

# **DATA VISUALIZATION, UNCERTAINTY, AND MEASUREMENT ERROR**

Aaron Hill, Assistant Professor  
Parsons School of Design

“Papers with more diagrams per page and, to a lesser extent, plots per page tended to be more influential (on average, a paper accrued two more citations for every extra diagram per page, and one more for every extra plot per page). By contrast, including photographs and equations seemed to decrease the chances of a paper being cited by others.”

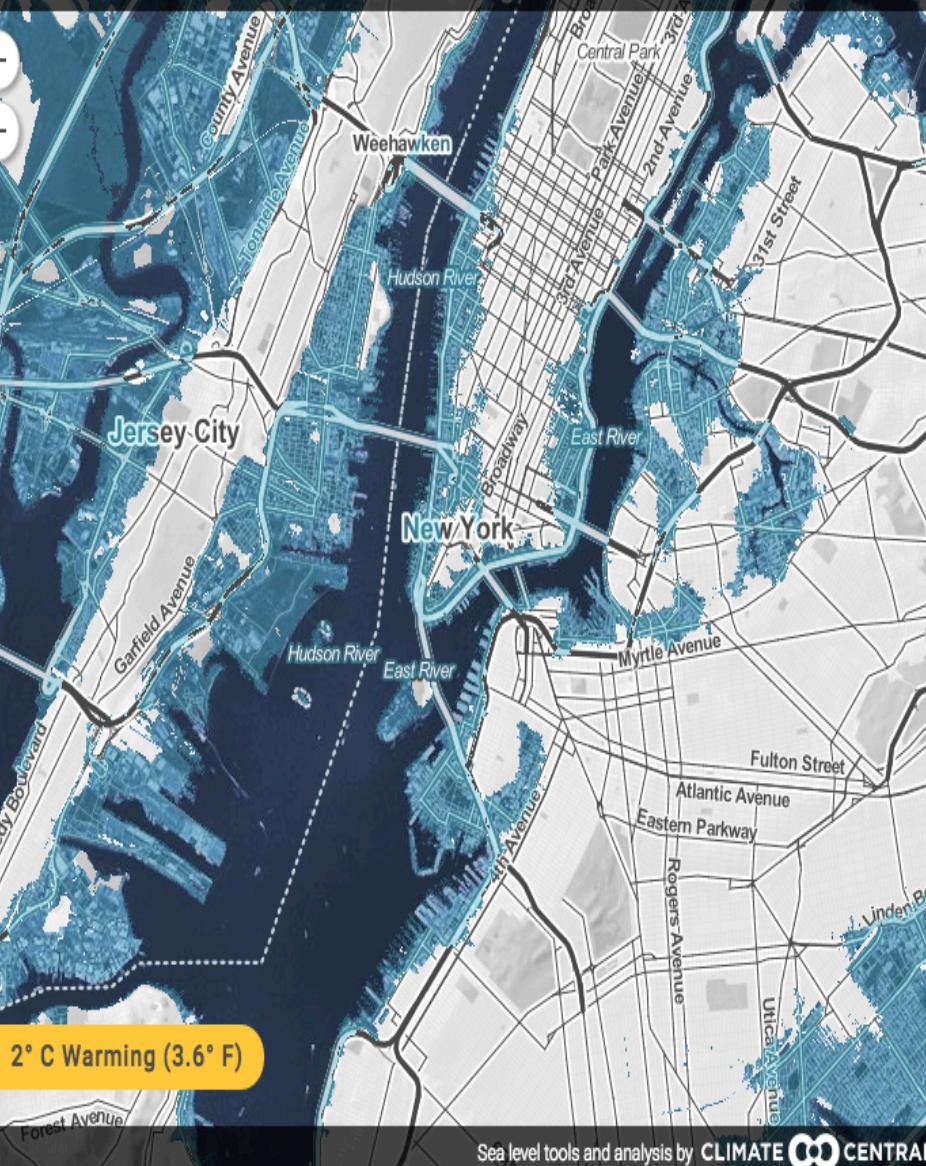
<http://www.economist.com/news/science-and-technology/21700617-scientific-study-importance-diagrams-science-graphic-details>

Enter a global coastal place



## Which sea level will we lock in?

When will this happen?



# New York Braces for Blizzard Amid Warnings of Closings and Hazards

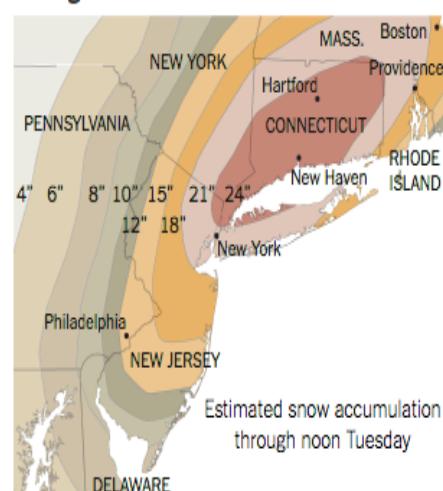
By COLIN MOYNIHAN JAN. 25, 2015



Mayor [Bill de Blasio](#) said on Sunday that the storm approaching on Monday was likely to be one of the biggest to ever strike New York City, and he urged people to stay indoors to avoid powerful winds, low visibility and “treacherous” road conditions.

The [National Weather Service](#), which issued a blizzard warning for the greater New York City area, forecast gusts of wind up to 50 miles per hour and snow accumulation of “at least one to two feet.”

