



ĐẠI HỌC BÁCH KHOA HÀ NỘI
VIỆN CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

Take Away - Storytelling with Data

Credit: prof. Nam Wook Kim

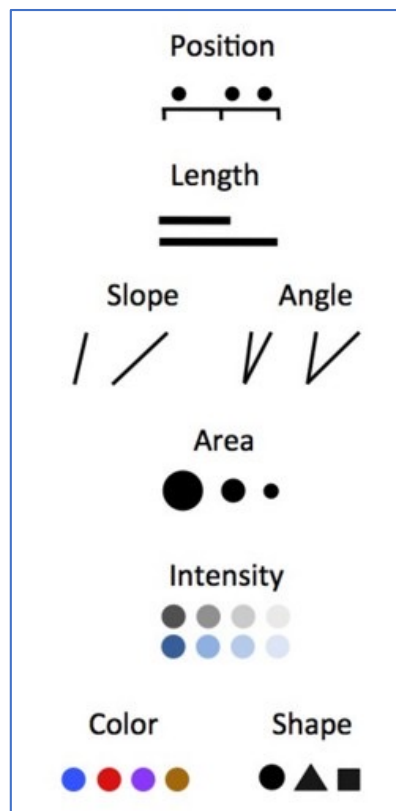
Goal

Beyond exploratory analysis: Visualization for communication

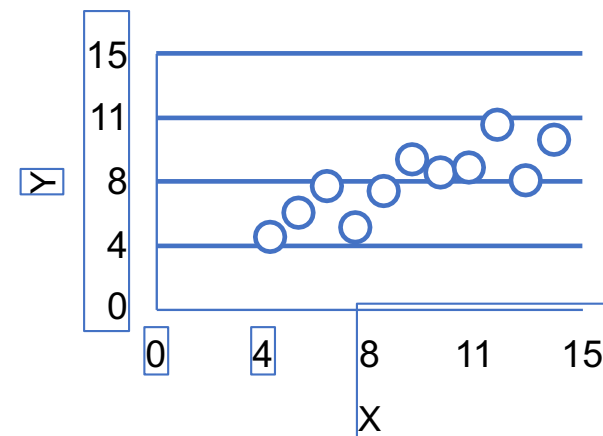
Data

X	Y
10.0	8.04
8.0	6.95
13.0	7.58
9.0	8.81
11.0	8.33
14.0	9.96
6.0	7.24
4.0	4.26
12.0	10.84
7.0	4.82
5.0	5.68

Perceptual Variables



Visualization



Position (x, y)

Design Criteria

- Expressiveness
 - A set of facts is expressible in a visualization if it expresses all the facts and only the facts in the data.
- Effectiveness
 - A visualization is more effective than another one if the information conveyed is more readily perceived.

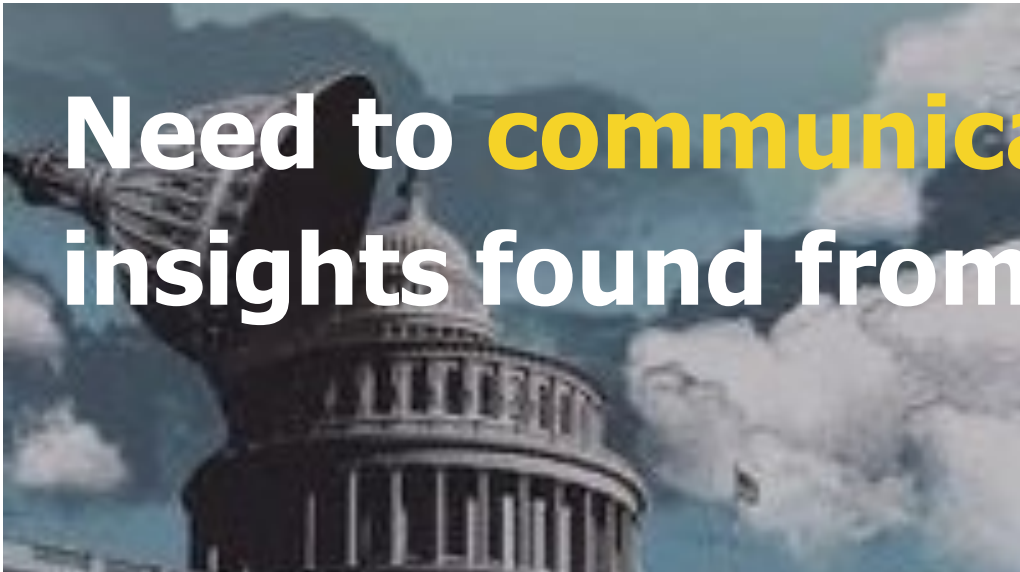
Data ↔ Insights



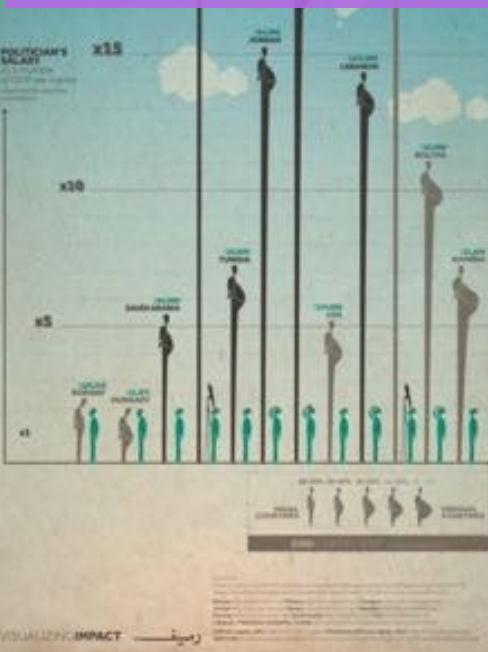
Exploratory

- Data Centered
- Domain Experts
- Analysis
- Desktop
- In-Lab

Need to **communicate**
insights found from data



POLITICIANS' SALARIES & INCOME INEQUALITY



MISSION(S) TO MARS

Though most missions to the red planet have failed, the success rate is definitely improving > > >

AERICAL CORNELIA UNIVERSITY, 85 BOWMAN SPACE HUNTERY, NARR. RUSSEANPACER.COM



U.S. HISTORY OF TAXATION ON CIGARETTES IN BILLIONS OF DOLLARS



42.5%

There is a growing trend of people who are not eating meat, but are still eating fish and seafood.

38%

There is a growing trend of people who are not eating meat, but are still eating fish and seafood.

