

1

# Introduction to Visualization

The midpoint between art and engineering



# Gettysburg Cemetery Dedication

Abraham Lincoln

11/19/1863

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[next](#)

# Agenda

- Met on battlefield (great)
- Dedicate portion of field - fitting!
- Unfinished work (great tasks)

11/19/1863

# Not on Agenda!

- Dedicate
- Consecrate
- Hallow  
(in narrow sense)
- Add or detract
- Note or remember what we say

11/19/1863

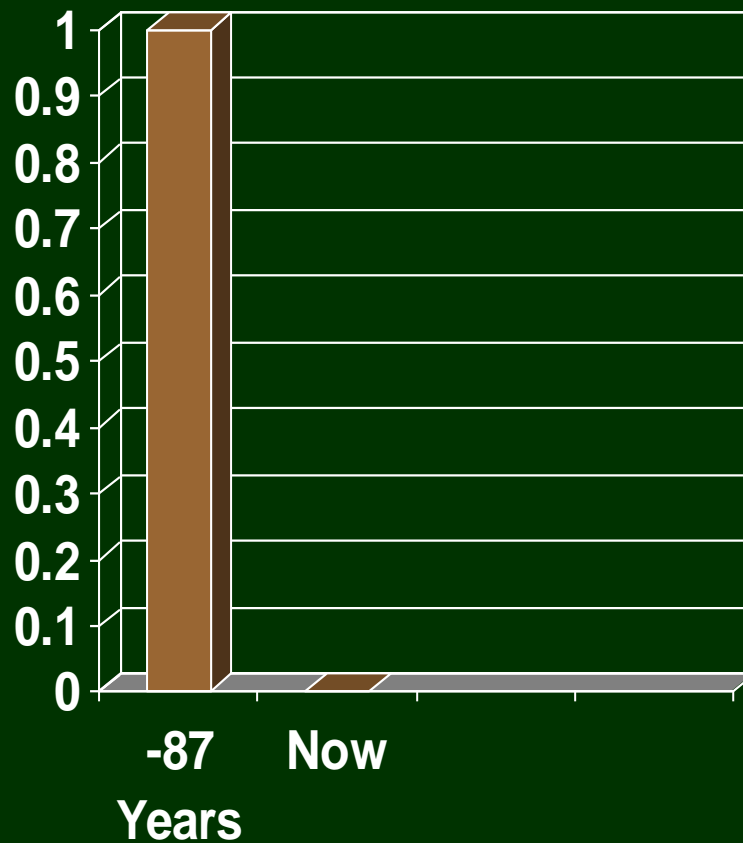
# Review of Key Objectives & Critical Success Factors

- What makes nation unique
  - Conceived in Liberty
  - Men are equal
- Shared vision
  - New birth of freedom
  - Gov't of/for/by the people

11/19/1863

# Organizational Overview

11/19/1863



■ New Nations

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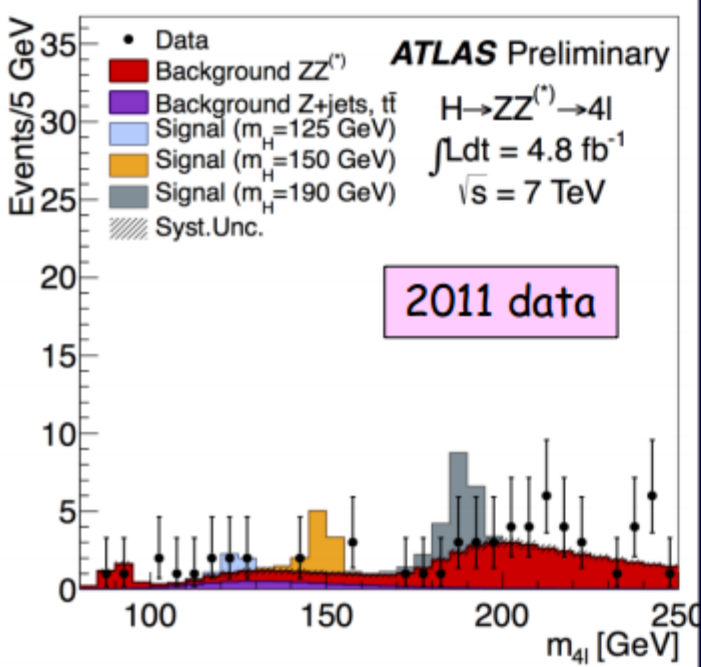
# Summary

- New nation
- Civil war
- Dedicate field
- Dedicated to unfinished work
- New birth of freedom
- Government not perish

11/19/1863

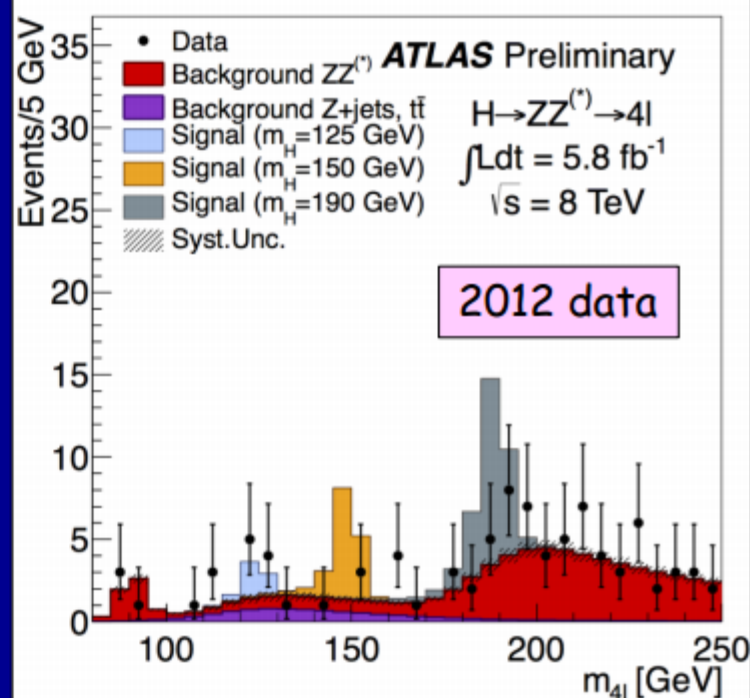


Gettysburg Address PowerPoint courtesy of Peter Norvig  
<http://www.norvig.com/Gettysburg/index.htm>

