Deceptive Visualization

Michael Correll
Tableau Research
What is a “bad” visualization?
What is a “bad” visualization?
Takeaway:

Visualizations are a form of communication.

You can lie, stretch the truth, and bullshit with visualizations, just like any form of communication.
DARK PATTERNS

(They’re Everywhere)
Dark Patterns
Bad Visualizations

Incorrect Visualizations

Illegible Visualizations

Bullshit Visualizations

Unconventional Visualizations
Bad Visualizations

Incorrect Visualizations

Illegible Visualizations

Bullshit Visualizations

Unconventional Visualizations
Incorrect Visualization

2010 Georgia Approval Ratings by Region

In a Georgia newspaper partnership poll, residents were asked how they approve or disapprove of their government. Select a politician or legislative branch to see how a Georgia resident voted for them.

Barack Obama
Approve: 37%
Disapprove: 32%
Net Sure: 11%

U.S. Congress
Approve: 21%
Disapprove: 60%
Net Sure: 19%

State Legislature
Approve: 30%
Disapprove: 37%
Net Sure: 34%

Sonny Perdue
Approve: 45%
Disapprove: 42%
Net Sure: 13%

https://accidental-art.tumblr.com/
GIANT HORNETS KILL 42 PEOPLE IN CHINA
The National Collegiate Health Assessment was taken by 1,000 UCSB students in Spring 2009. Participants were asked how frequently they used substances over the past 30 days. Numbers in white reflect actual student use, while red numbers indicate perceived substance use. The average age of participants was 20 years and approximately 99 percent were full-time students.

### OPIATES

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9 TIMES</td>
<td>0.7%</td>
</tr>
<tr>
<td>10-29 TIMES</td>
<td>0%</td>
</tr>
<tr>
<td>DAILY</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

### ALCOHOL

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>1-9 TIMES</td>
<td>56.9%</td>
</tr>
<tr>
<td>10-29 TIMES</td>
<td>21.1%</td>
</tr>
<tr>
<td>DAILY</td>
<td>1.4%</td>
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</tbody>
</table>

### COCAINE

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9 TIMES</td>
<td>0.3%</td>
</tr>
<tr>
<td>10-29 TIMES</td>
<td>0.2%</td>
</tr>
<tr>
<td>DAILY</td>
<td>0%</td>
</tr>
</tbody>
</table>
BY THE NUMBERS

The National Collegiate Health Assessment was taken by 1,000 UCSB students in Spring 2009. Participants were asked how frequently they used substances over the past 30 days. Numbers in white reflect actual student use, while red numbers indicate perceived substance use. The average age of participants was 20 years and approximately 99 percent were full-time students.

**OPIATES**
- 1-9 TIMES: 0.7%
- 10-29 TIMES: 29.1%
- DAILY: 2.4%
- 30+ TIMES: 0.4%

**ALCOHOL**
- 1-9 TIMES: 56.9%
- 10-29 TIMES: 21.1%
- DAILY: 1.4%
- 30+ TIMES: 11.2%

**COCAINE**
- 1-9 TIMES: 0.3%
- 10-29 TIMES: 0.2%
- DAILY: 5.3%
- 30+ TIMES: 1.2%
The National Collegiate Health Assessment was taken by 1,000 UCSB students in Spring 2009. Participants were asked how frequently they used substances over the past 30 days. Numbers in white reflect actual student use, while red numbers indicate perceived substance use. The average age of participants was 20 years and approximately 99 percent were full-time students.

<table>
<thead>
<tr>
<th>Substance</th>
<th>1-9 Times</th>
<th>10-29 Times</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opiates</td>
<td>0.7%</td>
<td>0%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>56.9%</td>
<td>21.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>0.3%</td>
<td>0.2%</td>
<td>0%</td>
</tr>
</tbody>
</table>
UNEMPLOYMENT RATE
UNDER PRESIDENT OBAMA

JAN: 9.0%
FEB: 8.9%
MAR: 8.8%
APR: 9.0%
MAY: 9.1%
JUN: 9.2%
JUL: 9.1%
AUG: 9.1%
SEP: 9.1%
OCT: 9.0%
NOV: 8.6%
UNEMPLOYMENT RATE
UNDER PRESIDENT OBAMA