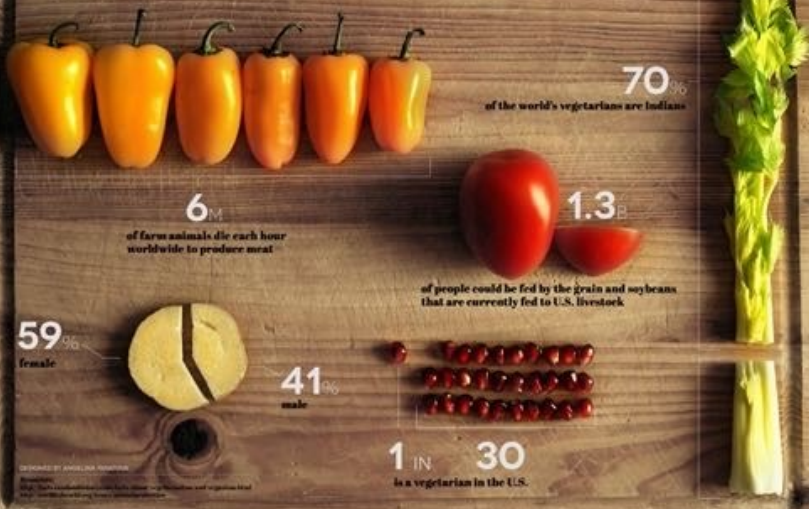
46%

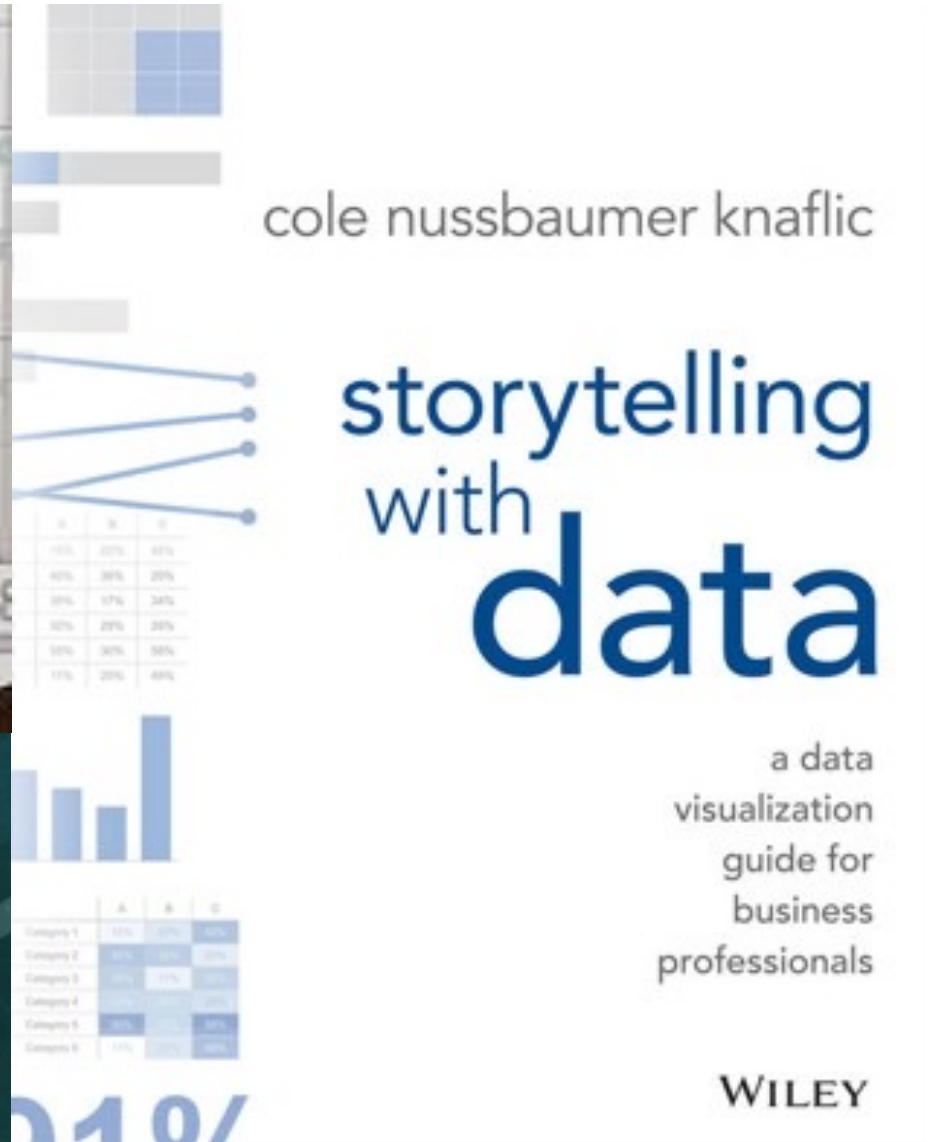
There is a growing trend of people who are not eating meat, but are still eating fish and seafood.

66%

There is a growing trend of people who are not eating meat, but are still eating fish and seafood.

VEGETARIANISM IN NUMBERS





Data ↔ Insights ↔ Messages

Exploratory

- Data Centered
- Domain Experts
- Analysis
- Desktop
- In-Lab

Beyond Exploratory

- Human Centered
- General Audience
- Communication
- Off-Desktop
- In-the-Wild

Practical guidance to better communicate visually with data

1. Understand the context
- ~~2. Choose an appropriate visual display~~
- ~~3. Use redundant encoding~~
- ~~4. Eliminate clutter~~
- ~~5. Focus your audience's attention~~
- ~~6. Add explanations~~
7. Tell a story

Understand the context

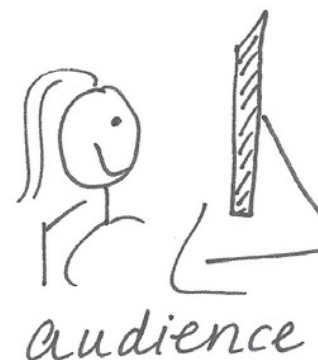
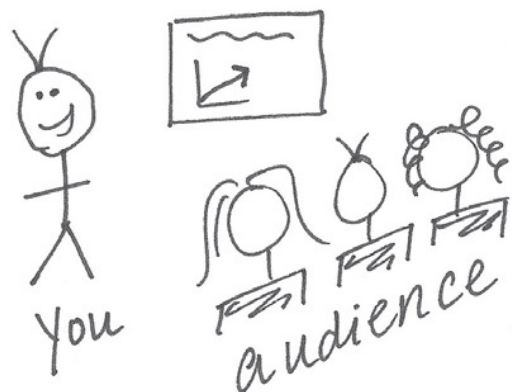
Exploratory vs. explanatory analysis

- Exploratory analysis is what you do to understand the data and figure out what might be noteworthy or interesting
 - simply present the data
 - show your audience everything, as evidence of all of the work you did and the robustness of the analysis
- The point of communicating our analysis to our audience, we really want to **be in the explanatory space**, meaning you have a specific thing you want to explain, a specific story you want to tell
 - taking the time to turn the data into information that can be consumed by an audience