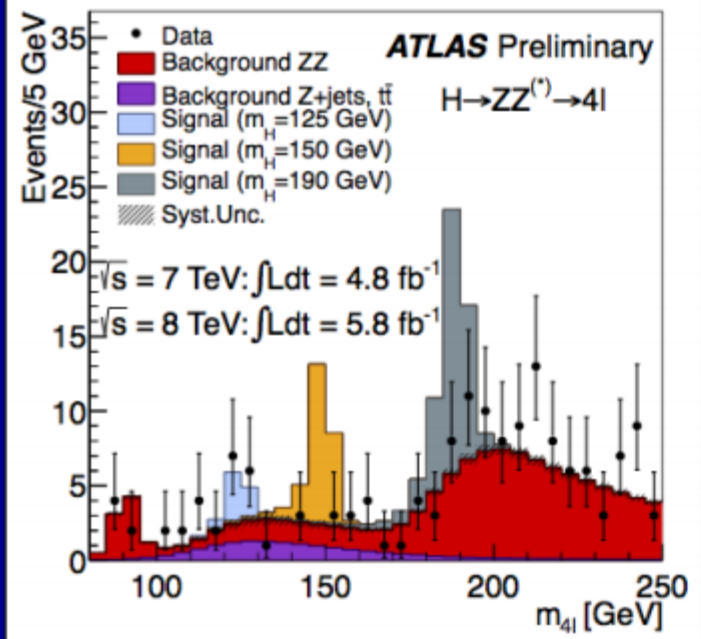


The low-mass region

m<sub>4l</sub> < 160 GeV:  
 Observed: 39  
 Expected: 34 ± 3



2011+2012 data



In the region 125 ± 5 GeV

Dataset	2011	2012	2011+2012
Expected B only	2±0.3	3±0.4	5.1±0.8
Expected S m <sub>H</sub> =125 GeV	2±0.3	3±0.5	5.3±0.8
Observed in the data	4	9	13
2011+ 2012	4μ	2e2μ	4e
Data	6	5	2
Expected S/B	1.6	1	0.5
Reducible/total background	5%	45%	55%



Hotmail



# (TS//SI//NF) FAA702 Operations

*Two Types of Collection*



## Upstream

- Collection of communications on fiber cables and infrastructure as data flows past.

(FAIRVIEW, ██████████, BLARNEY, ██████████)

## PRISM

- Collection directly from the servers of these U.S. Service Providers: Microsoft, Yahoo, Google, Facebook, PalTalk, AOL, Skype, YouTube, Apple.

**You Should Use Both**



# Data Visualization

“the study of the visual representation of data” (duh)

# Data Visualization

“the study of the visual representation of data” (duh)



## Information Visualization

“the study of (interactive) visual representations of abstract data to reinforce human cognition”

## Data Visualization

“the study of the visual representation of data” (duh)



WIKIPEDIA  
The Free Encyclopedia

# Design

"the creation of a plan or convention for the construction of an object or a system"

## Information Visualization

"the study of (interactive) visual representations of abstract data to reinforce human cognition"

## Data Visualization

"the study of the visual representation of data" (duh)



WIKIPEDIA  
The Free Encyclopedia

# All Human Knowledge

## Design

"the creation of a plan or convention for the construction of an object or a system"

## Information Visualization

"the study of (interactive) visual representations of abstract data to reinforce human cognition"

## Data Visualization

"the study of the visual representation of data" (duh)





**Everything Knowable**

**All Human Knowledge**

**Design**

"the creation of a plan or convention for the construction of an object or a system"

**Information Visualization**

"the study of (interactive) visual representations of abstract data to reinforce human cognition"

**Data Visualization**

"the study of the visual representation of data" (duh)



**WIKIPEDIA**  
The Free Encyclopedia

Why .biz TLDs  
didn't catch on

**Everything Knowable**

**All Human Knowledge**

**Design**

"the creation of a plan or convention for the  
construction of an object or a system"

**Information Visualization**

"the study of (interactive) visual representations of  
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# Data Visualization

“Making data easy to understand.”

# CS 1501 - 001 Special Topics in Computer Science

University of Virginia | 2013 Fall | Lecture

[Return to My Planner](#)

## Class Details

<b>Status</b>	<input type="checkbox"/> Closed	<b>Career</b>	Undergraduate
<b>Class Number</b>	20796	<b>Dates</b>	8/27/2013 - 12/6/2013
<b>Session</b>	Short Add	<b>Grading</b>	Credit/No Credit
<b>Units</b>	1 units	<b>Location</b>	On Grounds
<b>Instruction Mode</b>	In Person	<b>Campus</b>	Main Campus
<b>Class Components</b>	Lecture      Required	<b>Topic</b>	Graphics & Data Visualization

## Evaluations

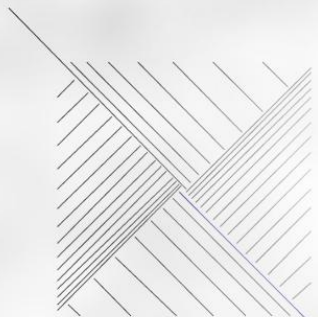
<b>Instructor Name</b>	<a href="#">Evaluations</a>
Staff	<a href="#">Evaluations</a>

## Meeting Information

Days & Times	Room	Instructor	Meeting Dates
Tu 5:00PM - 5:50PM	Thornton Hall E303	Thomas Horton	08/27/2013 - 12/06/2013

## Class Availability

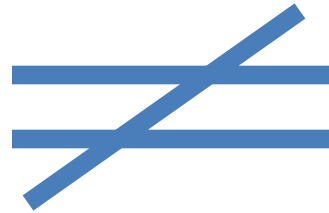
<b>Class Capacity</b>	60	<b>Wait List Capacity</b>	0
<b>Enrollment Total</b>	60	<b>Wait List Total</b>	0
<b>Available Seats</b>	0		



**CS1501**  
graphics and data visualization  
Tue. 5-5:50pm // THN E303



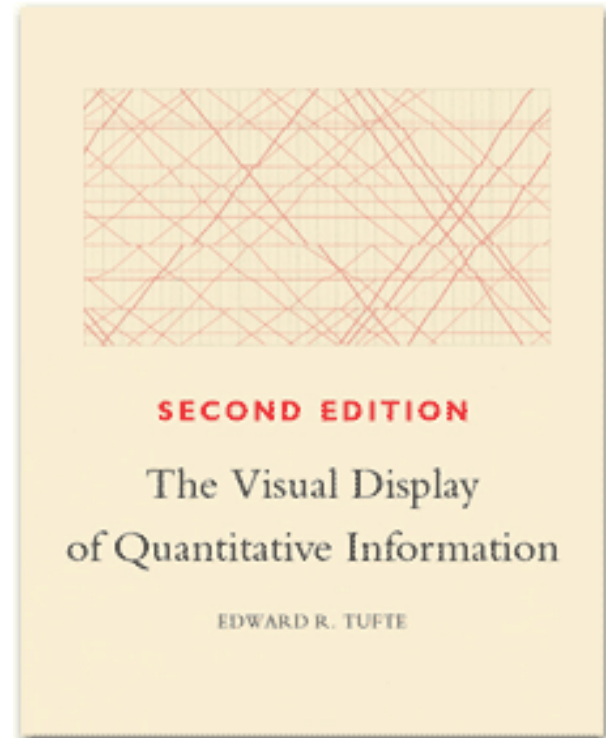
**Kevin McVey, Hs.D**



**Tom Horton, Ph.D**

# OPTIONAL

*(But real good!)*



**There is a final project.**

(calm down, it'll be okay)

Table 5.5. Gross virtual water trade between world regions in the period 1995-1999 (Gm<sup>3</sup>). The grey-shaded cells refer to gross trade between countries within the regions.

