Lecture 5: Advanced graphical considerations

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Prelim: Viz's in the news

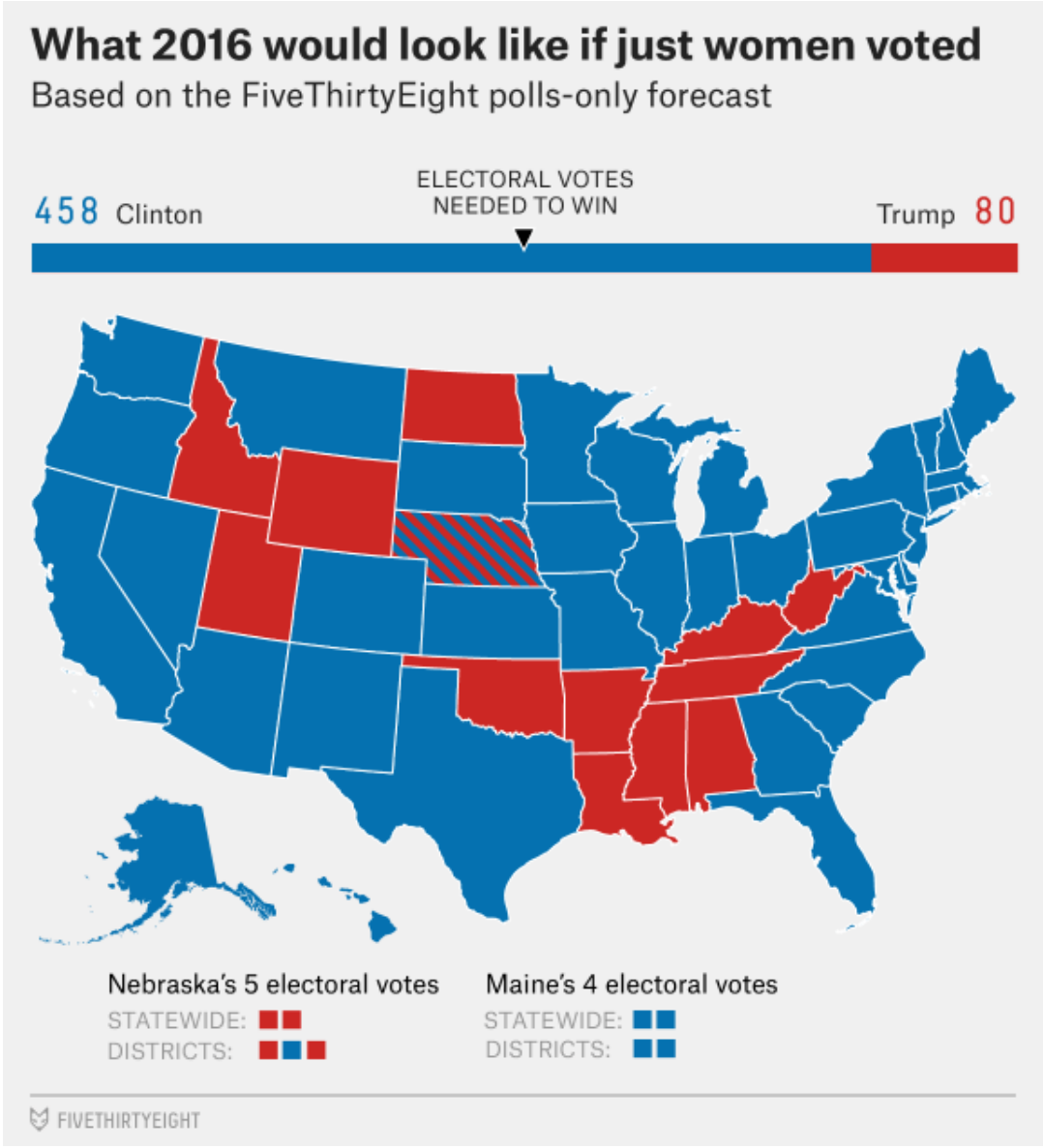


Figure 1: What the election would look like. . .