Explanatory analysis

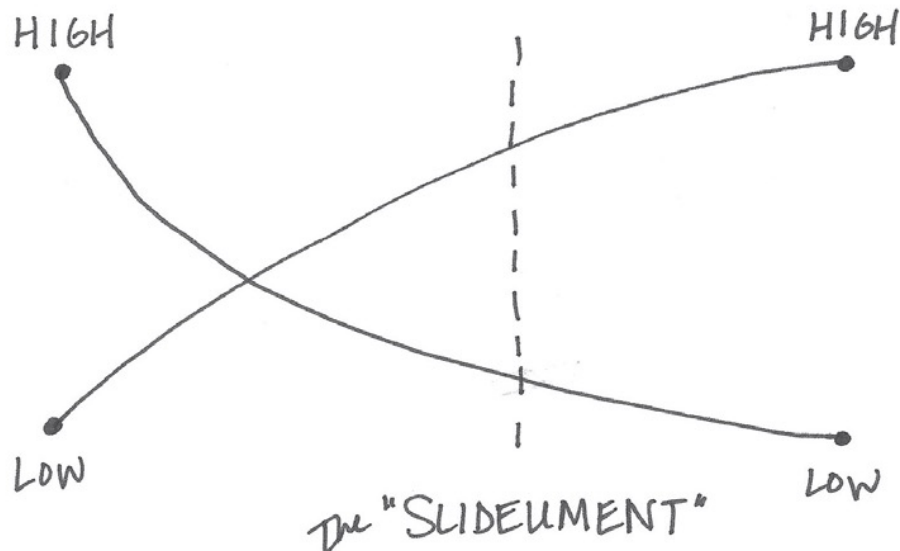
- A specific thing we want to explain, a specific story we want to tell
 - Taking the time to turn the data into information that can be consumed by an audience.
- A few things to think about and be extremely clear on before visualizing any data or creating content.
 - Who
 - First, To whom are you communicating?
 - What
 - Second, What do you want your audience to know or do?
 - Mechanism
 - How will you communicate to your audience?
 - Tone
 - What tone do you want your communication to set
 - How
 - What data is available that will help make my point?

LIVE PRESENTATION WRITTEN DOC OR EMAIL



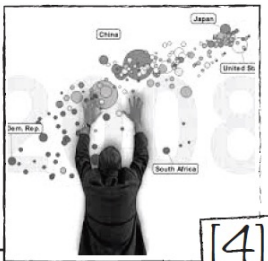
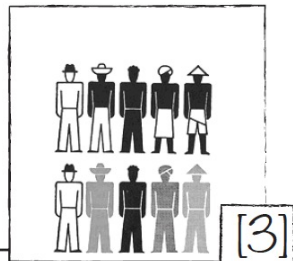
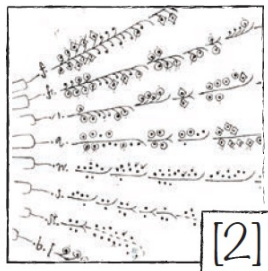
amount of
CONTROL
you have

level of
DETAIL
needed

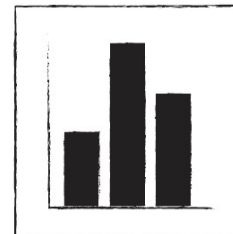


Tell stories with data

Visualizations can be effective in showing data,



but a single picture alone may not be able to explain nor to engage an audience in decoding a message.



How do we engage an audience?

How do we break down complexity?

How do we guide the audience?

Bach et al. CG&A'17

Storyboarding

- The storyboard establishes a structure for communication.
 - It is a visual outline of the content we plan to create.
- Subject to change as we work through the details but establishing a structure early on will set we up for success.

Example of storyboarding

Issue:

Kids have bad attitudes about science

Demonstrate Issue:

show student assignment grades over course of year

Ideas for overcoming issue, including pilot program

Describe pilot program - goals, etc.

Show before & after survey data to demonstrate success of program

RECOMMENDATION:
pilot was a success
let's expand it
we need \$\$



Stories

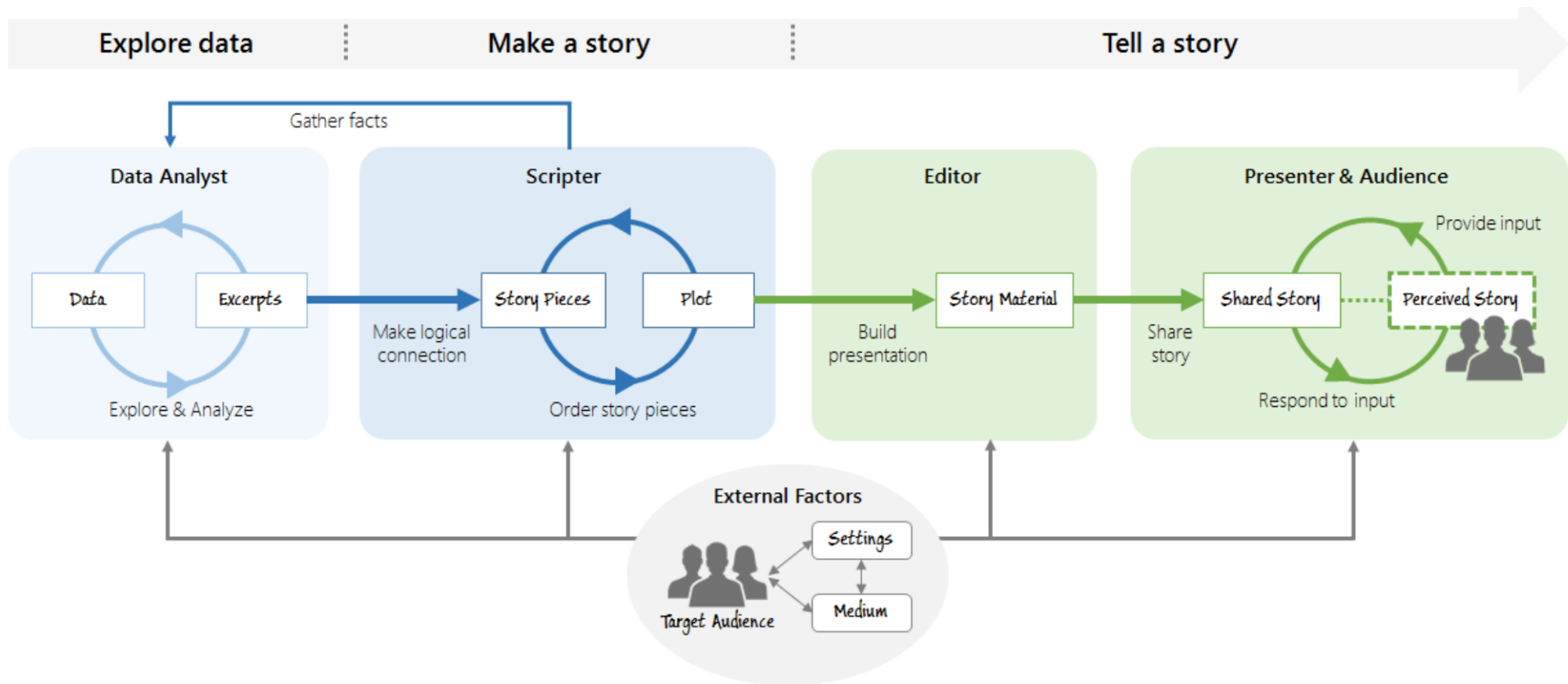
Stories are the most powerful delivery tool for information, more powerful and enduring than any other art form