Importer	Central Africa	Central America	Central & South Asia	Eastern Europe	Middle East	North Africa	North America	Oceania	FSU	Southern Africa	South America	South-east Asia	Western Europe	Total gross export
Exporter														
Central Africa	1.65	0.00	0.11	0.12	0.07	0.05	0.05	0.02	0.01	0.64	0.00	0.05	1.99	3.11
Central America	0.25	4.62	124.52	0.78	0.43	1.53	40.37	0.01	4.29	0.17	2.45	0.41	14.33	189.52
Central and South Asia	3.53	0.67	100.40	3.07	21.64	13.76	3.32	0.40	9.88	9.44	0.87	64.89	17.77	149.25
Eastern Europe	0.02	0.15	2.82	20.40	10.37	7.56	0.56	0.21	5.23	0.12	0.08	0.55	37.42	65.09
Middle East	0.79	0.13	11.56	2.54	25.65	13.21	2.35	0.82	1.21	0.03	0.48	2.72	18.37	54.21
North Africa	0.13	0.15	2.46	1.14	3.74	2.74	4.18	0.00	0.22	0.43	4.61	0.16	13.79	30.99
North America	2.87	153.24	395.21	9.51	63.77	128.51	82.78	4.02	9.65	9.84	88.67	82.80	170.27	1118.38
Oceania	0.81	0.40	83.26	0.07	9.47	9.31	2.69	2.80	0.06	2.84	3.66	31.56	4.41	148.54
FSU	0.01	0.33	8.00	13.06	29.26	3.07	0.96	0.01	48.68	0.00	0.06	0.40	35.00	90.17
Southern Africa	0.73	0.68	5.38	0.50	0.37	0.42	1.74	0.10	0.26	2.78	1.31	1.21	7.66	20.33
South America	1.63	7.16	62.29	7.83	20.26	18.63	13.37	0.34	4.85	2.75	146.73	16.50	191.21	346.83
South-east Asia	1.81	2.14	226.63	2.56	25.76	31.56	12.97	2.63	5.98	11.81	3.45	87.20	11.08	338.38
Western Europe	2.00	2.26	59.53	18.97	20.20	25.45	5.08	0.15	3.89	2.03	1.59	1.78	250.46	142.95
Total gross import	14.60	167.30	981.76	60.16	205.35	253.06	87.62	8.71	45.53	40.11	107.24	203.03	523.28	2698

The Water Footprint Network

<http://www.waterfootprintnetwork.org/Reports/Report11.pdf>



# Major Regions of Virtual Water Trade

A graphic depiction of the hidden flow of embedded water

Kevin McVey

Not all water is handled directly. From brussels sprouts to lined notebook paper, most products you see have seen water in some capacity. This secondary water, *virtual water*, can help paint a picture of our world. Here's a few examples, you can undoubtedly find many more.



Import / Export Relationships



Location Correlation



Exclusivity Metrics

Data provided by The Water Footprint Network  
<http://www.waterfootprintnetwork.org/Reports/Report11.pdf>

Discover more on your own at  
<http://people.virginia.edu/~kmm4ce/water/>

<http://people.virginia.edu/~kmm4ce/water/>

CS1501 (F13): Site Information Display

Options



<http://kevin.4mcveys.com/CS1501/>

CS1501 (F13): Recent Announcements

Options

**Announcements** (viewing announcements from the last 10 days)

There are currently no announcements at this location.

CS1501 (F13): Message Center Notifications

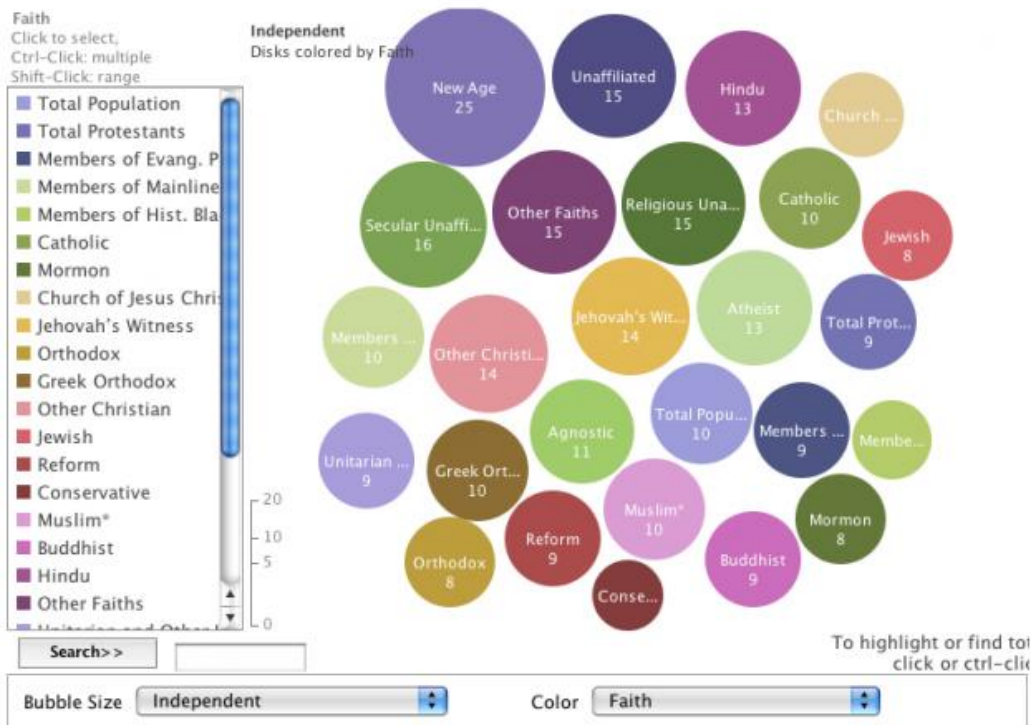
[New in Forums](#)