Prelim: Viz's in the news

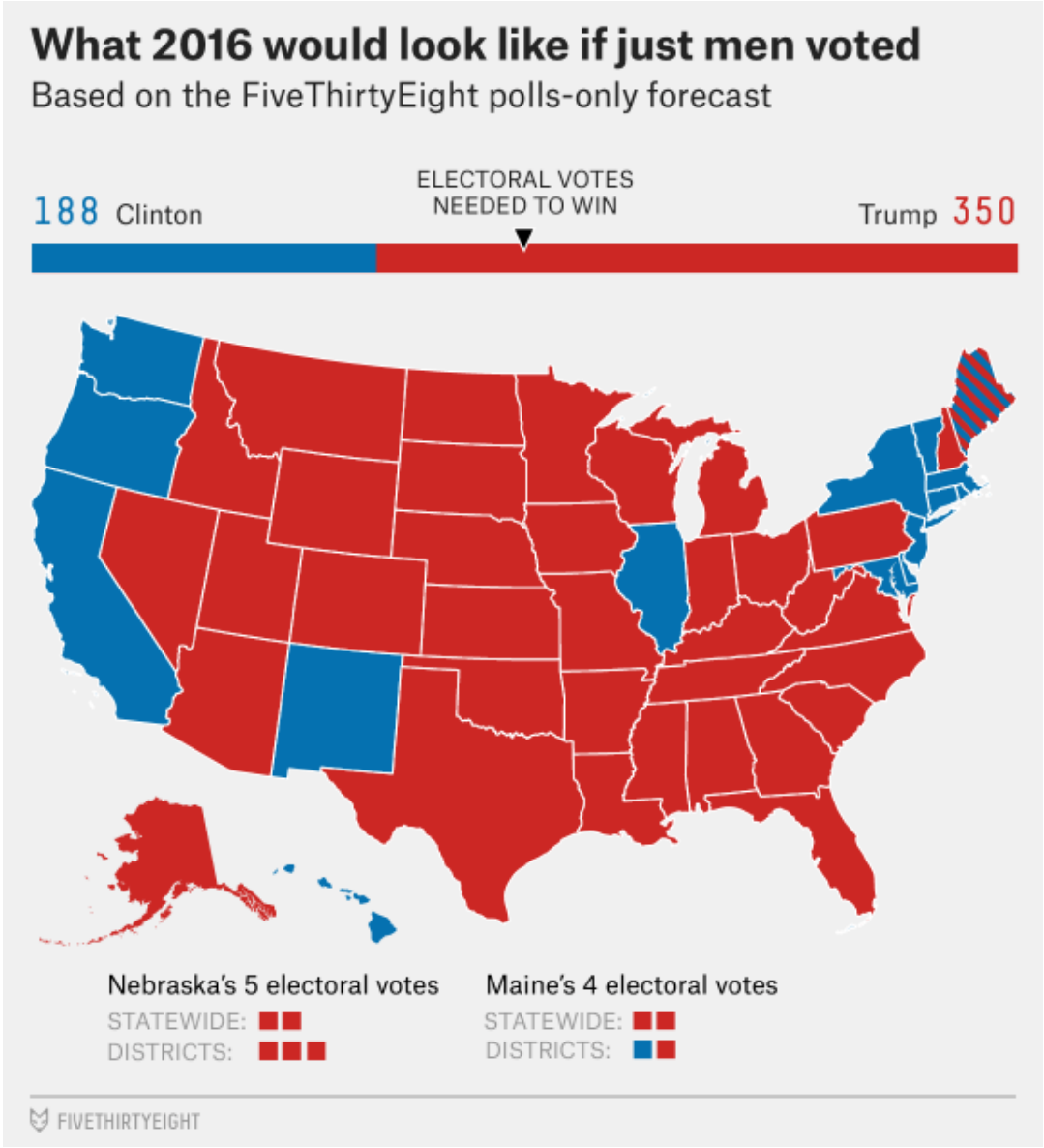


Figure 2: What the election would look like. . .

