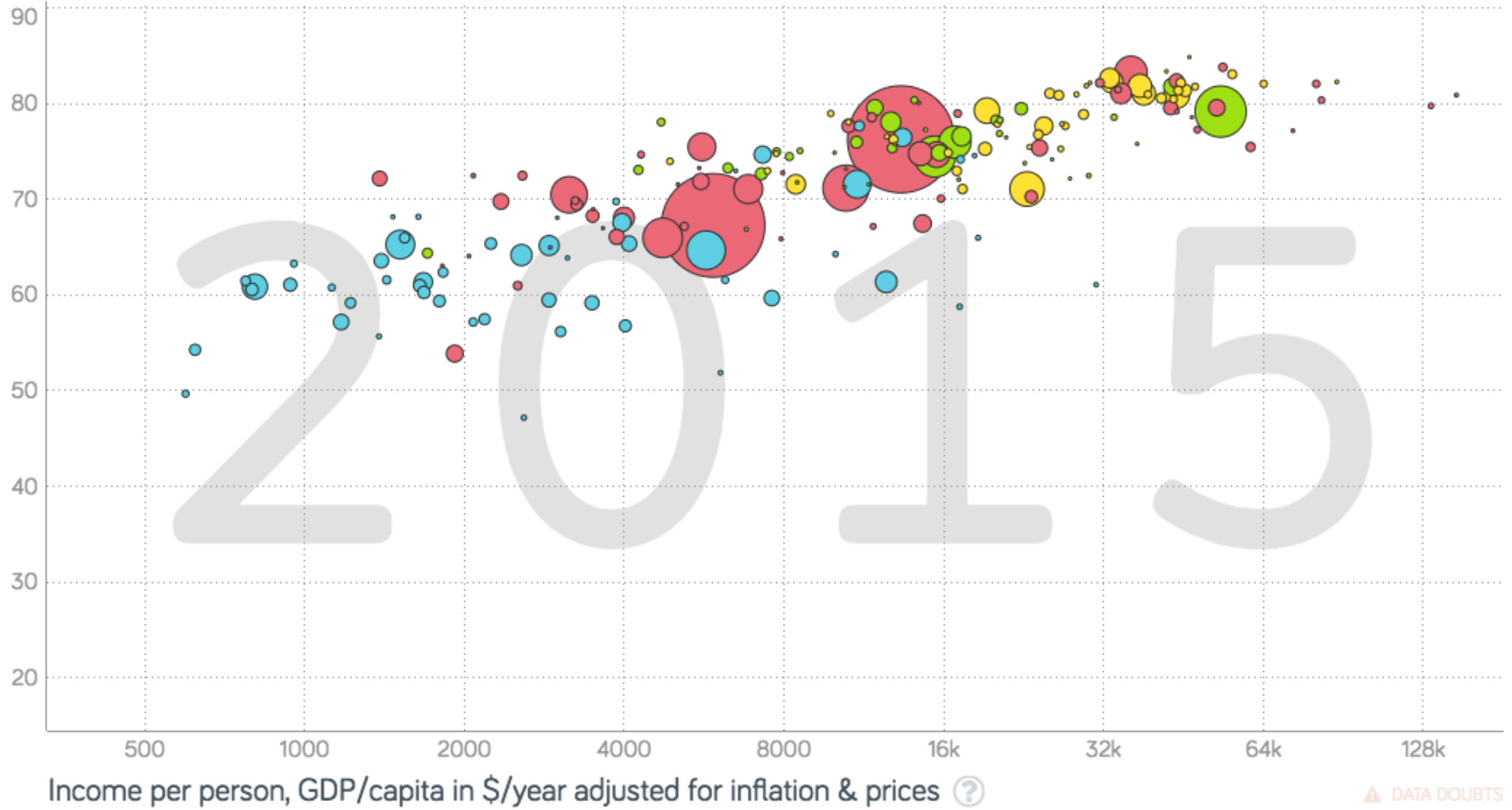
(Rosling, H. and gapminder.org)

Data Literacy

- Data Literacy has become essential in the new era of data collection and use
- Components of Data Literacy integrate mathematical thinking (Slater, 2016)
  - Examples
    - Examining data in context
    - Basic statistical abilities
    - Being able to ask questions in relation to data and make predictions
  - Inductive reasoning
  - Correlation vs. causation