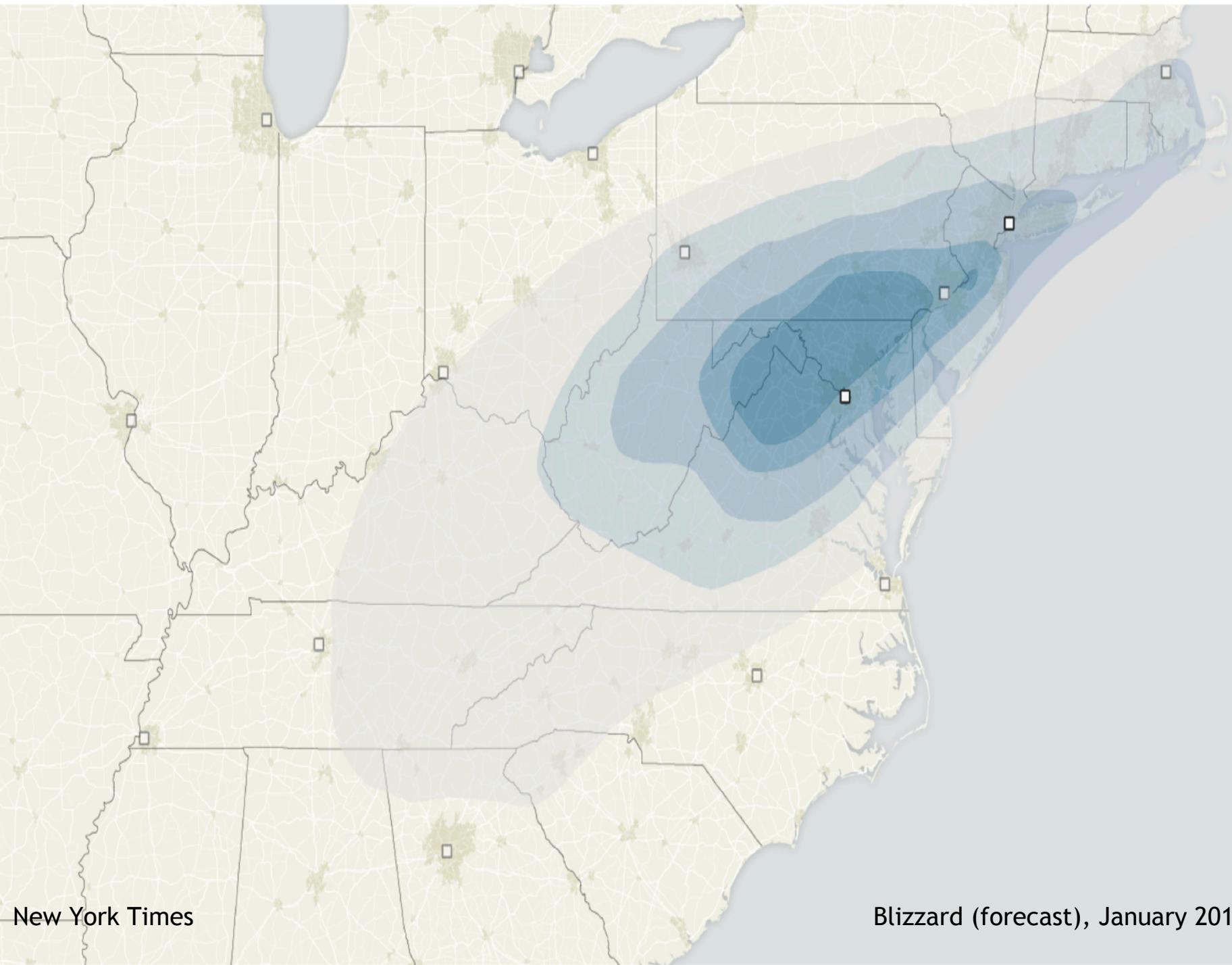
## A Big Snowfall in the Forecast



Source: National Weather Service

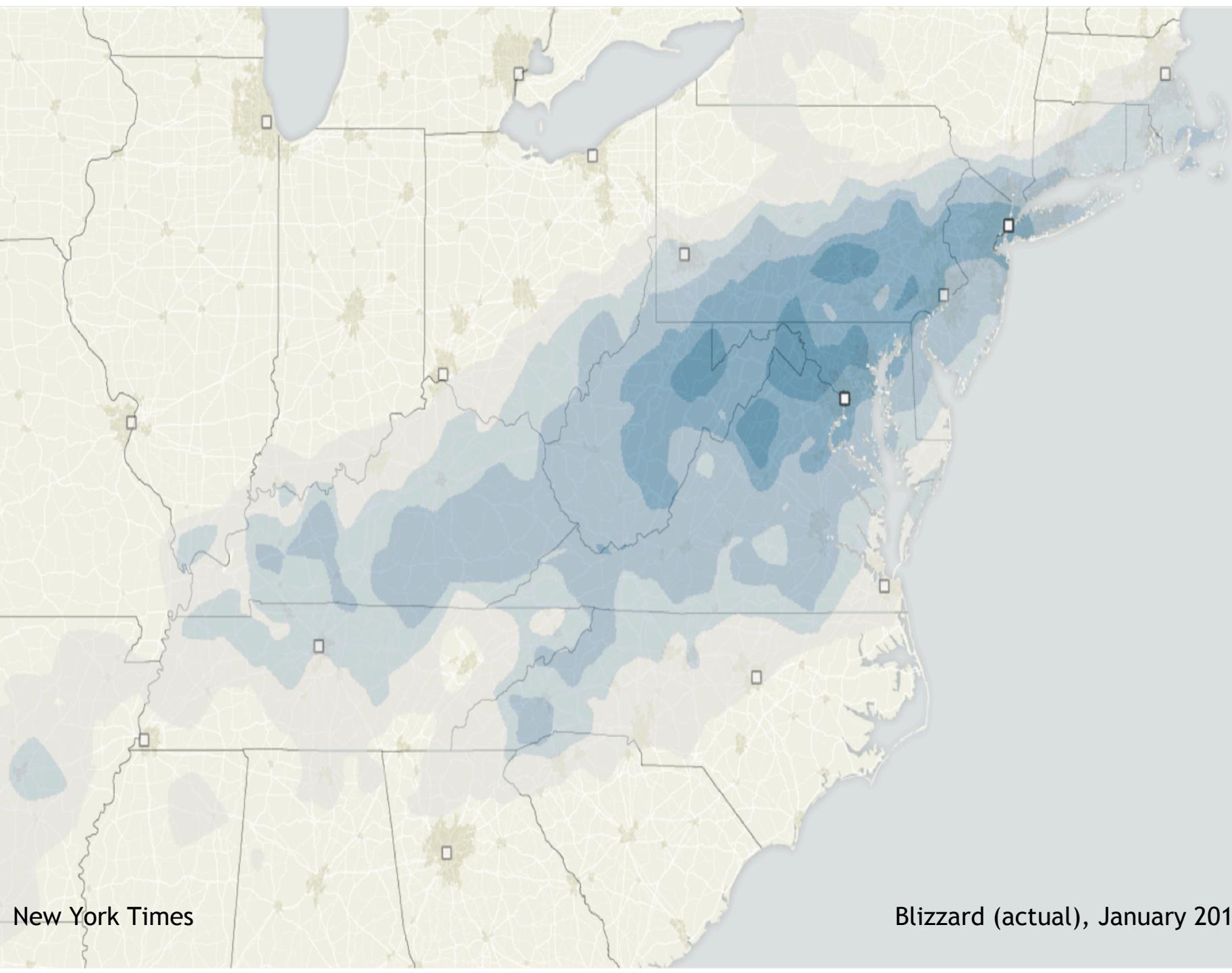
But Mr. de Blasio said the storm could bring up to three feet of snow, beginning with flurries late Monday morning, and that the heaviest snowfall would probably come Monday night into Tuesday morning.

Schools will be open on Monday but are likely to close on Tuesday, Mr. de Blasio said. Alternate side of the street parking was canceled, along with the city's annual count of the homeless population, which had been scheduled for Monday night.



New York Times

Blizzard (forecast), January 2015



New York Times

Blizzard (actual), January 2015

Post Nation

# The ‘historic’ blizzard missed New York City, and therefore didn’t happen



15



A man skis north on Central Park West on Tuesday morning in New York City. New York, and much of the Northeast, was hit with heavy overnight snow from Winter Storm Juno. (Photo by Alex Trautwig/Getty Images)

Overnight a blizzard dumped several feet of snow on...not New

## Most Read

- 1 A fortress against fear



- 2 Prosecutor: Man told 2-year-old to ‘put up his hands’ and fight before beating him to death



- 3 41 injured, 2 dead including La. fire chief as unlicensed party bus driver plows into crash scene



- 4 ‘Toxic environment’ for sons accused of campus sex offenses turns mothers into militants



- 5 At NIH, one woman says gender bias has blocked promotions





**Henry Blodget**  
@hblodget

Follow

There is basically no snow. And the entire city is shut down.  
Absurd.

7:04 AM - 27 Jan 2015

87 55



**Dr.MargaretMcMenamin**  
@DrMcM

Follow

BUST! After all that hype we get a run-of-the-mill snow storm.  
NJ closed. Roads closed. School closed. Waste of  
time/resources! #Hype #Juno

7:33 AM - 27 Jan 2015

3 5



**Drew Kerr**  
@DrewKerr

Follow

After NY-based media inundates rest of U.S. with blizzard-  
mania, & blizzard becomes bust, no wonder media not trusted &  
unwanted.