The best stats you've ever seen

- <https://www.youtube.com/watch?v=hVimVzgtD6w>

Use of elements from storytelling
to convey compelling data stories

Data Storytelling Process: transforming data into visual stories



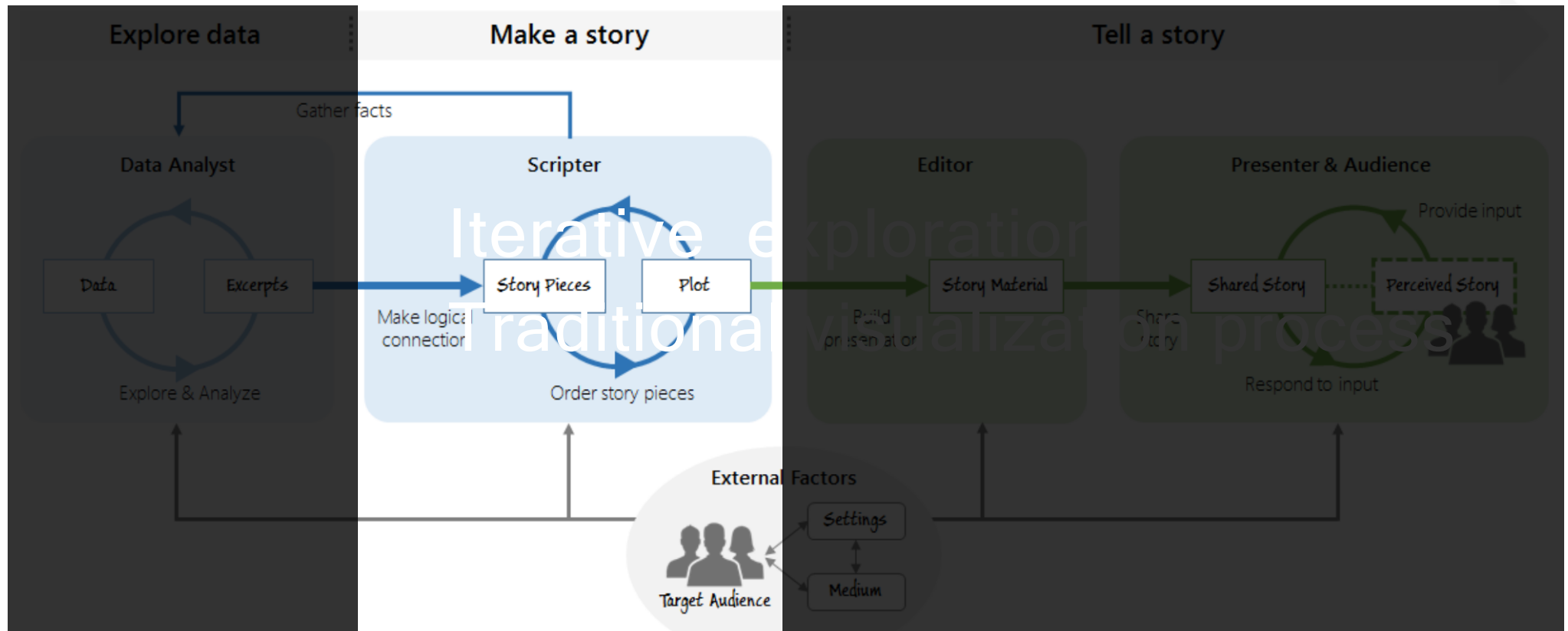
[B. Lee et al 2015]

Data Storytelling Process: transforming data into visual stories



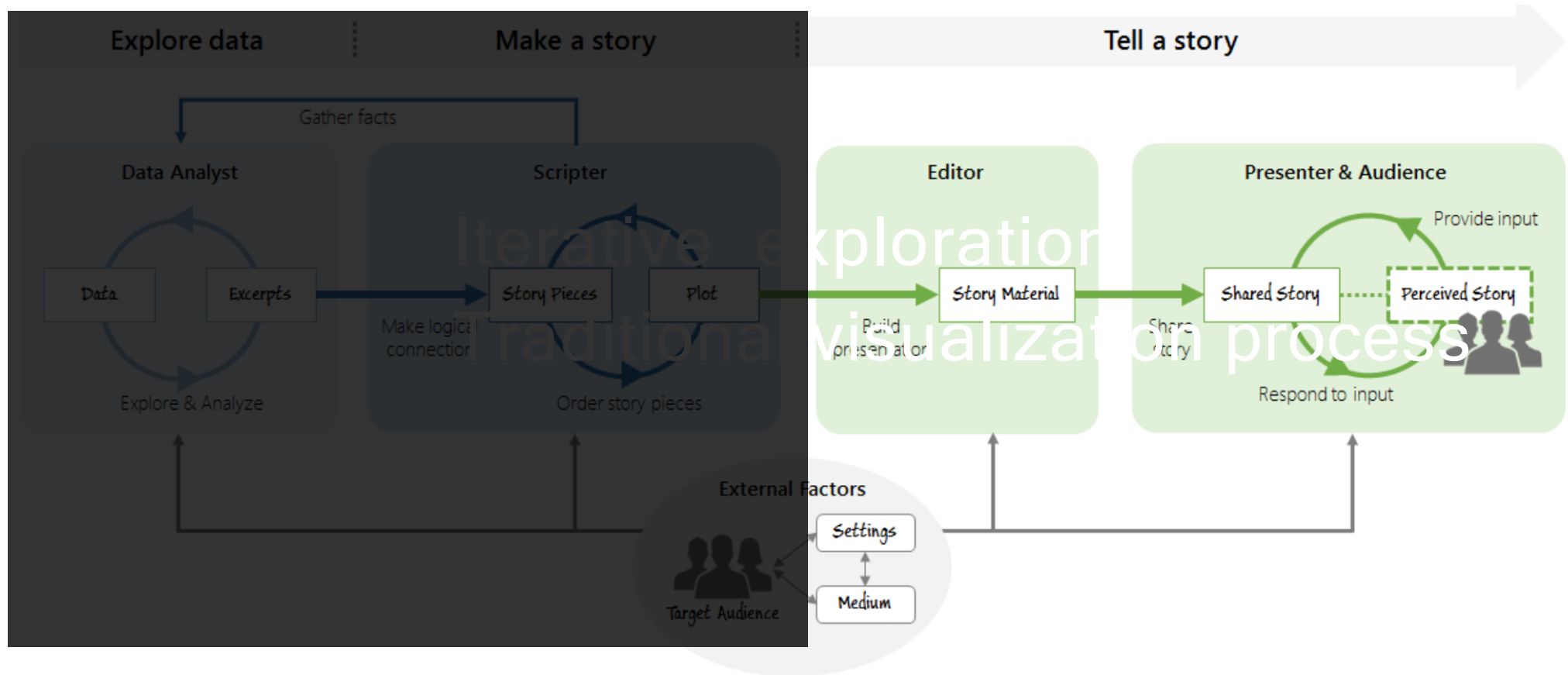
[B. Lee et al 2015]