Total revenue generated by arcades
correlates with
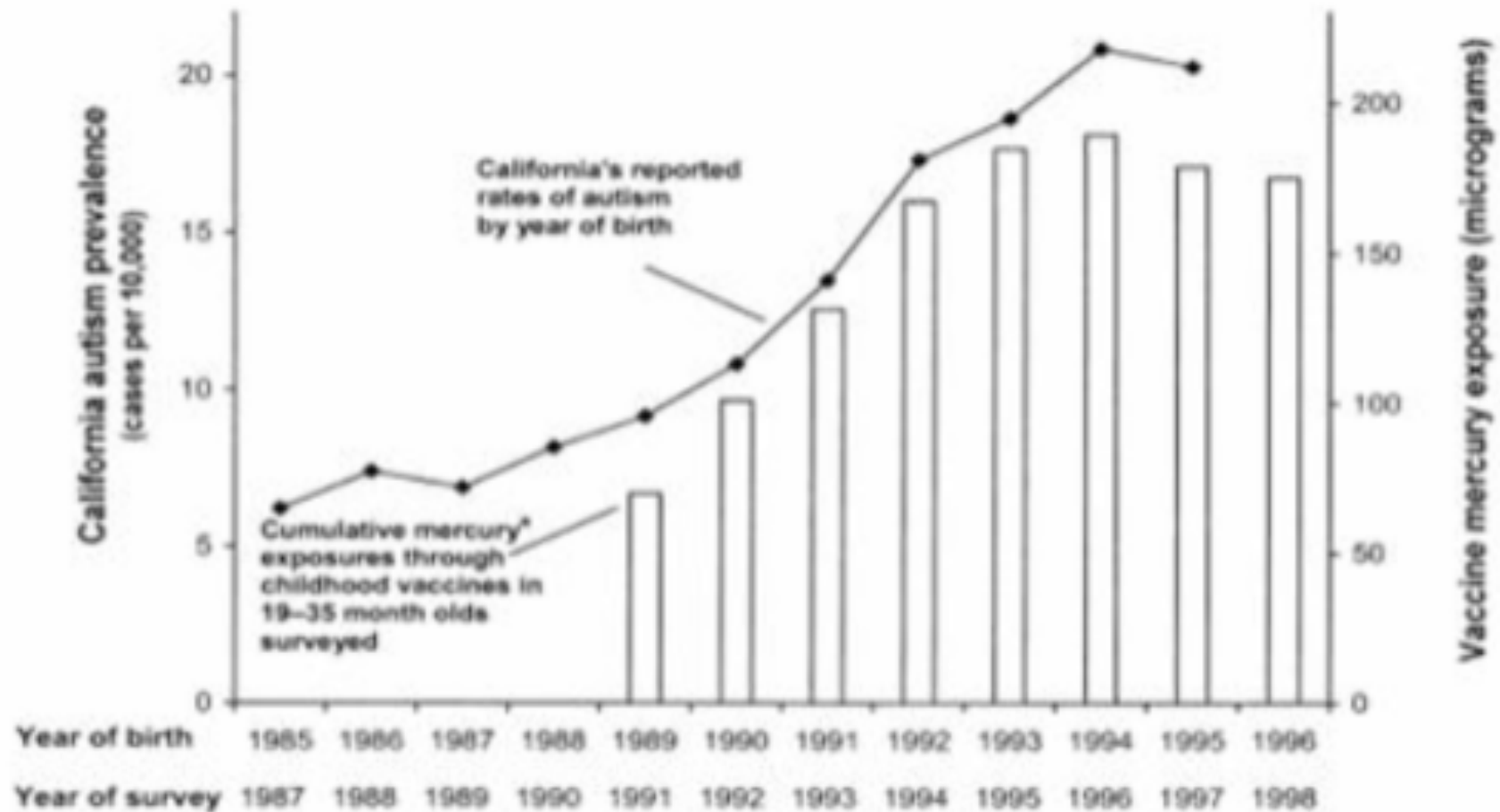Computer science doctorates awarded in the US

Correlation: 98.51% (r=0.985065)
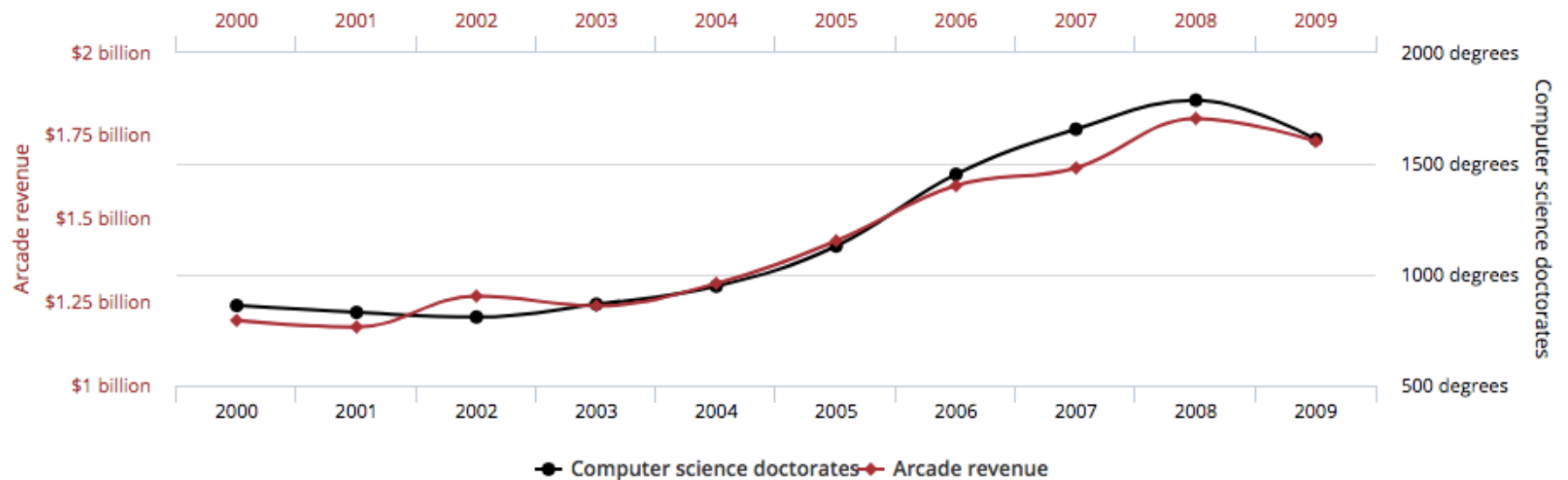
http://www.tylervigen.com/spurious-correlations

California Autism prevalence correlates with vaccine mercury exposure

(Bellinga and Gillebaart 2017)

Data Literacy and Education

- Educating the public
  - Fighting Data ignorance by bringing data into journalism (Bellinga and Gillebaart 2017), (Thorp, J. (2012)
  - Making data accessible and exciting. (Rosling 2010)
    - gapminder.org
- Educating young people
  - Data Driven Society starts with data savvy youth (Ercegovac 2015)
    - Integration of statistics and data into everyday learning
  - Shifting paradigm in education to student exploration and discovery

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