8:02 AM - 27 Jan 2015

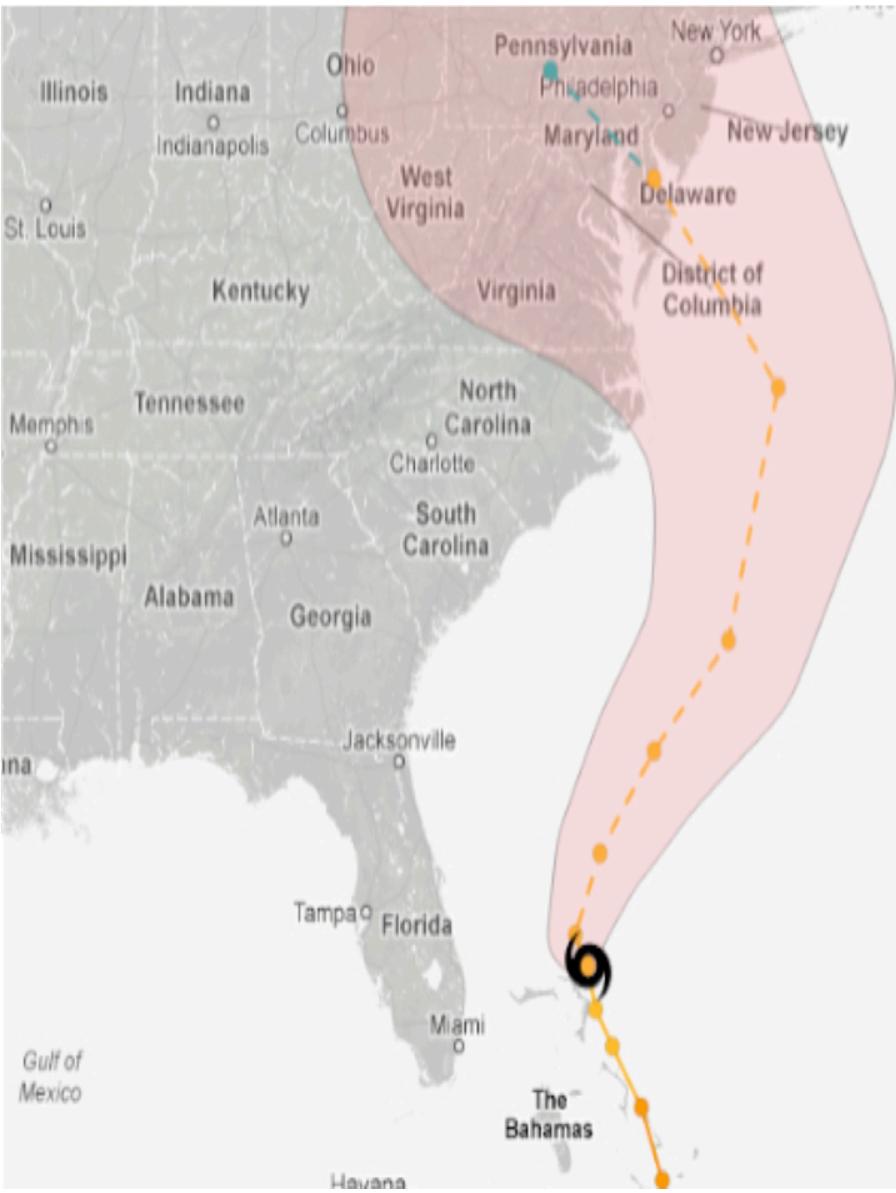


**Anna Zhang**  
@BanannaZhang

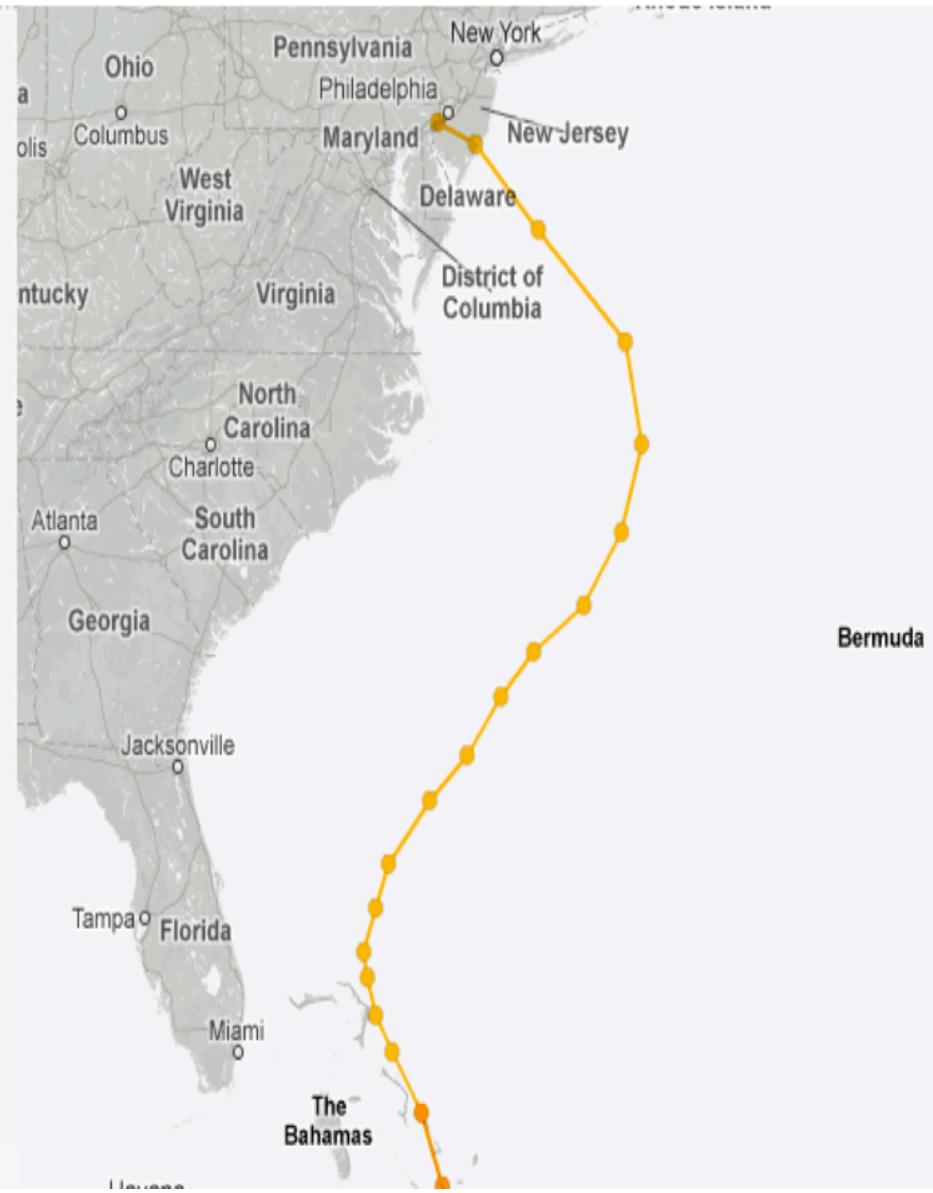
Follow

#juno2015 The storm to end all subsequent snow days that my  
company will be doling out since this one was such a bust.