none

# Independents by Religious Tradition

Creator: The New York Times

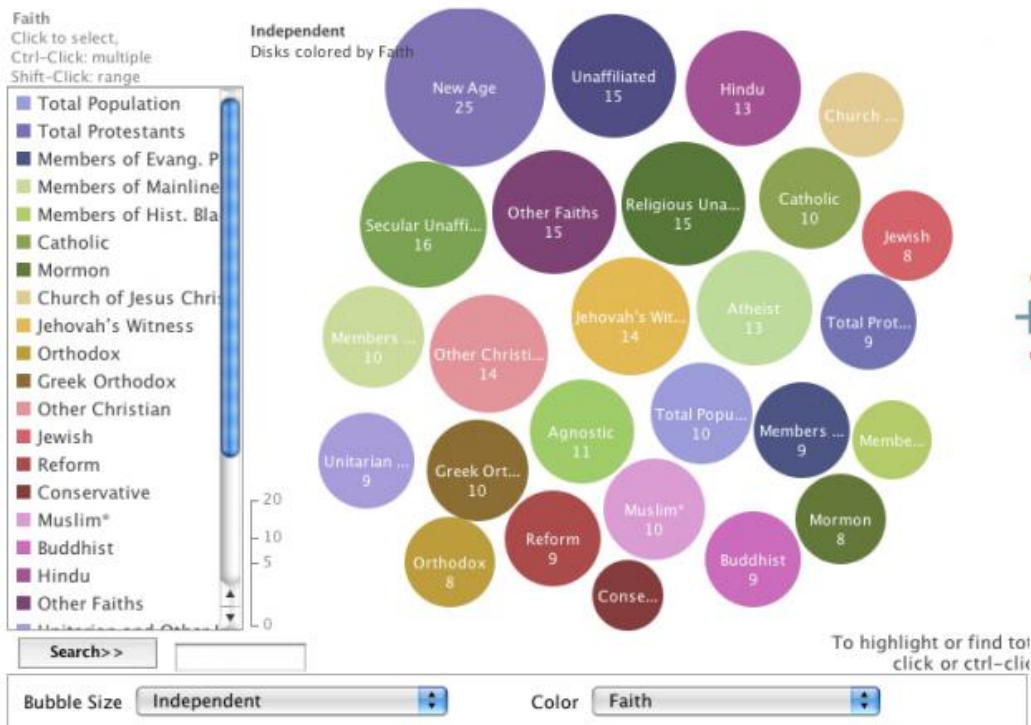
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Creator: The New York Times

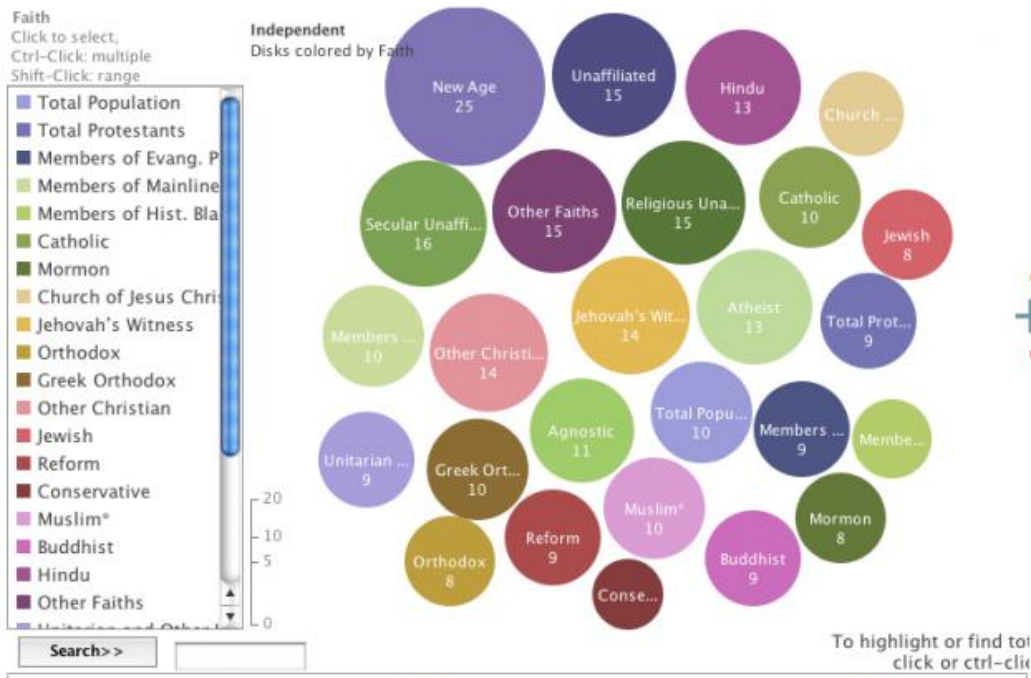
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# Independents by Religious Tradition

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## Software Development Engineer - Data Visualization & Machine learning

[Apply for this Job](#)

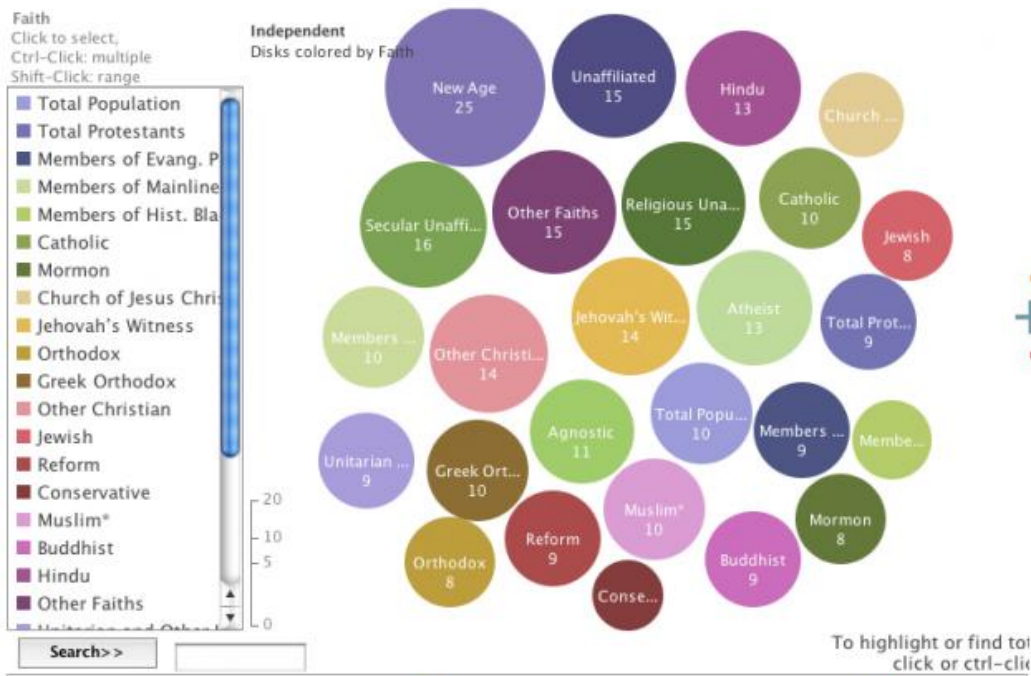
US, WA, Seattle • Job ID 214217 • Amazon Corporate LLC