Prelim: Viz's at home

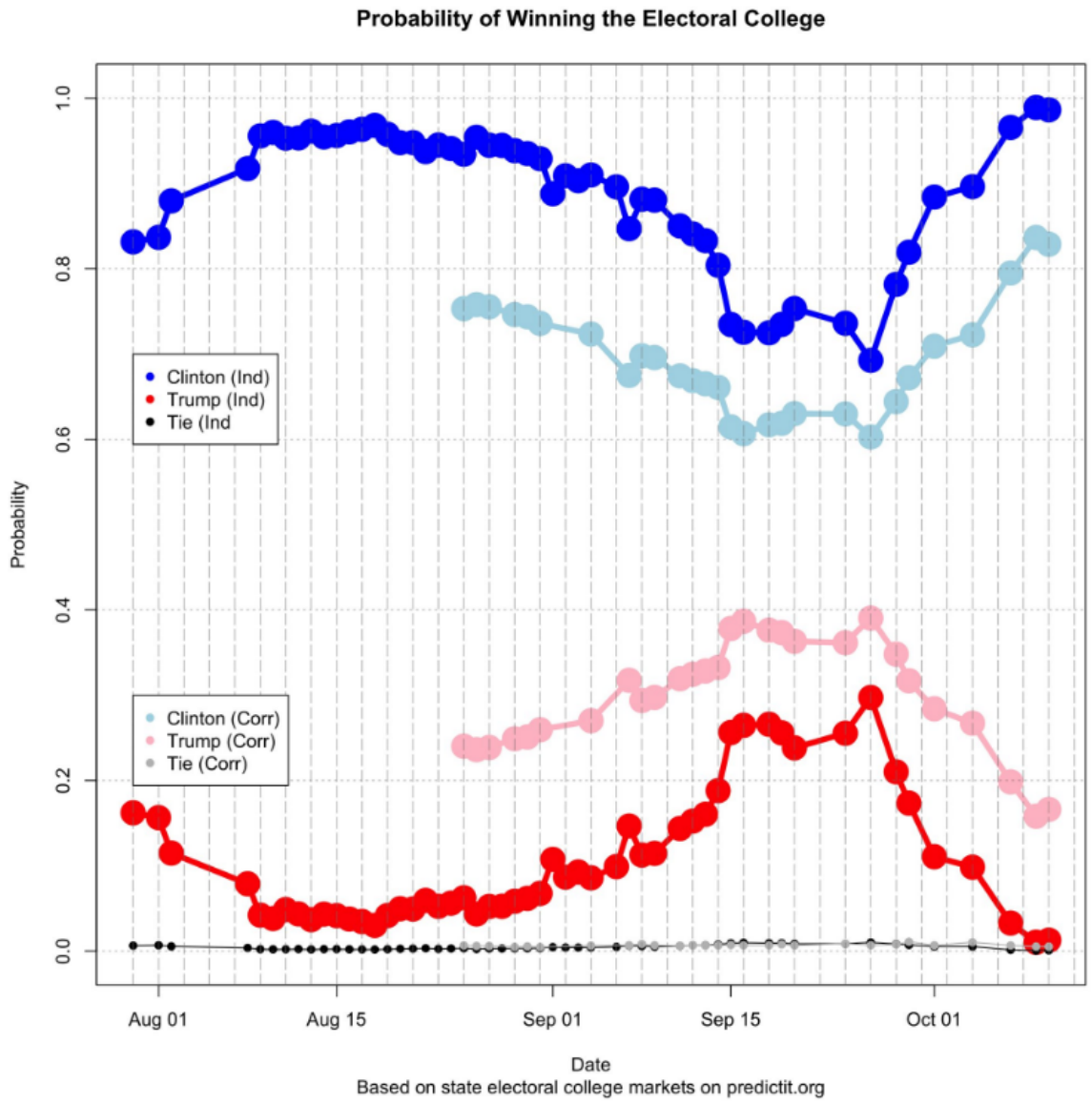


Figure 3: Markets

Preliminary thought

Any visualization is a model. The more accurately a model fits whatever it stands for without being needlessly complex, and the easier it is for its intended audience to interpret it, the better it will be - Alberto Cairo