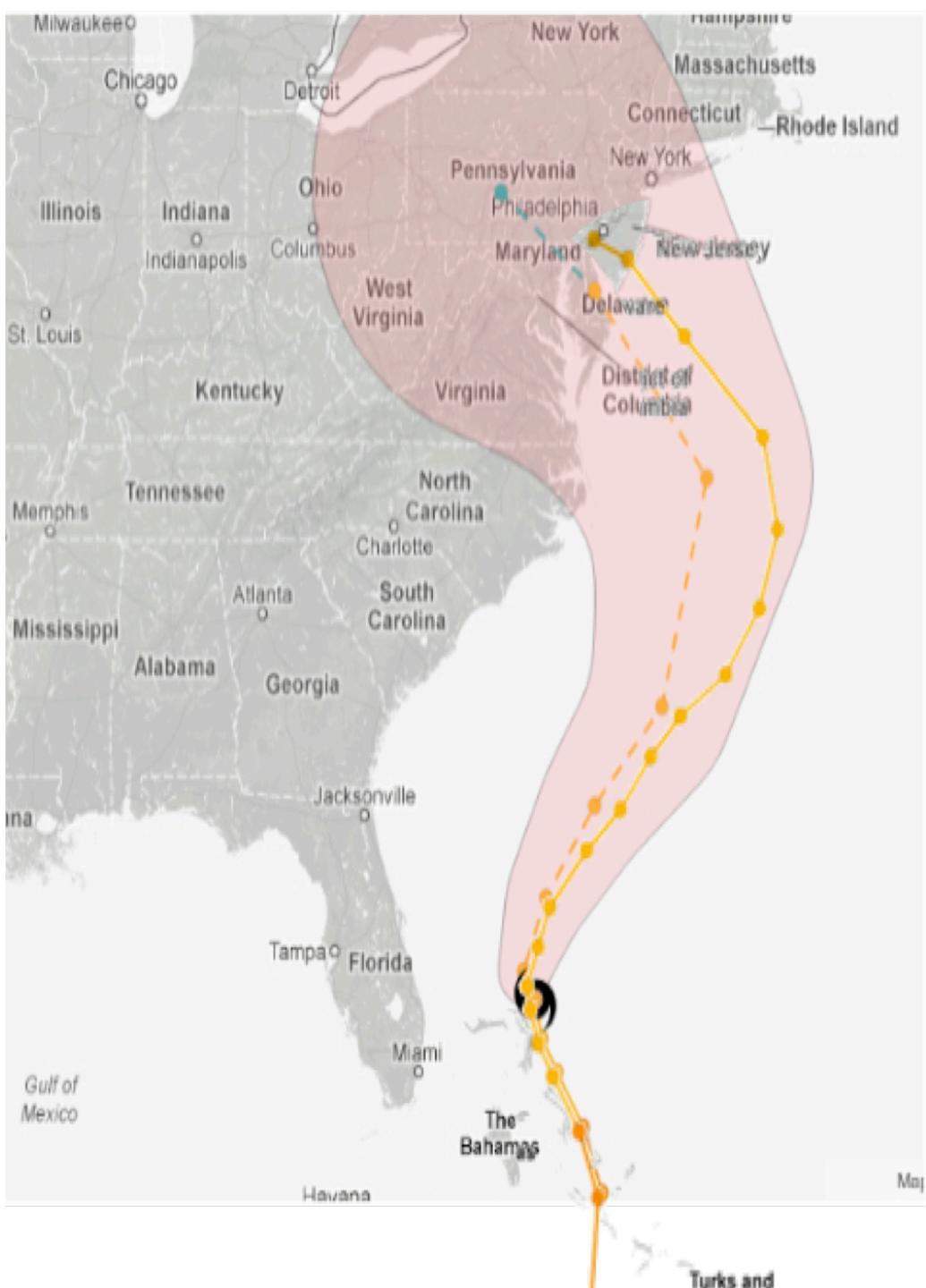
8:19 AM - 27 Jan 2015



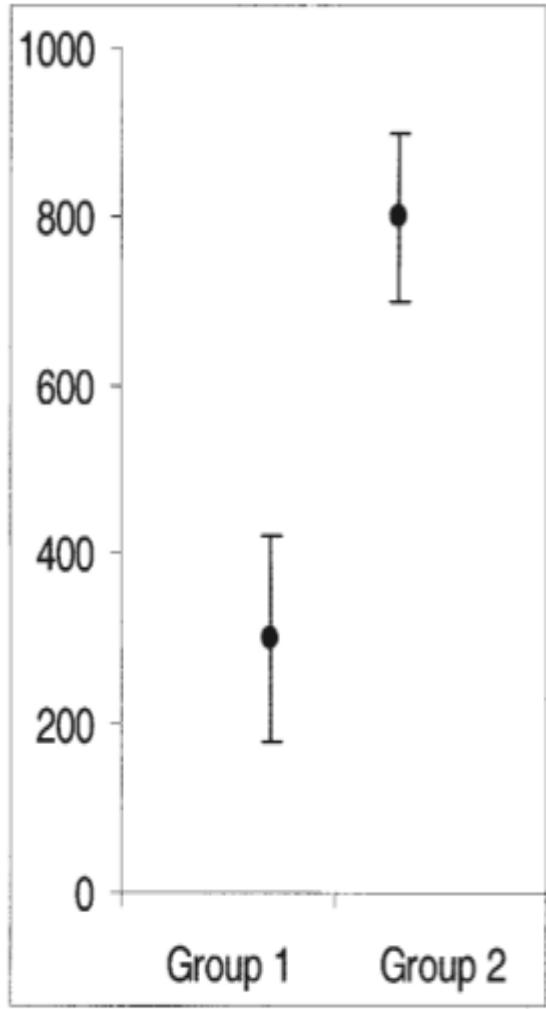
New York Times



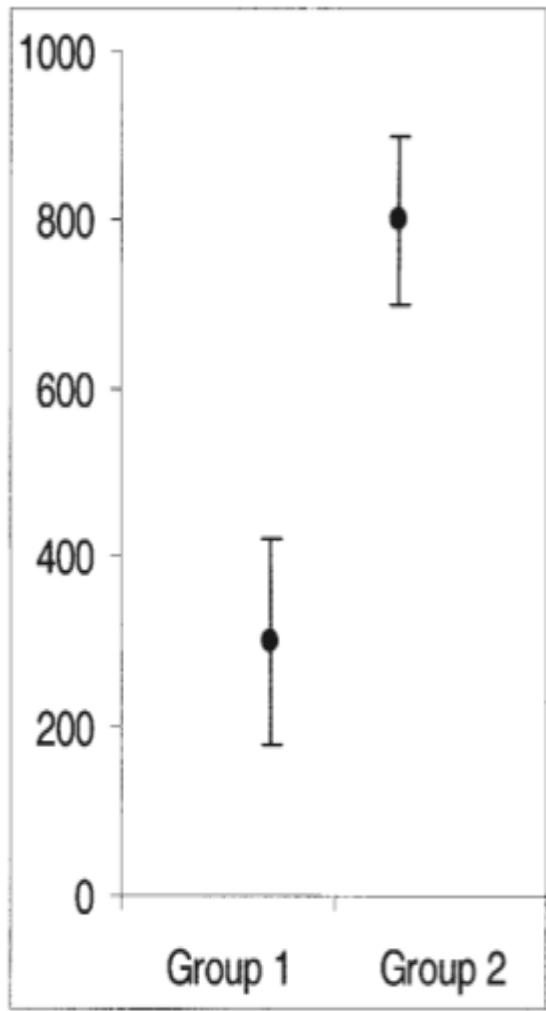
Hurricane Sandy



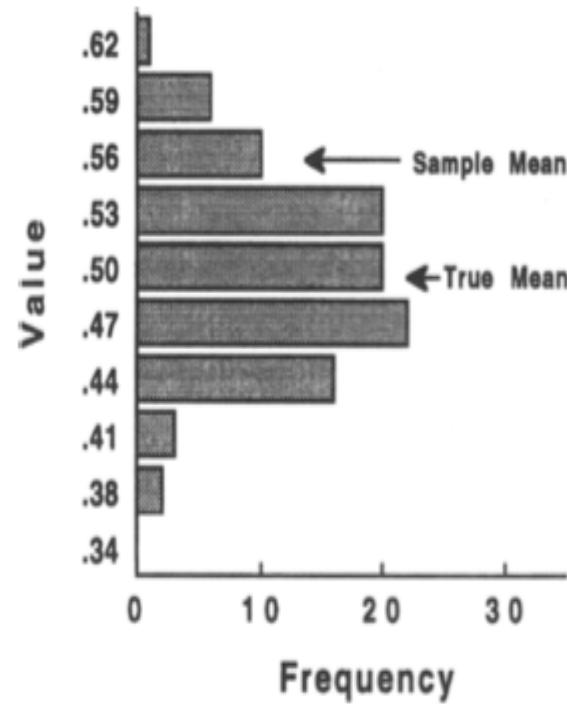




Belia, 2005



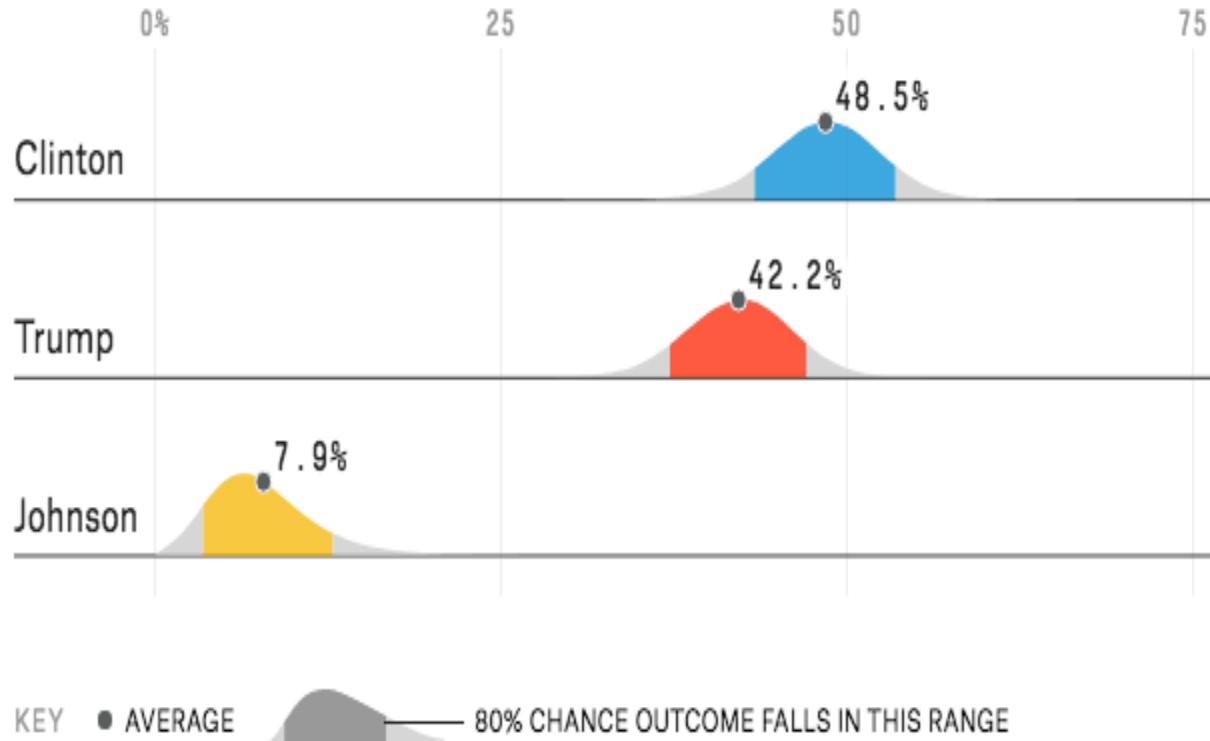
Belia, 2005



Estes, 1997

## Who's winning the popular vote

Our model produces a distribution of outcomes for the national popular vote. The curves will get narrower as the election gets closer and our forecasts become more confident.