# Independents by Religious Tradition

Creator: The New York Times

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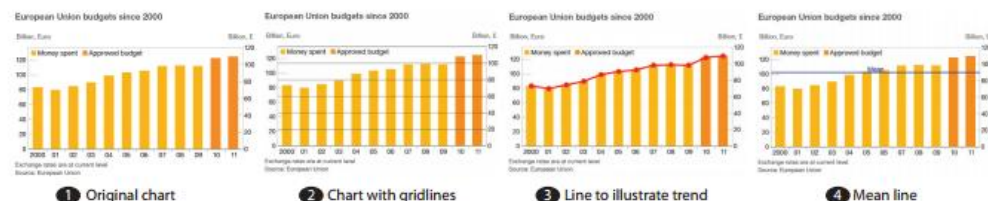
## Software Development Engineer - Data Visualization & Machine learning

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## Graphical Overlays: Using Layered Elements to Aid Chart Reading

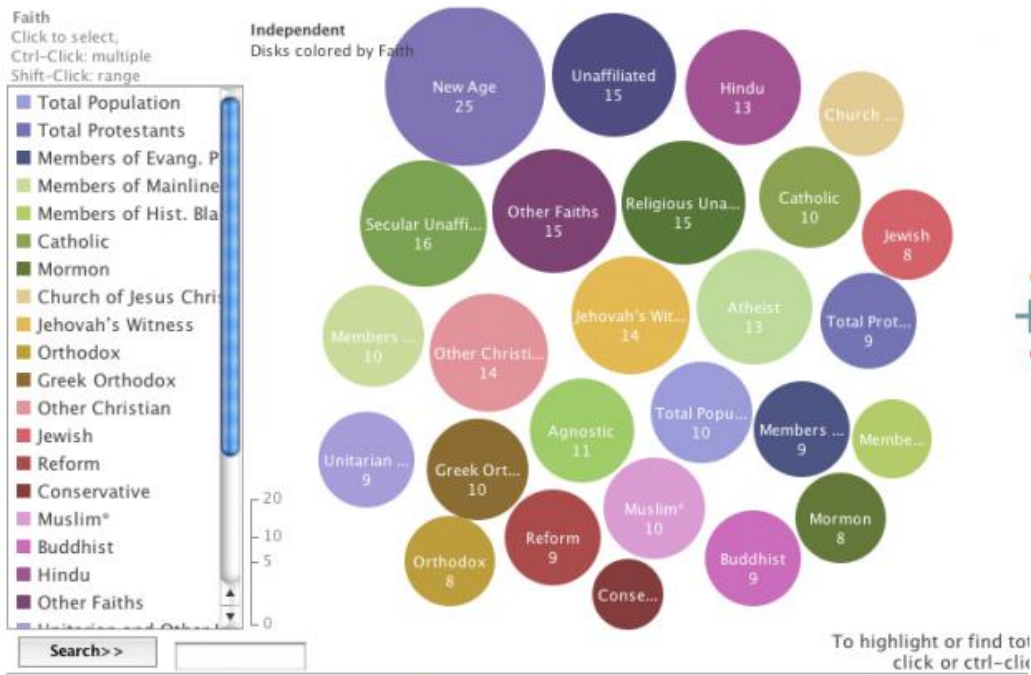
Nicholas Kong and Maneesh Agrawala



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Creator: The New York Times