- Model accuracy
- Mental model, designer
- Mental model, viewer

Example: Model accuracy

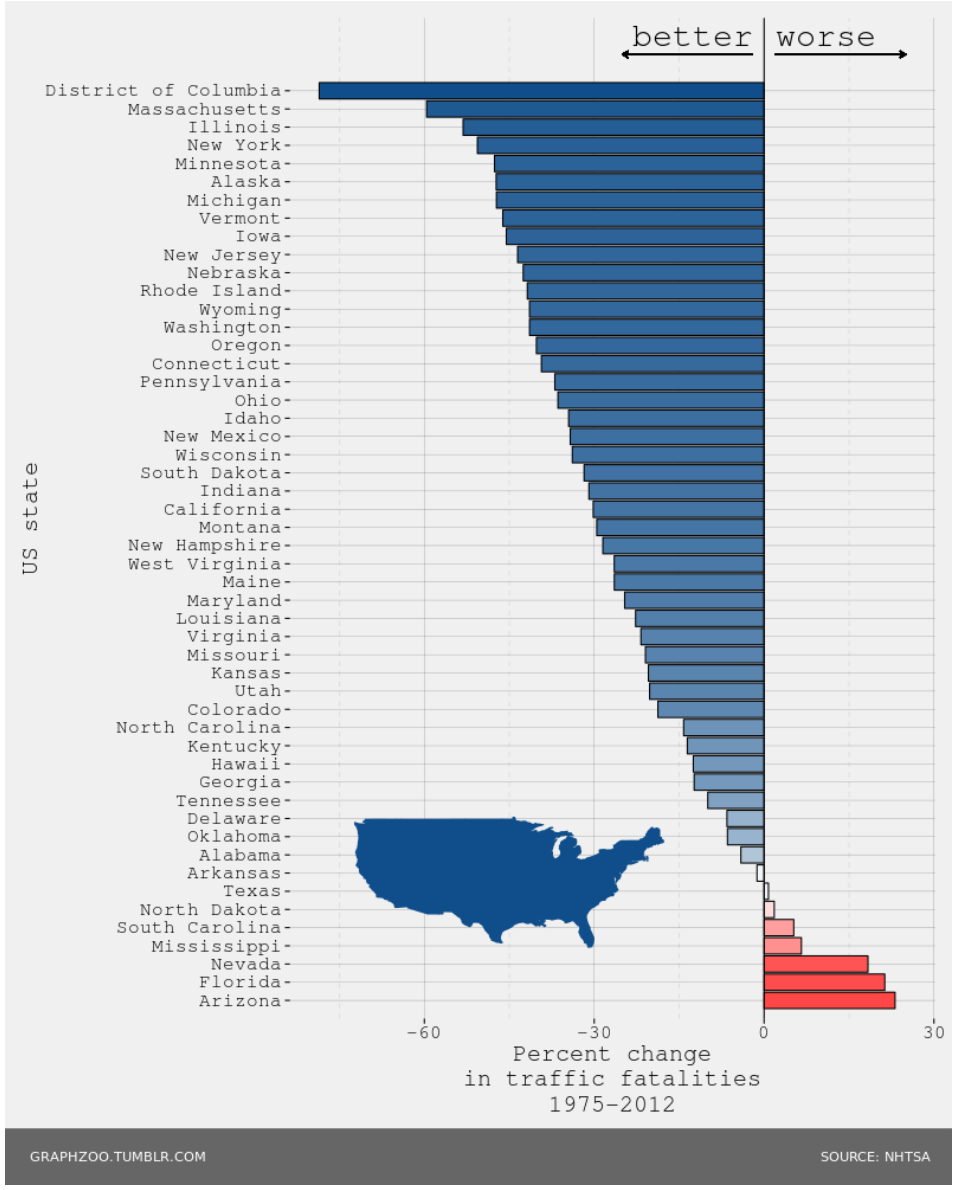


Figure 4: Percent change in total traffic fatalities

Example: Model accuracy

How to assess model accuracy?

- What is the graph trying to show?
- What does the graph actually show?
- What other information is needed?

Mental Model, designer

Good visualizations shouldn't oversimplify information. They need to clarify it. In many cases, that means increasing the amount of information.
- Cairo

- More or less?
- How to clarify?
- How to explain?