## Decreased Risk

NAME	CONFIDENCE	YOUR RISK	AVG. RISK	COMPARED TO AVERAGE
Prostate Cancer		13.0%	17.8%	0.73x
Psoriasis		%	0.44x	
Restless Legs Syndrome		%	0.74x	
Age-related Macular Degeneration		%	0.14x	
Exfoliation Glaucoma		%	0.79x	
Type 1 Diabetes		%	0.51x	
Crohn's Disease		%	0.78x	
Ulcerative Colitis		%	0.47x	
Esophageal Squamous Cell Carcinoma		%	0.80x	
Multiple Sclerosis		%	0.59x	
Stomach Cancer (Gastric Cardia Adenocarcinoma)		%	0.77x	
Celiac Disease		%	0.44x	
Alcohol Dependence				
Atrial Fibrillation: Preliminary Results				
Basal Cell Carcinoma				
Behcet's Disease				

## Research Confidence

- Established Research. At least two studies examined more than 750 people with the trait or condition and/or the associations are widely accepted in the scientific community. The reports may cover rare conditions or include variants that do not greatly influence a person's absolute lifetime risk for a condition.
- Preliminary Research. More than 750 people with the condition were studied, but the findings still need to be confirmed by the scientific community in an independent study of similar size.
- Preliminary Research. Fewer than 750 people were studied. Multiple large studies are needed to confirm these findings.
- Preliminary Research. Fewer than 100 people were studied. Multiple large studies are needed to confirm these findings.

Today

Notifications

Monday,  
August 29<sup>th</sup>

Sunny currently. The high will be 91°. Clear tonight with a low of 70°.

Right now, it would take you about 117 minutes to drive to Barrett.

You have two items scheduled for 6 PM.



Calendar

*We think you'll love these!*



Learn To Fly Course  
(Online) - Private Pilot Test  
Prep Learn To Fly Course  
(Online) - Private Pilot Test  
Prep

[SHOP NOW »](#)



Cozy Toes Electric Foot  
Warmer

[SHOP NOW »](#)



Squirrel Chaser Repellent  
(set of 6)

[SHOP NOW »](#)



12 inch Cast Iron Skillet Lid

[SHOP NOW »](#)



Silicone Hot Handle Holder

[SHOP NOW »](#)



Solar Security Light

[SHOP NOW »](#)



<https://youtu.be/MrwxE8qOxA>

critique by redesign

# Original

## From first published to masterpieces

Visualized are the authors of the 100 best English novels of 1900 according to the Modern Library ranking. Authors are represented through circles showing their life span where their debut novel, their masterpiece(s) according to the ranking are positioned. Authors' order points out the time-gap between the debut novel and the first published novel selected from the Modern Library ranking (masterpiece). Debut novel and first masterpiece correspond for the first 22 authors. Information about authors' hometown and novels' ranking are reported as well.

Sources:  
[biography.com](http://biography.com), [britannica.com](http://britannica.com), [modernlibrary.com](http://modernlibrary.com)

### How to read it?

Authors are ordered from the earliest success to the last one.

color  
 Asia, North America  
 Europe, South America

number

novel ranking position

Author name  
 100 years birth

death-age  
 circumference = lifespan

age at debut novel

distance between debut novel and first masterpiece

age at first masterpiece

age at second masterpiece

age at third masterpiece

age at fourth masterpiece

first masterpiece coincide with debut

author still alive

novel published posthumous



# Quick redesign

### How to read

Masterpiece according to the Modern Library — Death

### Place where the author was born

North America

Central and South America

Asia

Europe

### Age

10 20 30 40 50 60 70 80 90 100

### Normal Mailer



### Ernest Hemingway



### James Baldwin



### Jerome D. Salinger



### James Joyce



### Iris Murdoch



### Elizabeth Bowen



### Erskine Caldwell



### Jean Rhys



### Joseph Heller



### David H. Lawrence



### Edward M. Forster



### Salman Rushdie

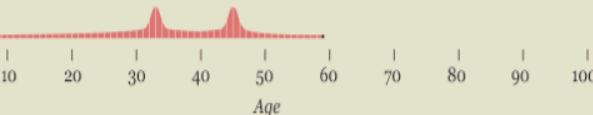


Still alive

### Jack Kerouac



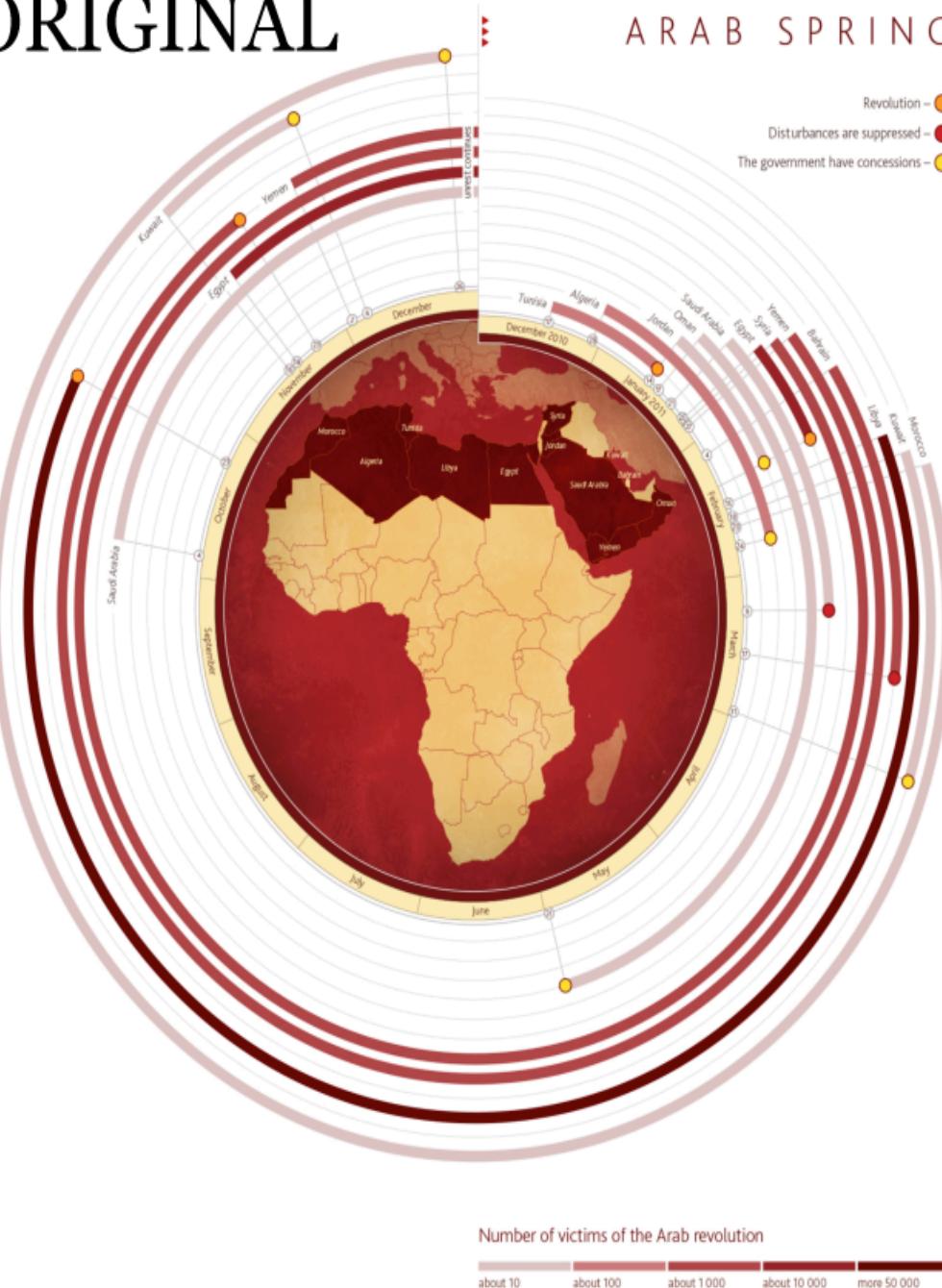
### Virginia Woolf



10 20 30 40 50 60 70 80 90 100

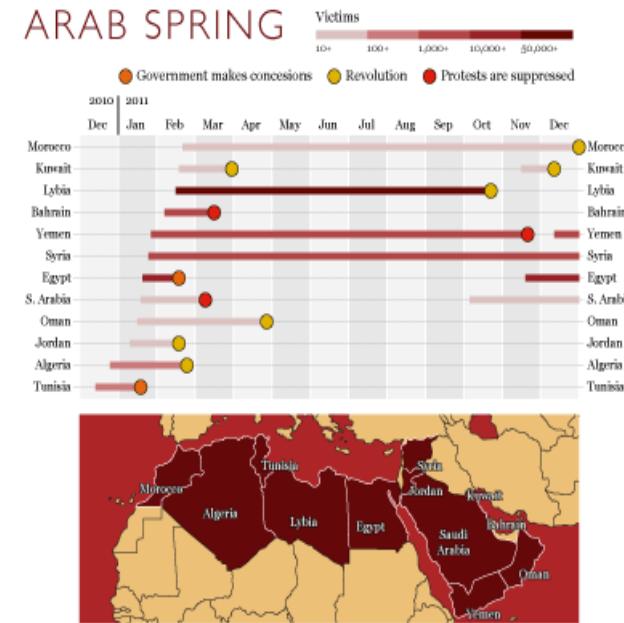
# ORIGINAL

## ARAB SPRING



# NEW VERSION

## ARAB SPRING



Number of victims of the Arab revolution

about 10      about 100      about 1000      about 10 000      more 50 000

measurement of user comprehension:  
a new form of critique?