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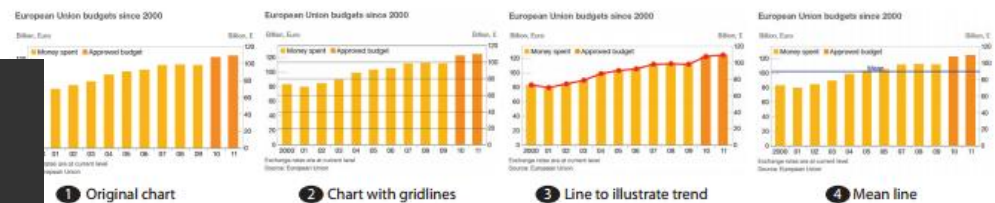
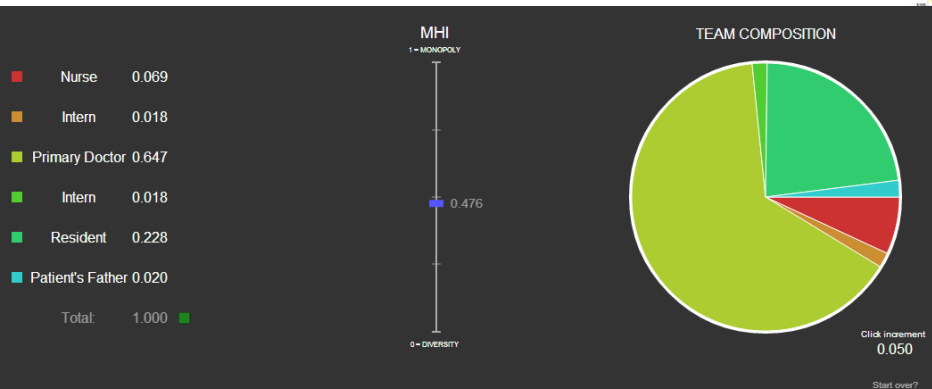
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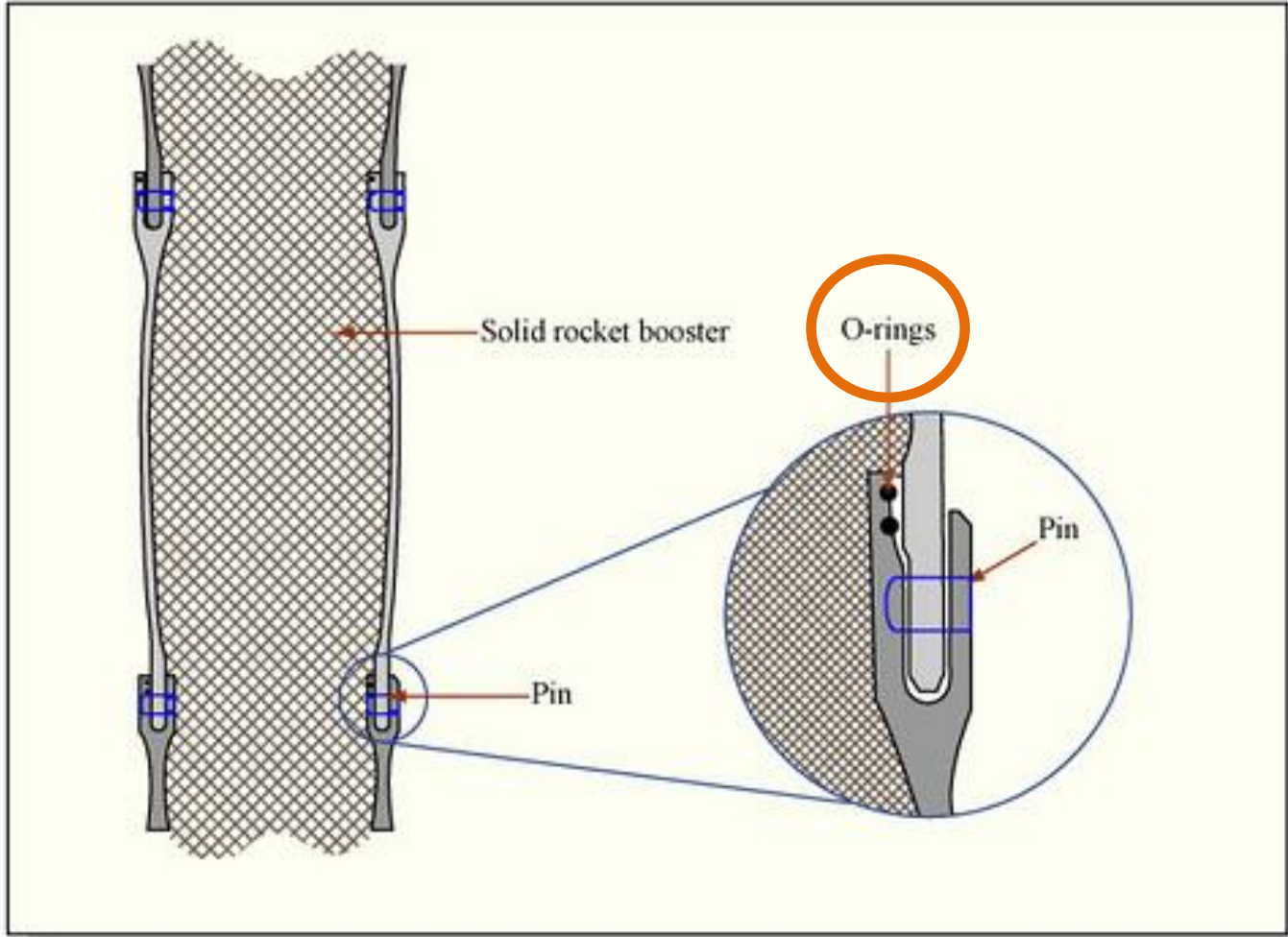
[Apply for this Job](#)

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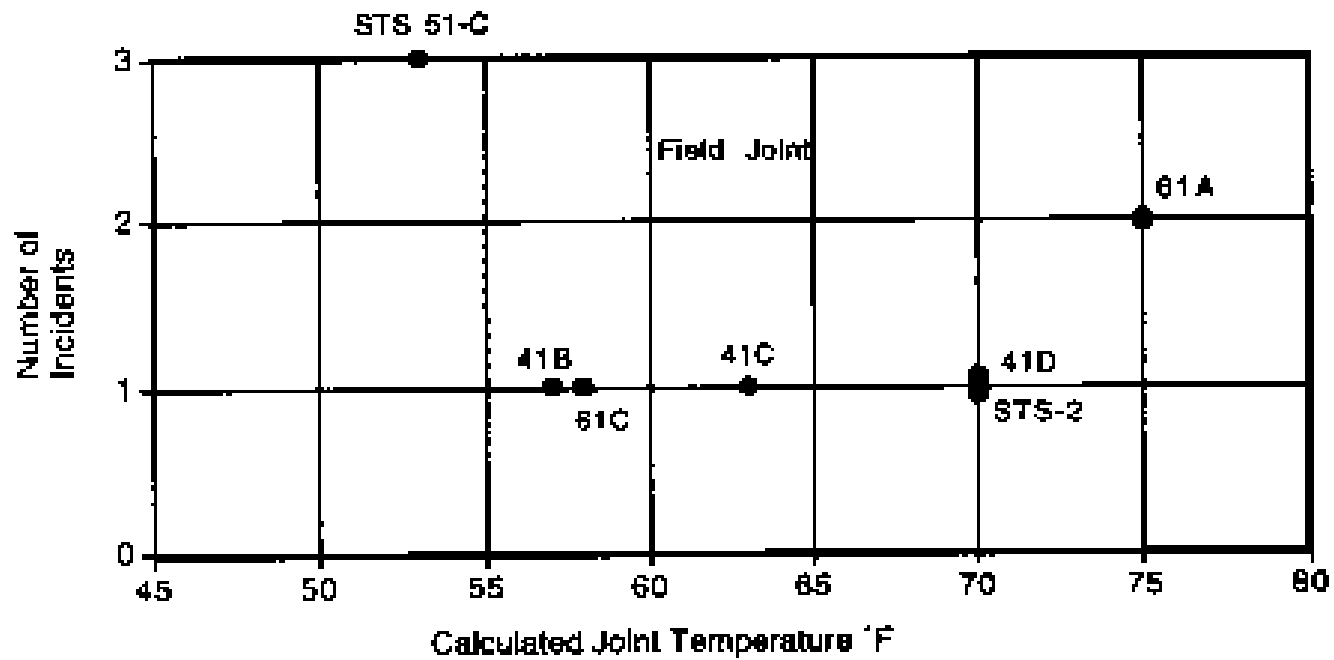
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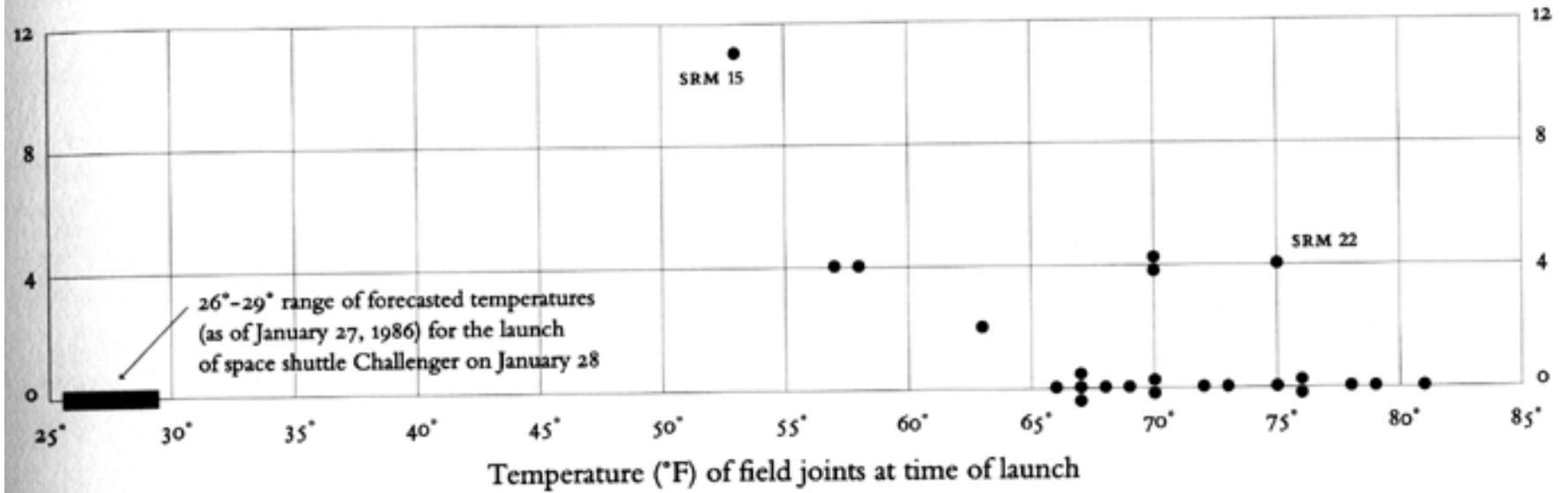