Example: Increasing information

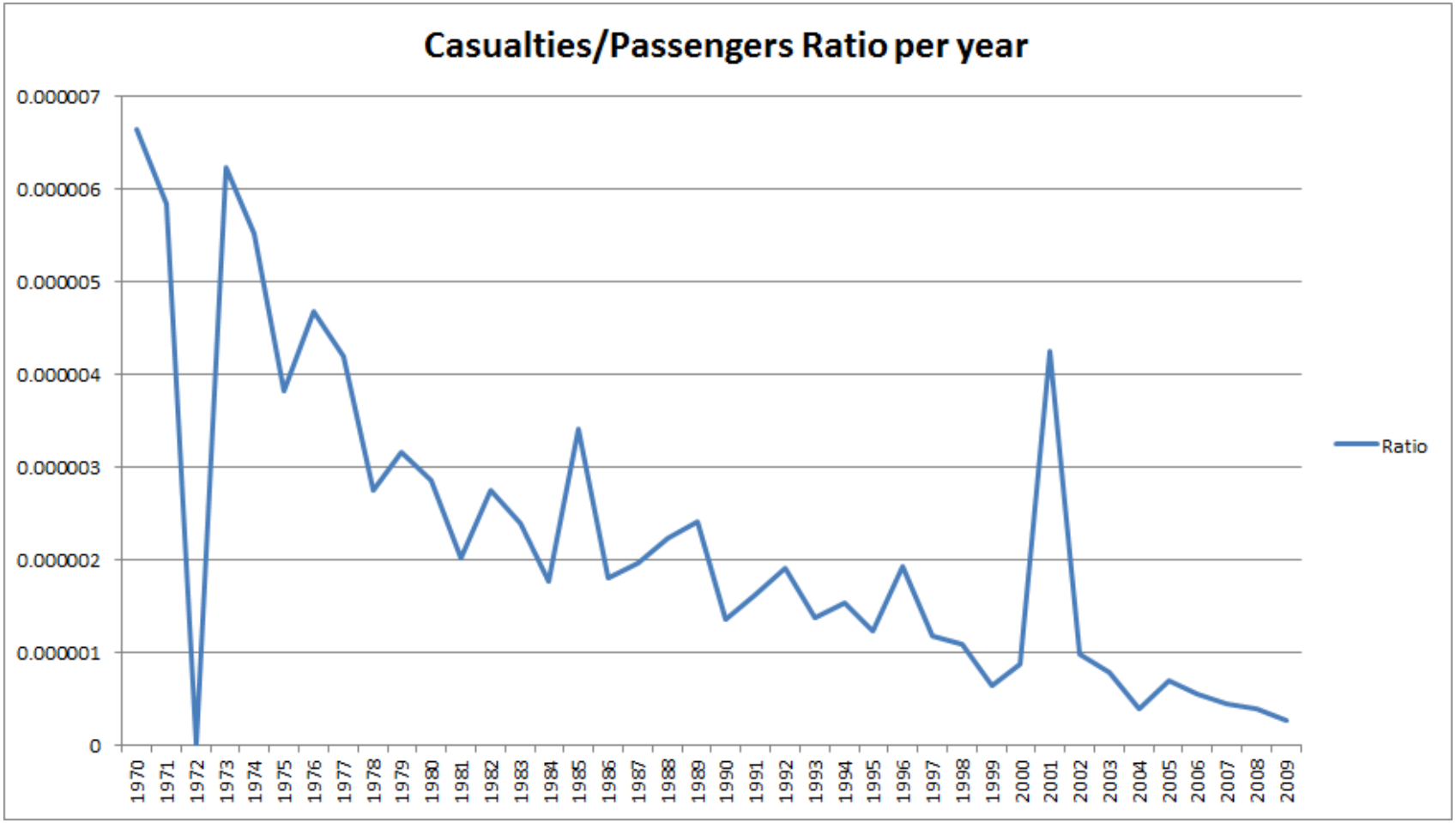


Figure 5: Fatalities per year, airlines

Mental model, designer

Example, truth continuum

Model 1: `28\% of journalism grads wish they'd chosen a different field, the annual survey of grads by the University of Georgia said`

Untrue — True

Example

Model 1: `28\% of ....`
Model 2: Model 1 + change in time + error

Untrue True

Example

Model 1: `28\% of ....`
Model 2: Model 1 + change in time + error
Model 3: Model 2 + comparison with other grads

Untrue True

Example

Model 1: `28\% of ....`
Model 2: Model 1 + change in time + error
Model 3: Model 2 + comparison with other grads
Model 4: Model 3 + ???

Untrue True

Mental Model, viewer

What you design is never exactly what your audience ends up interpreting, so reducing chances of misinterpretation becomes crucial - Cairo

Why are humans sometimes mistaken?

- Patternicity bug
- Storytelling bug
- Confirmation bug
- Reversion towards average

Patternicity

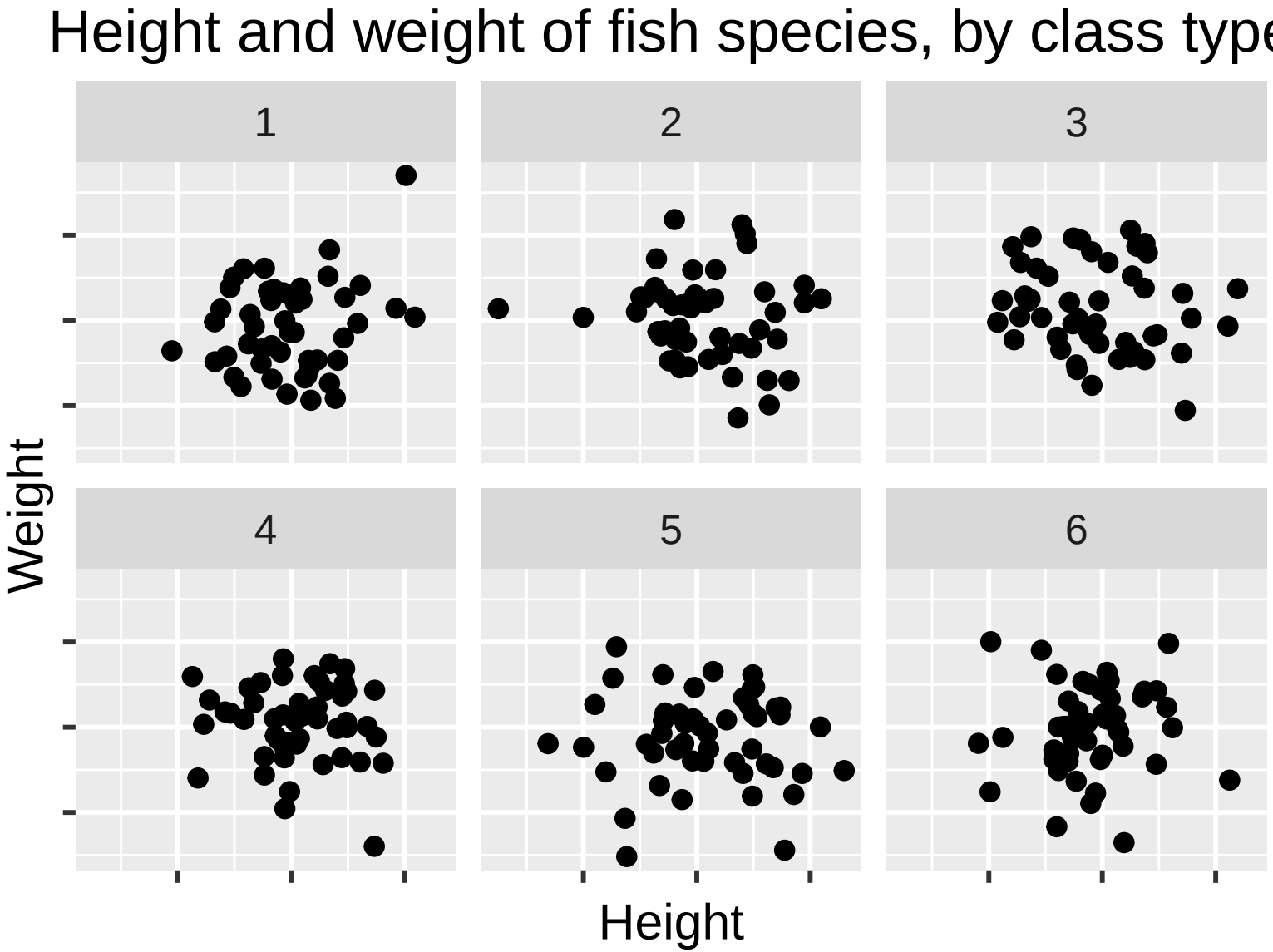
```
##  [1] "Heads" "Tails" "Tails" "Heads" "Heads" "Tails" "Tails"
##  [9] "Tails" "Heads" "Heads" "Heads" "Heads" "Tails" "Heads"
## [17] "Heads" "Tails" "Tails" "Tails" "Tails" "Tails" "Heads"
## [25] "Heads"
```