Data Storytelling Process: transforming data into visual stories



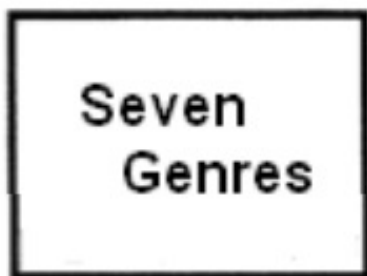
[B. Lee et al 2015]

Data Storytelling Process: transforming data into visual stories

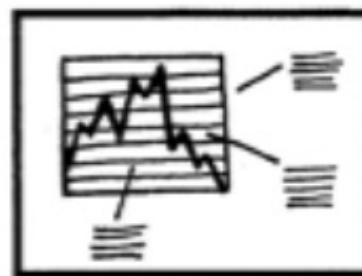


[B. Lee et al 2015]

Genres of Data Stories



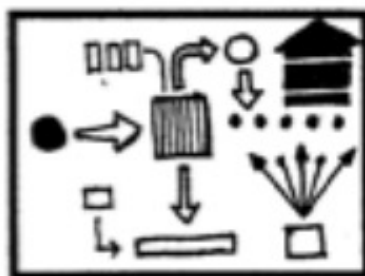
Magazine Style



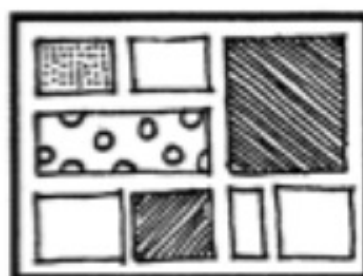
Annotated Chart



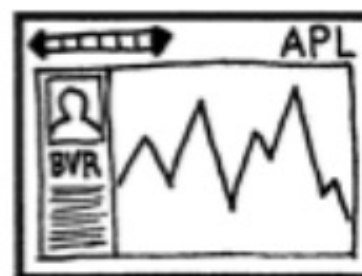
Partitioned Poster



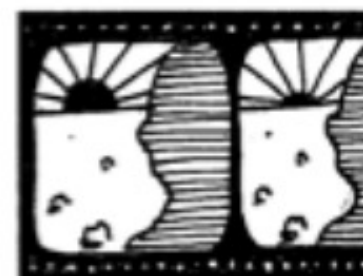
Flow Chart



Comic Strip



Slide Show



Film/Video/Animation

Narration Styles

- Author-Driven
 - Strict ordering of scenes
 - Heavy messaging
 - No interactivity
- Reader-Driven
 - No prescribed ordering
 - No messaging
 - Free interactivity