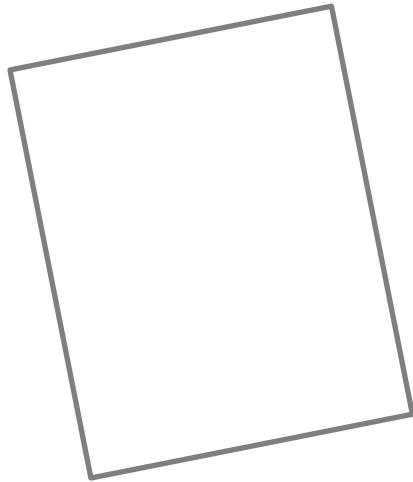


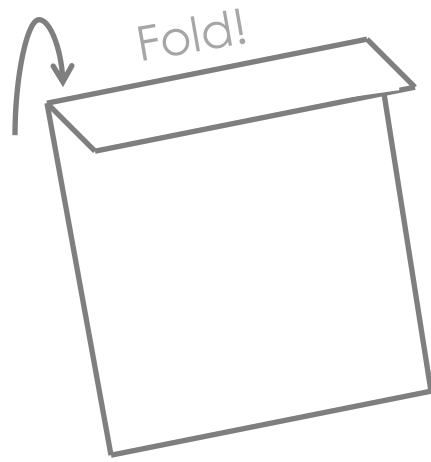
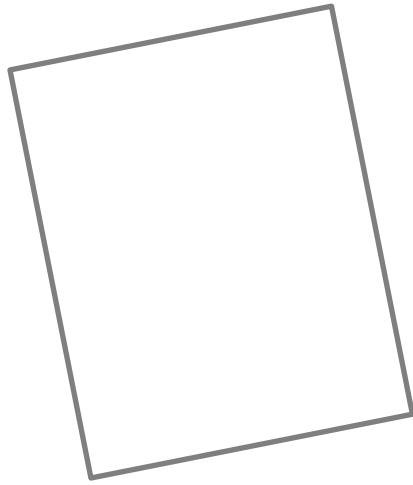
O-ring damage index, each launch

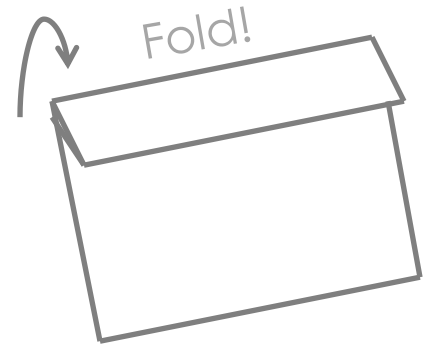
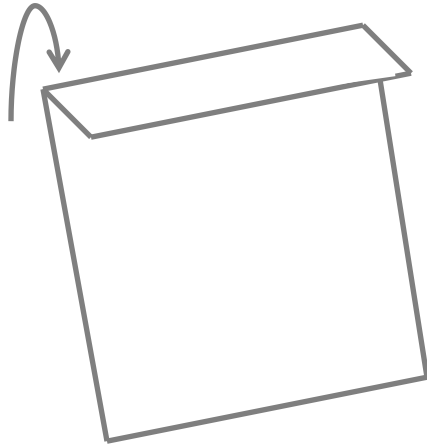
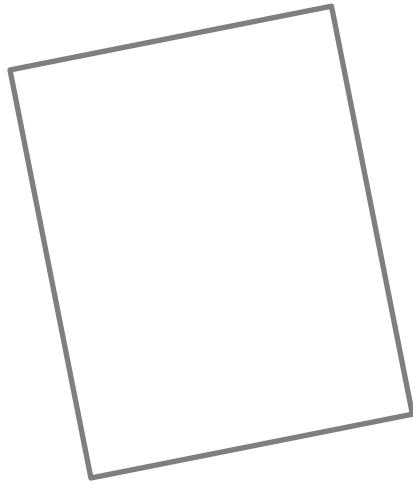