Patternicity

```
set.seed(5)
coins <- c("Heads", "Tails")
sample(coins, 25, replace = TRUE)
```

```
##  [1] "Heads" "Tails" "Tails" "Heads" "Heads" "Tails" "Tails"
##  [9] "Tails" "Heads" "Heads" "Heads" "Heads" "Tails" "Heads"
## [17] "Heads" "Tails" "Tails" "Tails" "Tails" "Tails" "Heads"
## [25] "Heads"
```

Patternicity



Patternicity

```
set.seed(5); library(ggplot2)
x <- rnorm(300)
y <- rnorm(300)
df <- data.frame(Height = x, Weight = y, Species = rep(1:6, 50))
ggplot(df, aes(Height, Weight)) +
  geom_point() +
  facet_wrap(~Species) +
  theme(axis.text.x=element_blank(), axis.text.y=element_blank()
  ggtitle("Height and weight of fish species, by class type")
```

Storytelling bug

We are naturally born storytellers who have a propension to believe our own tales- Will Storr, Unpersuadables

- Issue: starting with story, then collecting, mining, or aggregating data

Why does this matter?

Confirmation bias

Example: Dominating Impact of Group Influence on Political Beliefs (link)

- Welfare policies presented to self-identified liberals and conservatives
- liberals supported policy if it was presented as coming from Democratic Party
- conservatives supported policy if it was presented as Republican Party

Why does this matter?