Author-Driven

https://www.youtube.com/watch?feature=player_detailpage&v=hVimVzgtD6w#t=159s



Reader-Driven

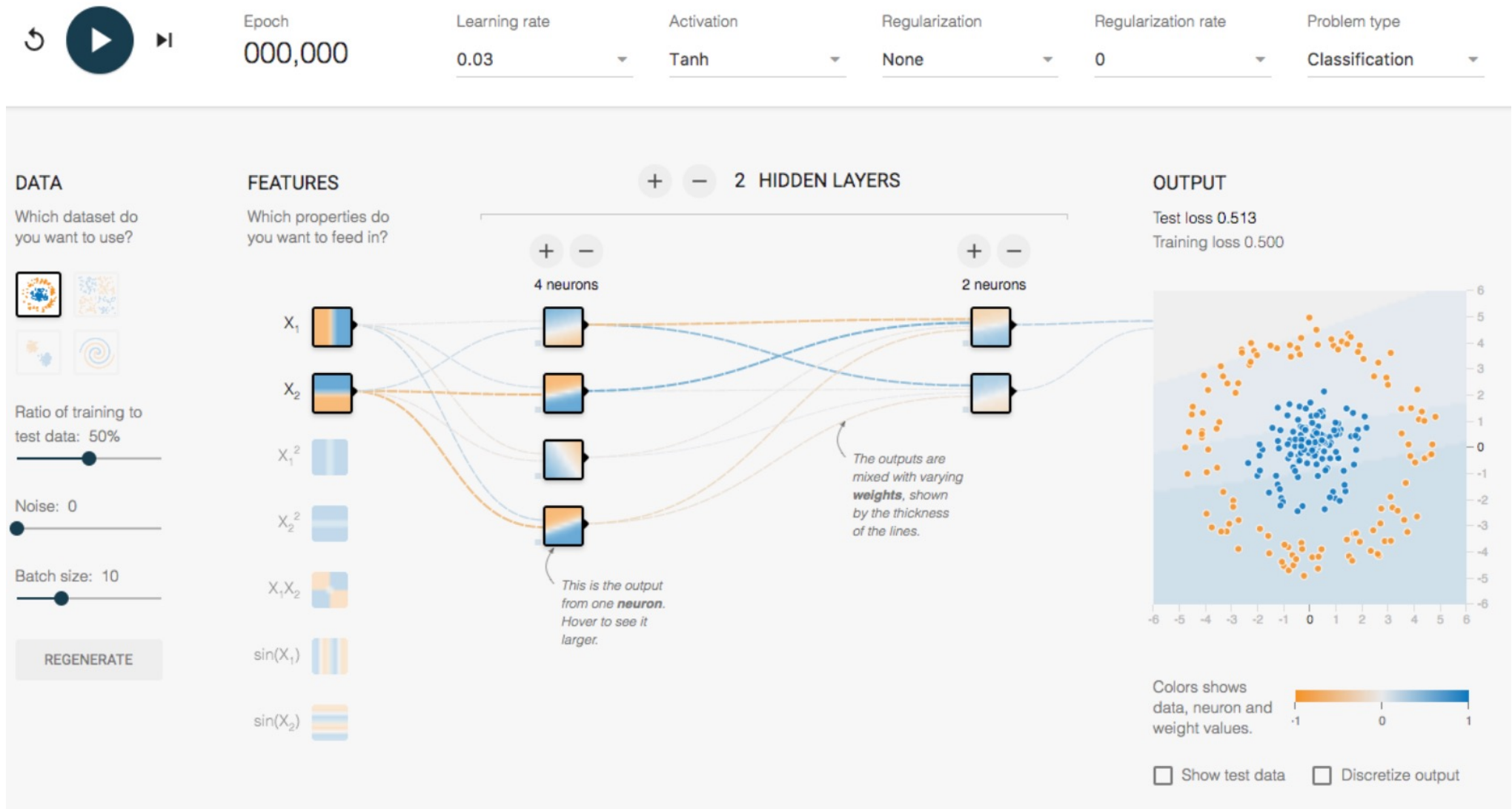


25
YEARS ANNIVERSARY

SOICT

VIỆN CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

<http://playground.tensorflow.org/>



Author-Driven + Reader-Driven

Published: February 2, 2010

Budget Forecasts, Compared With Reality

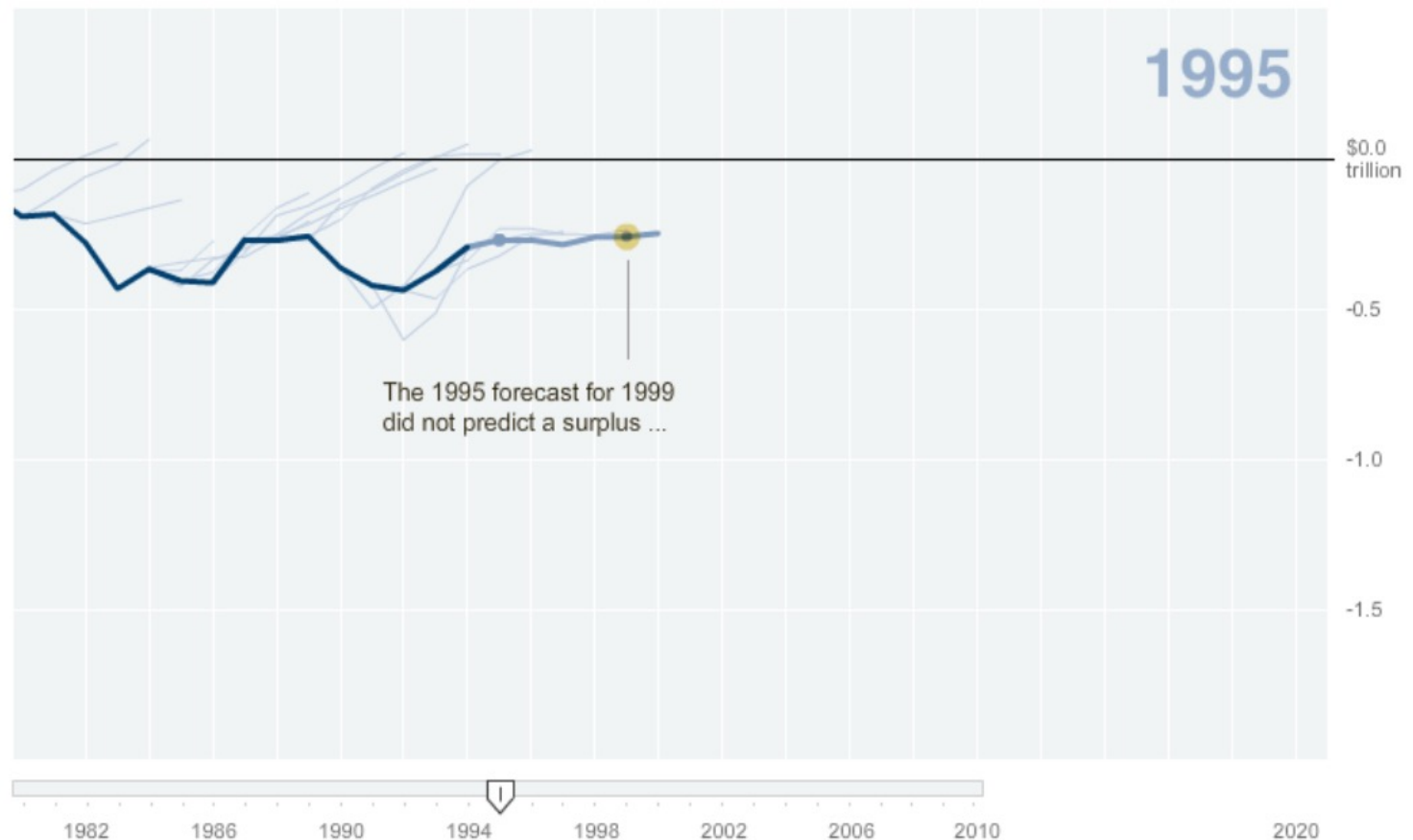
Just two years ago, surpluses were predicted by 2012. How accurate have past White House budget forecasts been?

1 2 3 4 5 6 NEXT ▶

Past forecasts

Even that may be an understatement. In the last 30 years, about 80 percent of four-year deficit forecasts have been too optimistic.

The early Clinton budgets — which failed to predict the surpluses that were generated, in part, by a stock market bubble — are the only major exception.

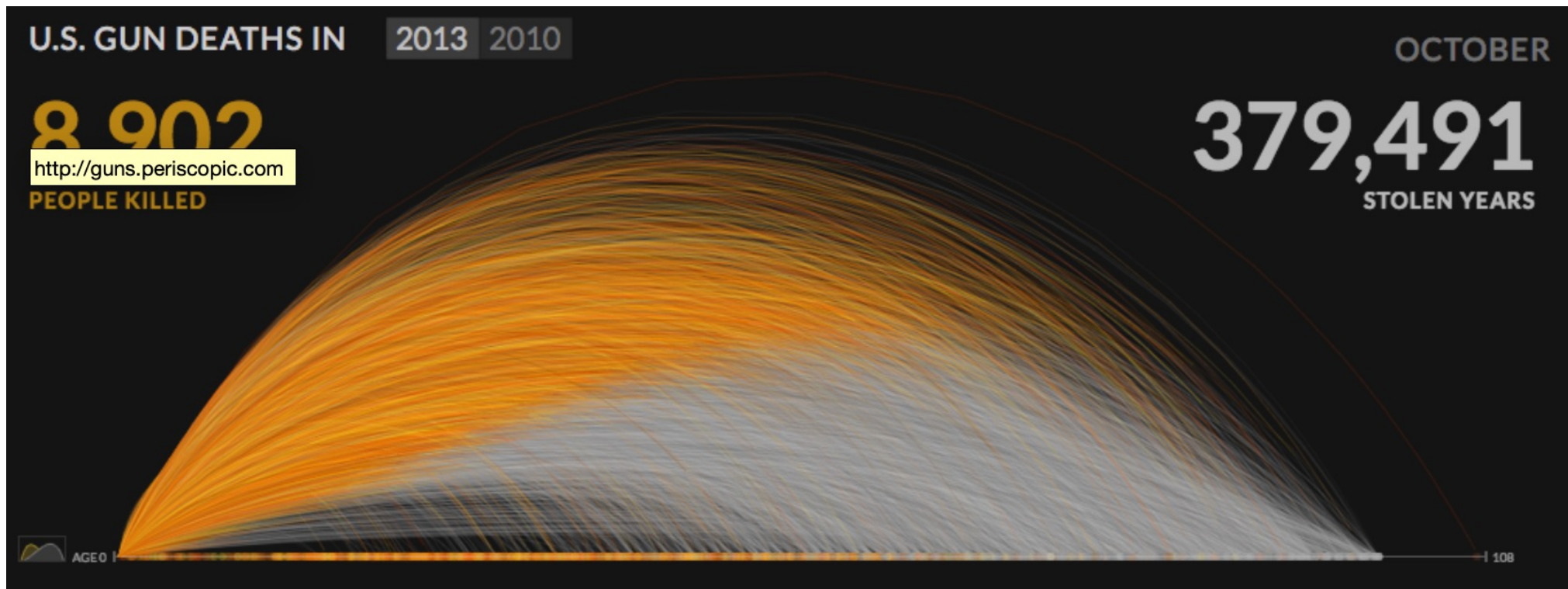


By AMANDA COX | [Send Feedback](#)