JAN  | FEB  | MAR  | APR  | MAY  | JUN  | JUL  | AUG  | SEP  | OCT  | NOV  
9.0% | 8.9% | 8.8% | 9.0% | 9.1% | 9.2% | 9.1% | 9.1% | 9.1% | 9.0% | 8.6% 

8%
UNEMPLOYMENT RATE
UNDER PRESIDENT OBAMA

<table>
<thead>
<tr>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
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<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8%</td>
<td>8.9%</td>
<td>9.0%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>9.2%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>8.6%</td>
</tr>
</tbody>
</table>
Incorrect Visualizations

People assume that visualizations properly encode their data...if we violate that assumption, we can do anything we want.
Bad Visualizations

Incorrect Visualizations

Illegible Visualizations

Bullshit Visualizations

Unconventional Visualizations
“Do not fuck with graphic designers” – Robert Palmer
“Do not fuck with graphic designers” – Robert Palmer
Illegible Visualizations

People will get lost in the details or overwhelmed by complexity

...if we make things intentionally complex people then people will just assume we know what we’re talking about or will be too dazed to check too closely.
Bad Visualizations

Incorrect Visualizations

Illegible Visualizations

Bullshit Visualizations

Unconventional Visualizations
Lie:
“No, officer, I wasn’t speeding”
(you know the truth, but intentionally say something you know is untrue)

Bullshit:
“The party was lame anyways, it’s good I wasn’t invited”
(you don’t know or don’t care about the truth, but intentionally say something you hope is persuasive)
the DECLINE of ARTISTIC STANDARDS

YEAR

STANDARDS

ART REDUCED TO PERSONAL EXPRESSION
For people under 60, coronavirus is LESS dangerous than the seasonal flu:

![Flu and COVID-19 death rates by age](image-url)

**Source:** Flu rates from US Centers for Disease Control and Prevention; COVID-19 rates as of March 12, 2020 from Korea Centers for Disease Control and Prevention.
States where physicians are highly paid have lower Covid-19 mortality per capita.

Fact check: Countries with more economic freedom have less racist attitudes, according to the World Values Survey.
Sweden Covid-19 deaths per day
Rolling 3-day average
source: Folkhälsomyndigheten, daily spreadsheet

graph by @davidsteadson
Bullshit Visualizations

You can just make stuff up with no connection to reality

...show stuff that looks like data but isn’t
...assume a conclusion and pretend it’s true
...or give people data they can’t do anything with
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2012 PRESIDENTIAL RUN

GOP CANDIDATES

70% BACK PALIN

63% BACK HUCKABEE

60% BACK ROMNEY
Which states have the most STIs?
“Each state has been rated from one to 50: the higher the score, the smaller the proportion of STIs. So on the map - the darker the colour, the smaller the rate of STIs.”
Gun deaths in Florida

Number of murders committed using firearms

Source: Florida Department of Law Enforcement
Gun deaths in Florida

Number of murders committed using firearms

2005 Florida enacted its ‘Stand Your Ground’ law

Source: Florida Department of Law Enforcement

C. Chan 16/02/2014
Rising Signs

Why does college have to cost so much?

1965
1999
Cornell University's Tuition
Cornell University's Ranking

1990
Average Female Height per country

- Latvia
- Australia
- Scotland
- Peru
- South Africa
- India
Average Annual Global Temperature in Fahrenheit
1880-2015
Unconventional Visualizations

People have tacit conventions on how they interpret charts (around colors, axes, slopes)

...if you violate those conventions, you can catch people off guard.
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Other Types of Bad Visualizations

Fragile Visualizations?
Inhuman Visualizations?
Visualization White Lies?
Sam Dragga & Dan Voss “Cruel Pies: The Inhumanity of Technical Illustrations”
Where Your Employees Live

Logging fatalities and percentages by region, 1992-97

Logging employment percentages by region, 1992-97
Logging fatalities and percentages by region, 1992-97

771 Dead People

Logging employment percentages by region, 1992-97

Where Your Employees Live
“The UnEmpathic Art”

I am just very skeptical of the idea that data visualization is a medium that can convey (or even care about conveying) or increase “empathy”

-Alberto Cairo
Visualization “White Lies”
Wrap Up

Ways to mislead:
Breaking assumptions, expectations, conventions, drowning people in details... or just making stuff up.

Nuance:
Not every chart that breaks a “rule” is misleading
Not every chart that follows the “rules” is truthful