Reversion towards the average

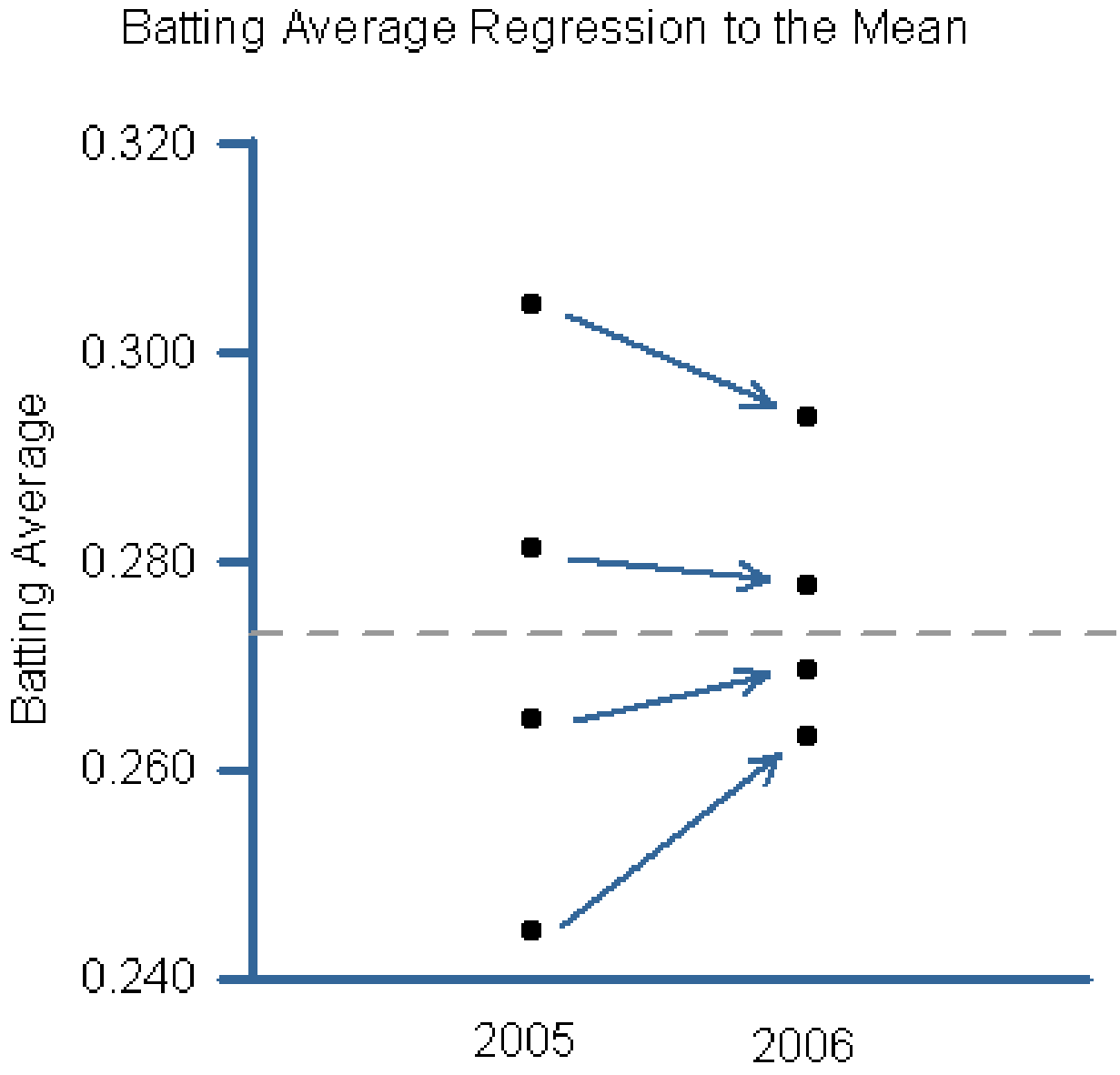


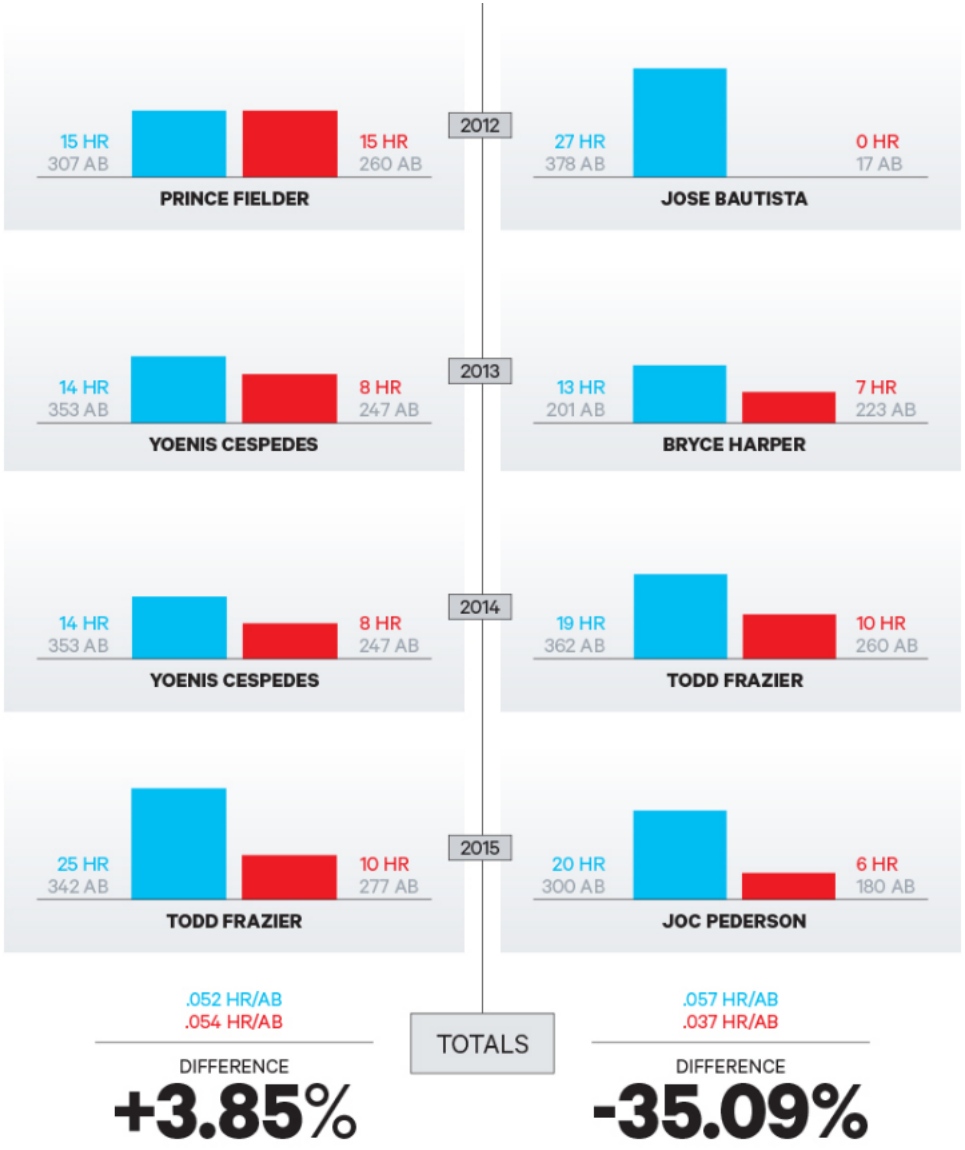
Figure 6: Batting average, year 1 to year 2