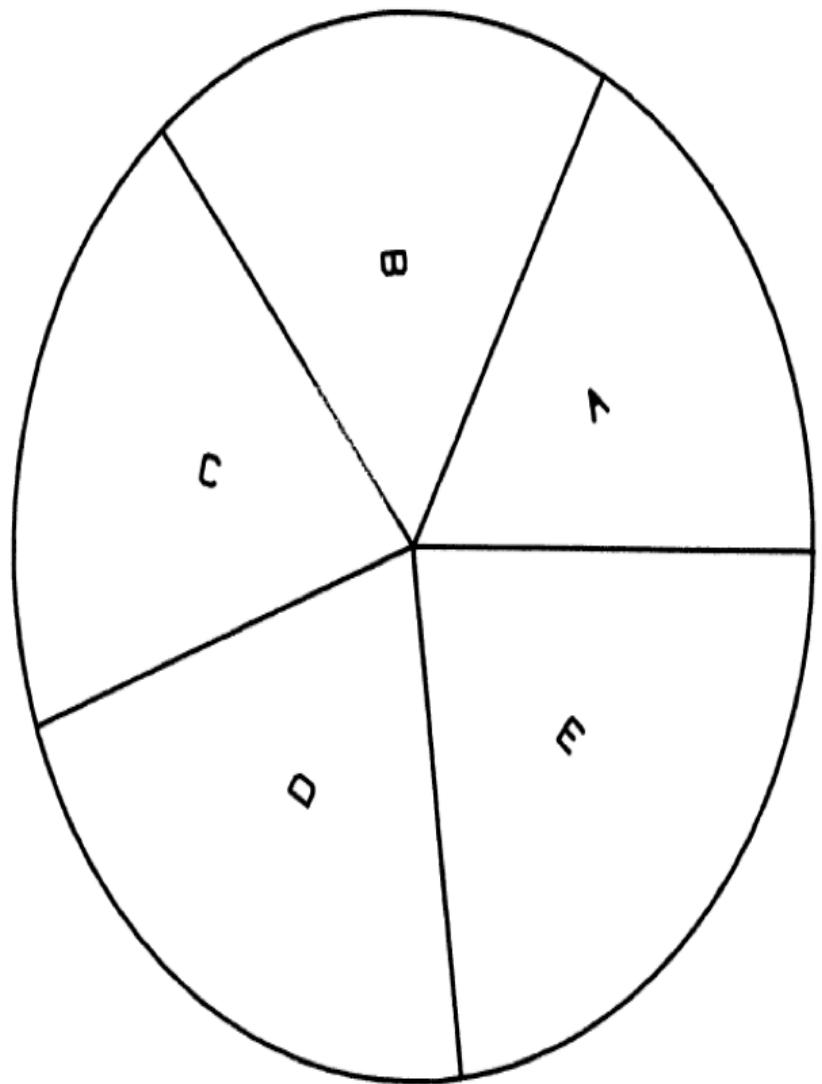


Figure 22. Pie chart.

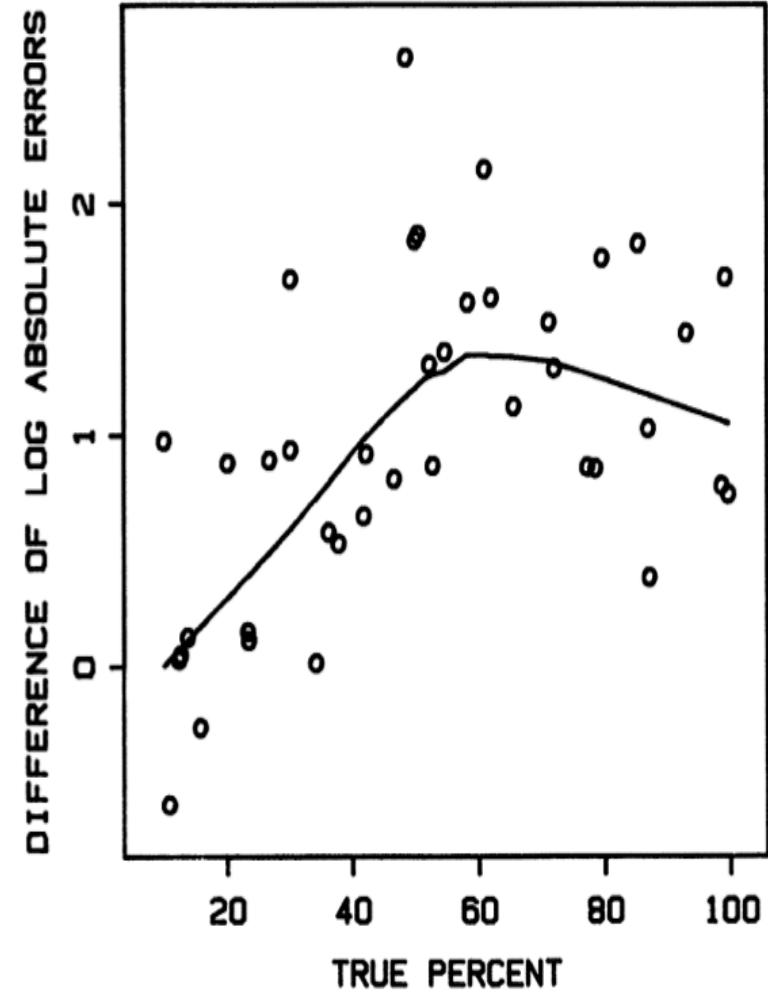
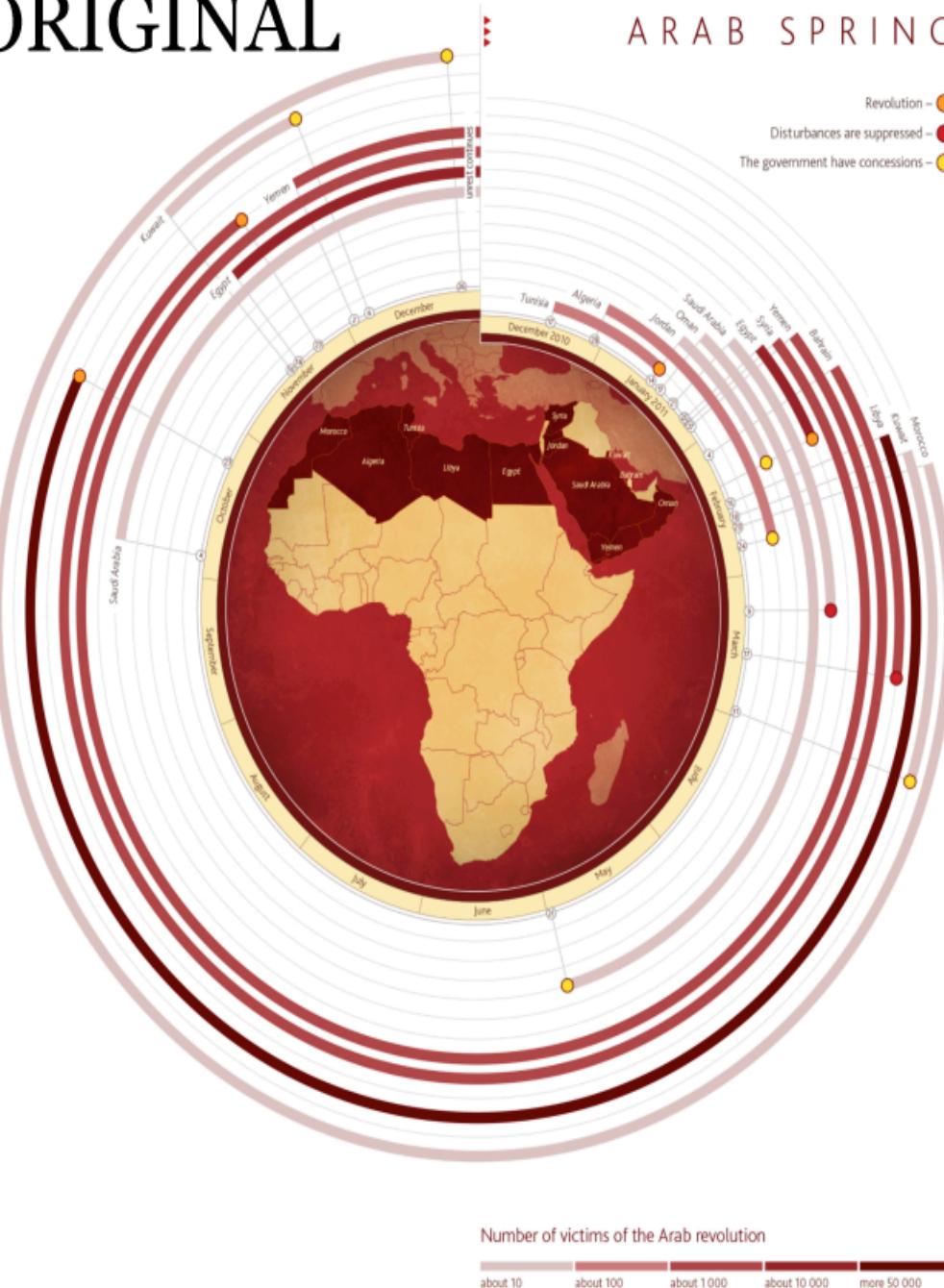