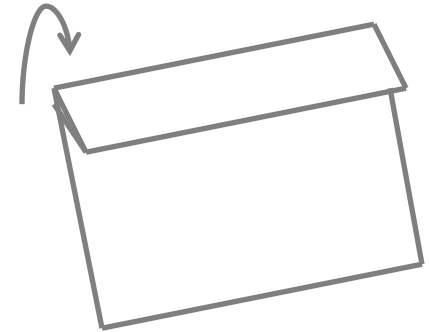
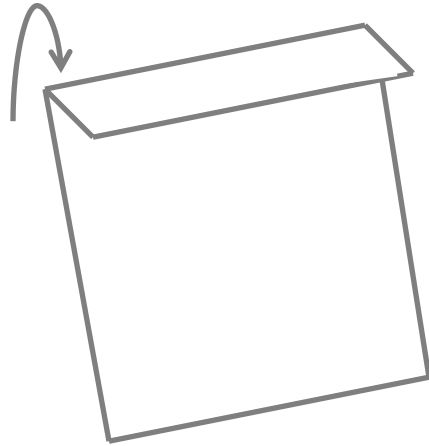
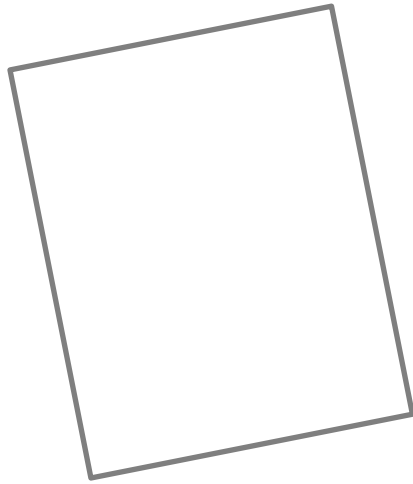
**“Above all else, show the data.”**

-Edward Tufte

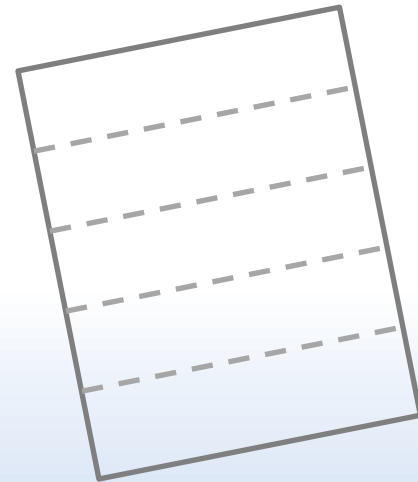








Repeat until...



Kevin McVey  
Not really funny

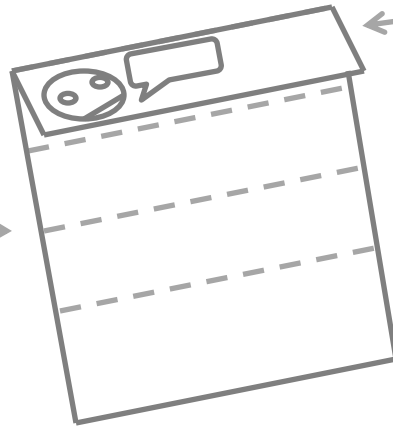
1) Name

2) Something about yourself

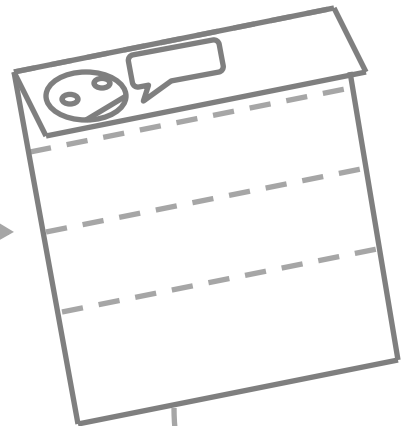
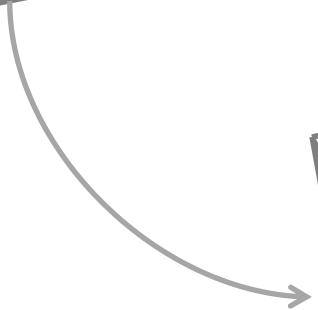
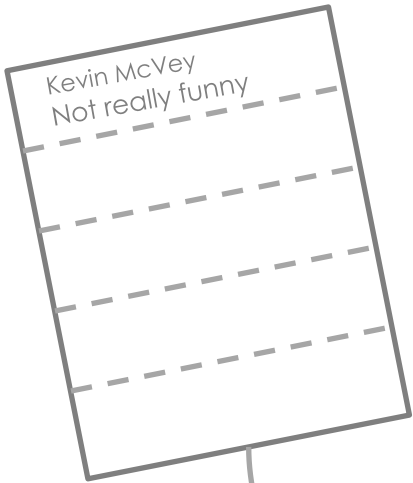




Pass to someone else



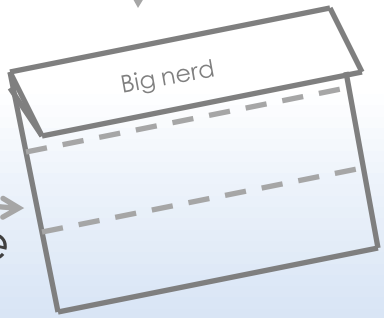
Read, fold, draw a picture of the "something"

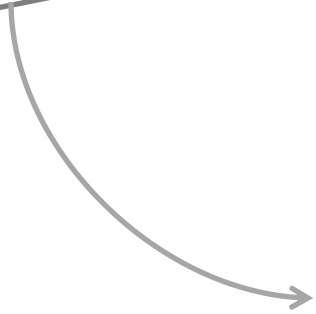
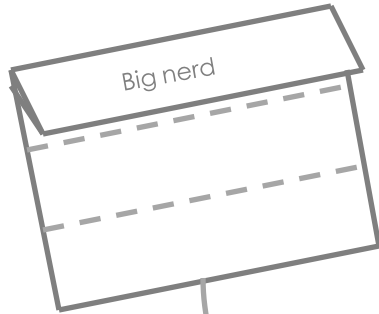


Pass to someone else

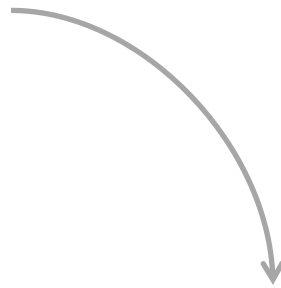


Study, fold, write what the drawing is of

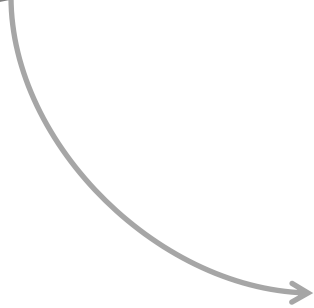




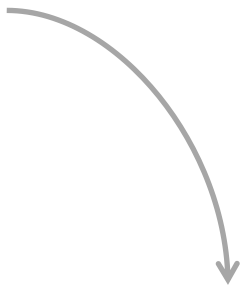
Continue until...



Horse drawn carriage



**Unfold, compare!**



Kevin McVey  
Not really funny

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