Examples

1. What are the plots trying to show?
2. What are the plots actually showing?
3. Are the plots accurate?
4. Truth continuum
5. Model bugs: audience

Example plot 1

MLB's real home run derby curse impacts second place, (link)



Example plot 2

`The web is dead`, (Wired.com)

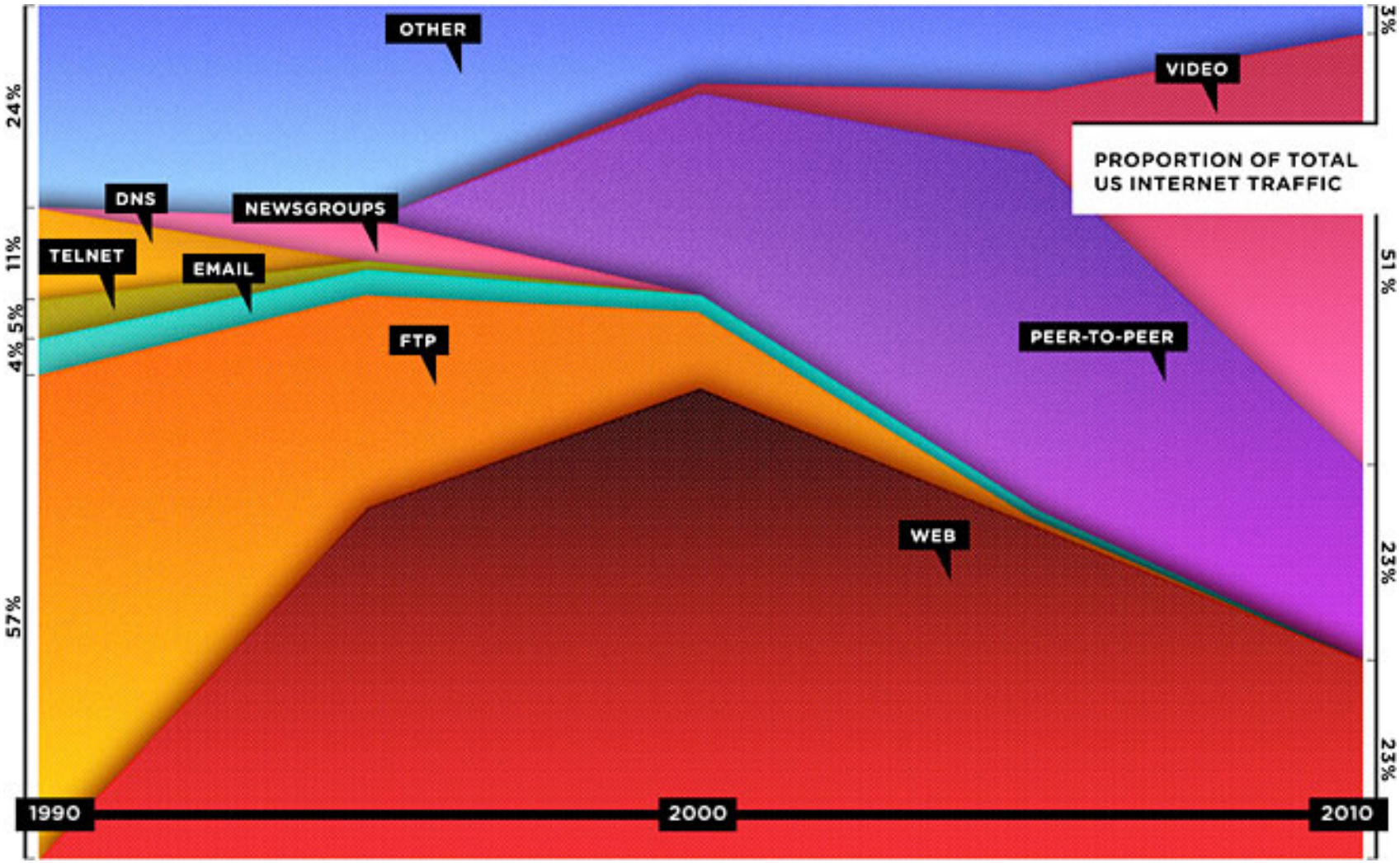


Figure 8: Proportion of total internet traffic.

Example plot 3

`More or less crime?`, (Vox.com)