Figure 15. Position-angle experiment: Angle midmeans minus position midmeans against true percentages.

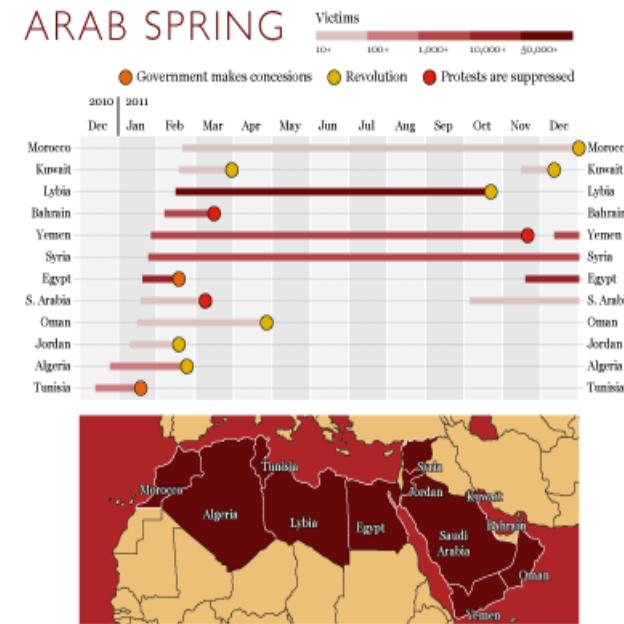
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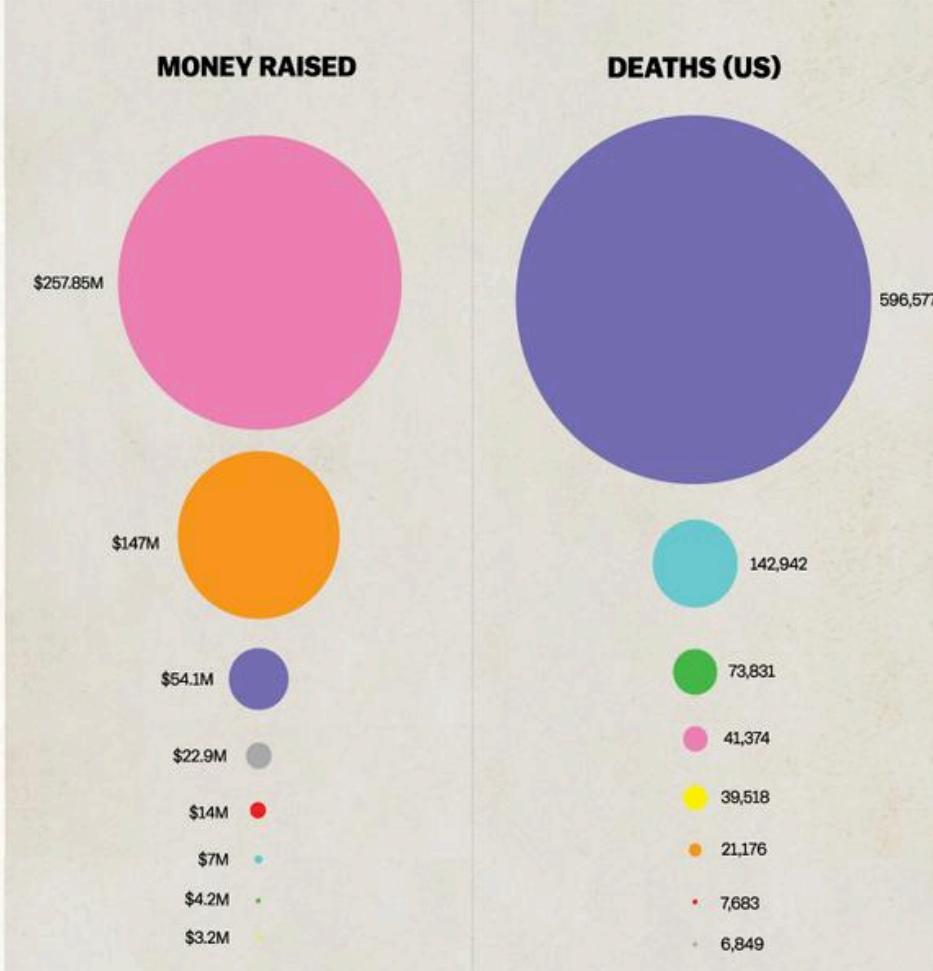
Number of victims of the Arab revolution

about 10    about 100    about 1000    about 10 000    more 50 000

# WHERE WE DONATE VS. DISEASES THAT KILL US

Legend:

- Heart Disease: Jump Rope for Heart (2013)
- Suicide: Out of Darkness Overnight Walk (2014)
- Diabetes: Step Out: Walk to Stop Diabetes (2013)
- HIV / AIDS: Ride to End AIDS (2013)
- Breast Cancer: Komen Race for the Cure (2012)
- Motor Neuron Disease (including ALS): ALS Ice Bucket Challenge (2014)
- Chronic Obstructive Pulmonary Disease: Fight for Air Climb (2013)
- Prostate Cancer: Movember (2013)



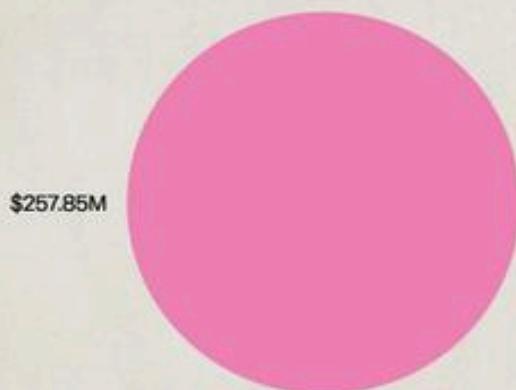
Source: CDC (2011)