Source: Office of Management and Budget

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<https://guns.periscopic.com/>

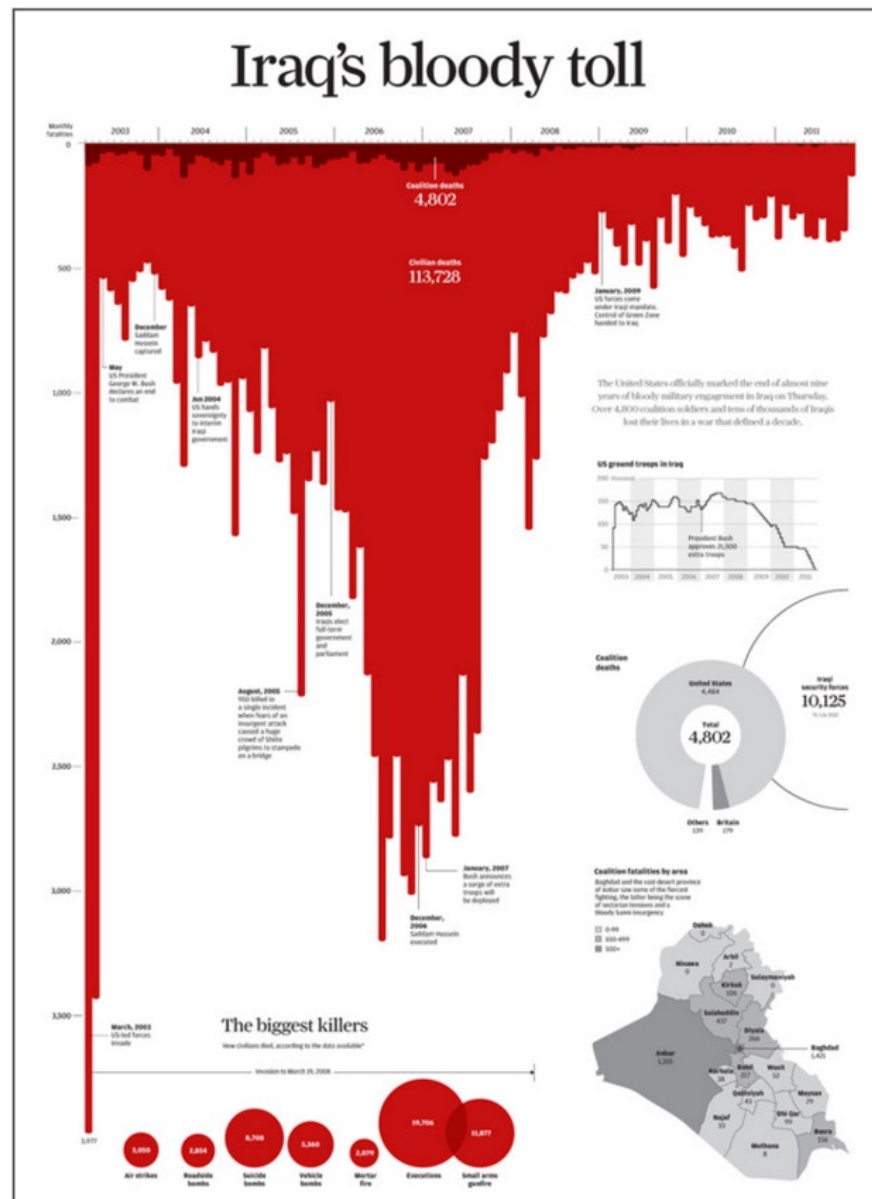


<http://www.fallen.io/>

THE Fallen OF World War II

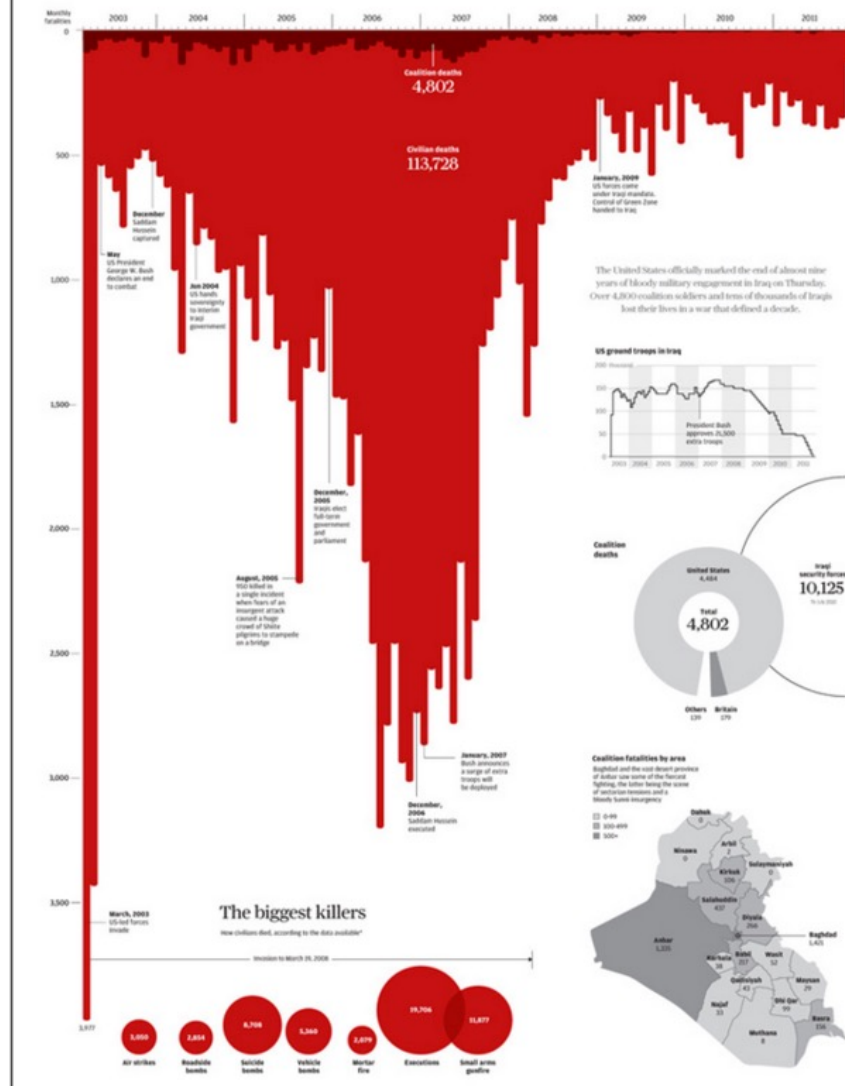


Storytelling, double-edged Sword?



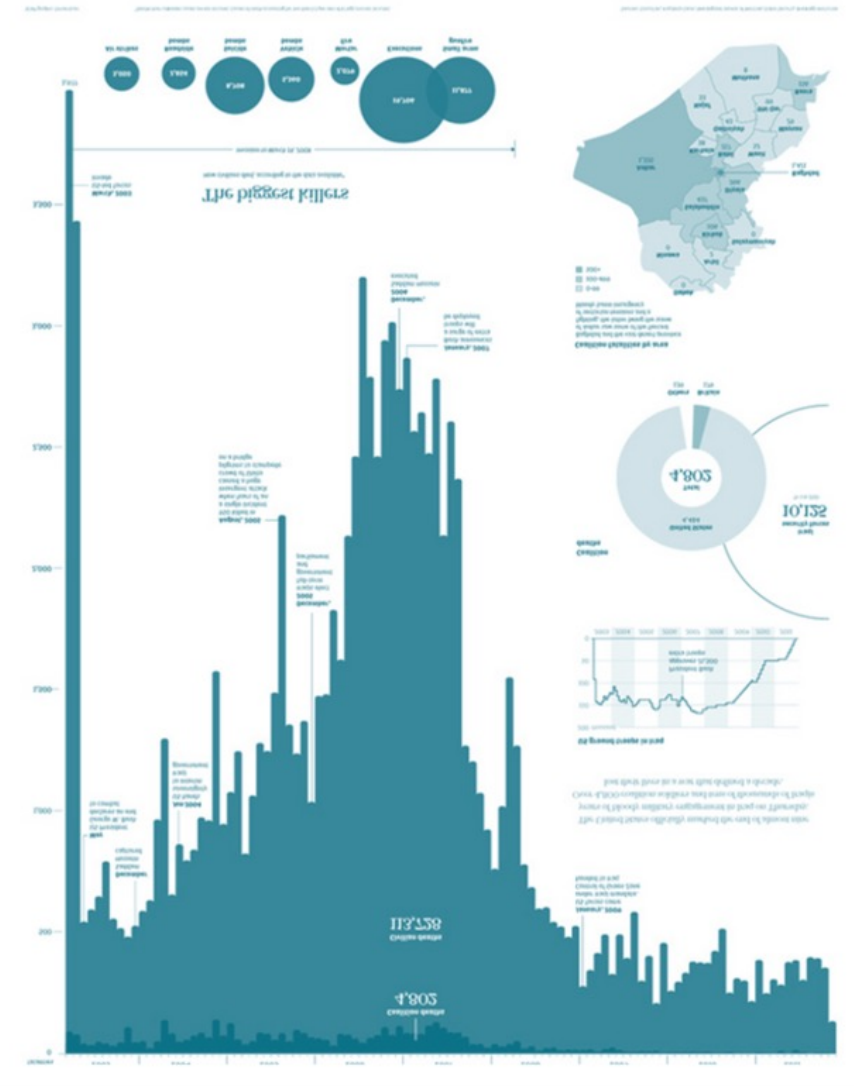
[South China Morning Post
2011]

Iraq's bloody toll

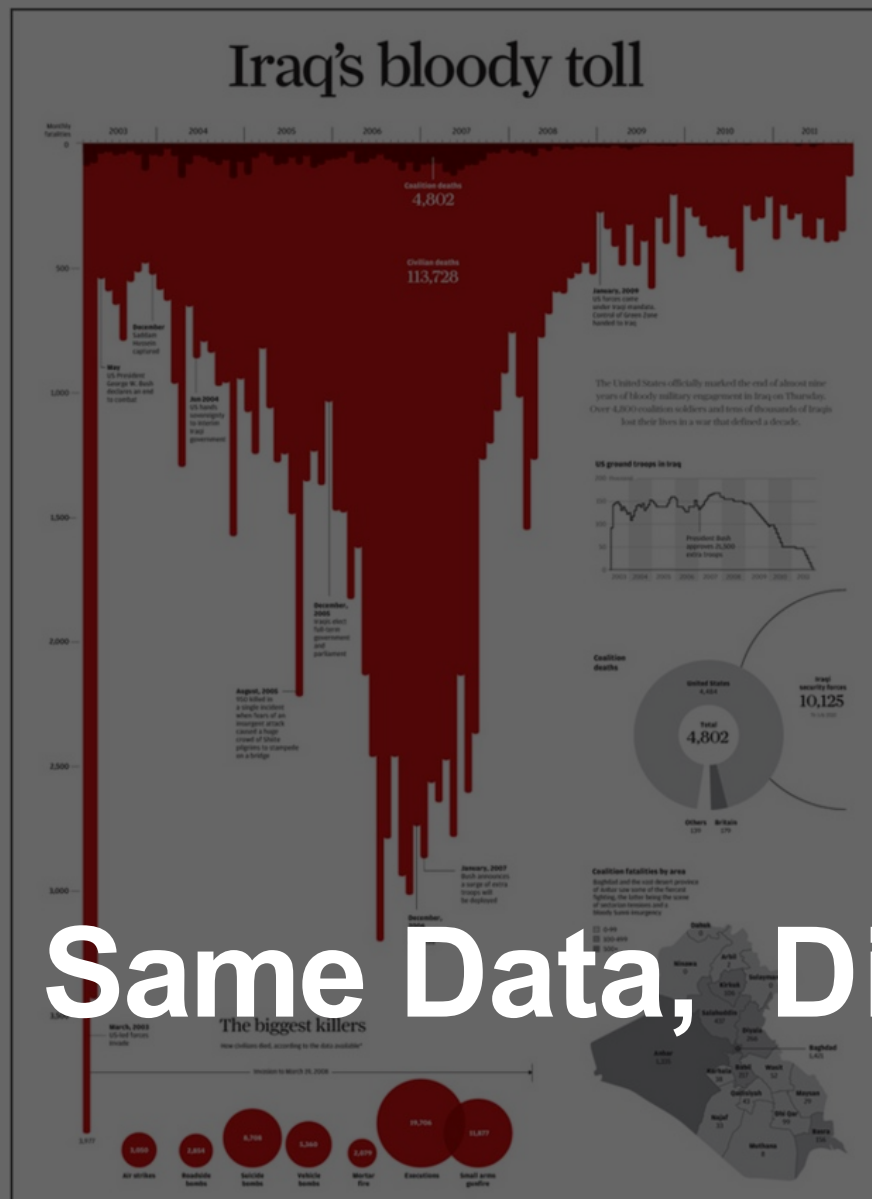


[South China Morning Post 2011]

Iraq: Deaths on the decline



Flipped upside down....



Same Data, Different Stories

[South China Morning Post
2011]



Flipped upside down....