V

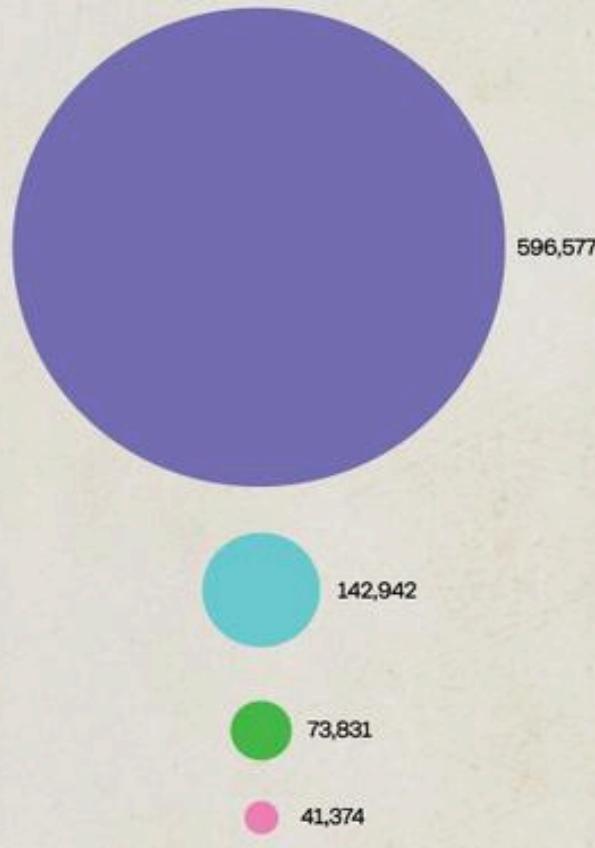
# WHERE WE DONATE VS. DISEASES THAT KILL US

<b>Heart Disease</b> Jump Rope for Heart (2013)	<b>Suicide</b> Out of Darkness Overnight Walk (2014)
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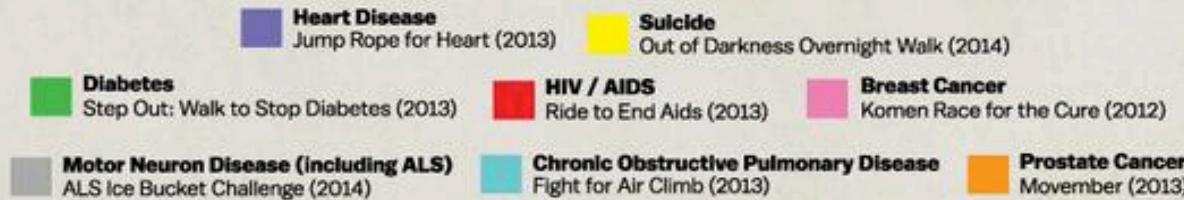
## MONEY RAISED



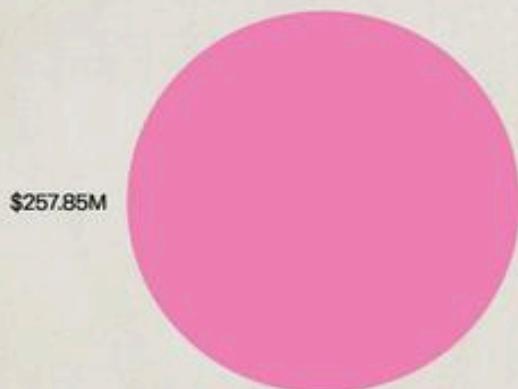
## DEATHS (US)



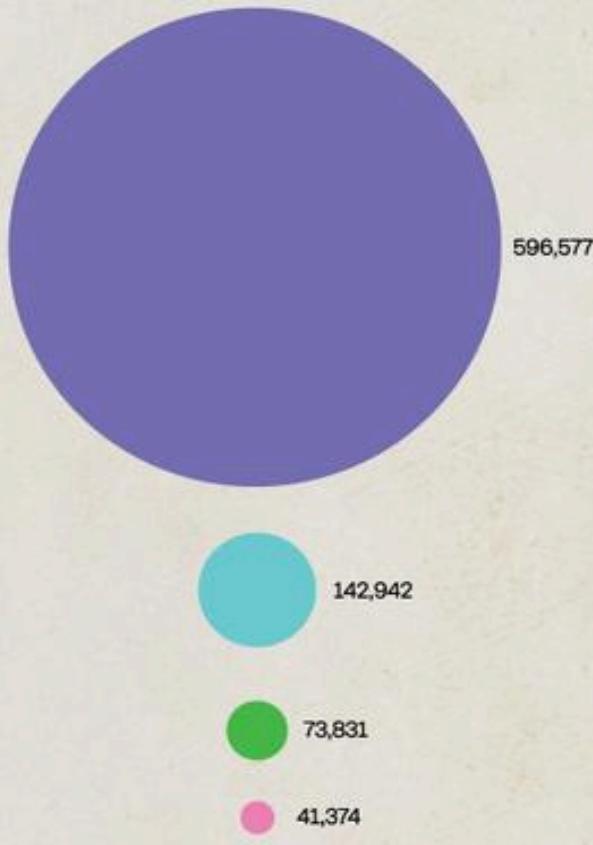
# WHERE WE DONATE VS. DISEASES THAT KILL US



## MONEY RAISED



## DEATHS (US)



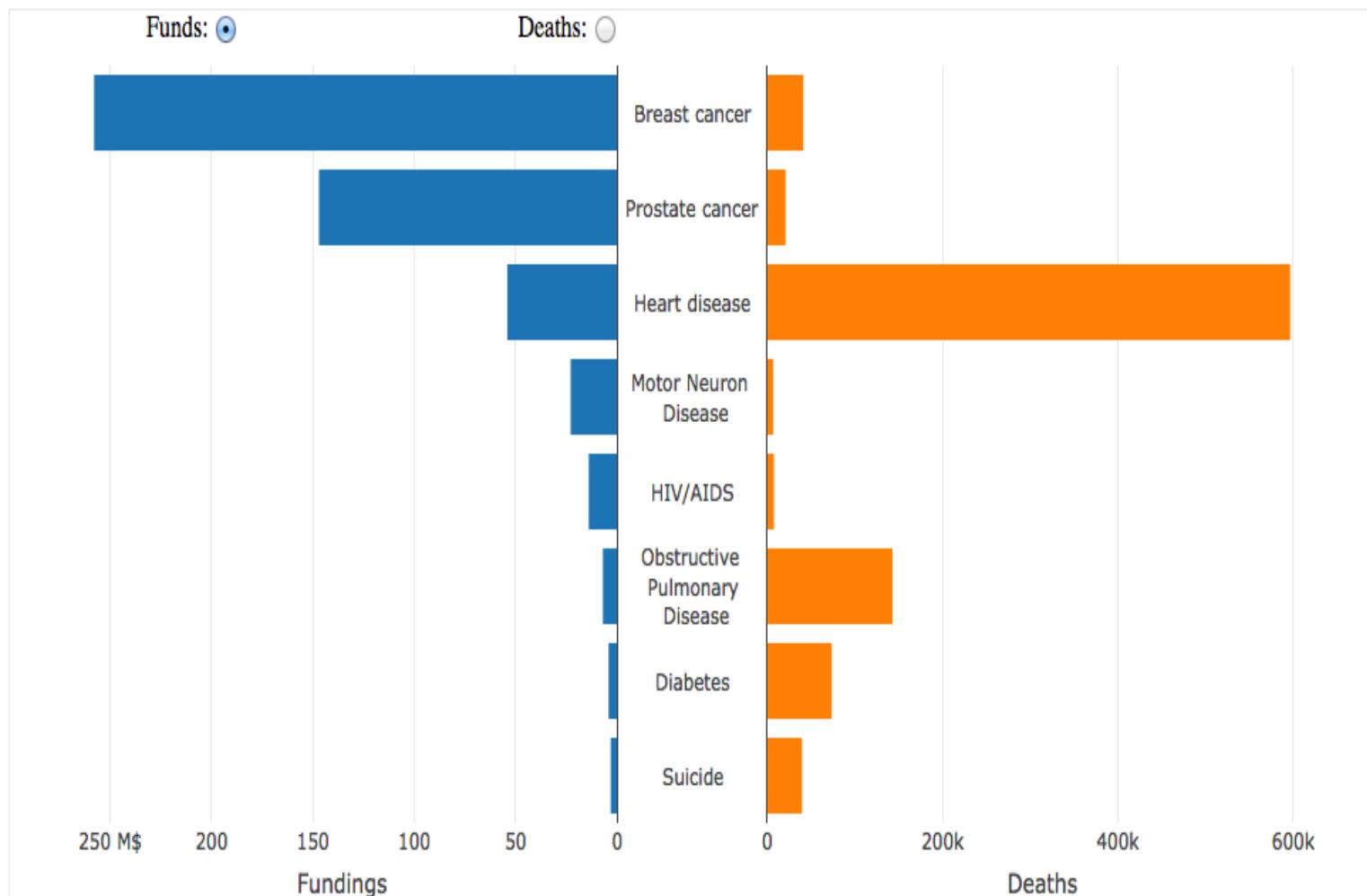
$$A = (\pi/4) \times D^2$$



Marco Torchiano's Block d452e57ac33ff165d590fb48c43f5e9  
Updated May 30, 2016

Popular / About

# Where we donate vs. Diseases that kill us



## **AS A DISCIPLINE...**

- can we develop a new visual language and set of standards to express “error?”
- can we develop a standardized methodology for measuring perception and user comprehension?

# **DATA VISUALIZATION, UNCERTAINTY, AND MEASUREMENT ERROR**

Aaron Hill, Assistant Professor  
Parsons School of Design