

5 principles to display data



Visual Scribbler

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“Visualization gives you answers to questions you didn’t know you had.”

- Ben Schneiderman

“The greatest value of a picture is when it forces us to notice what we never expected to see.”

- John Tukey

The 5 Principles

 1. Tell the truth

 2. Know your audience

3. Choose the  right chart

4. Emphasize the important 

5. Form  should follow function

1. Tell the truth

Data presentation is not only a skill but also a responsibility

Misleading Methods

- × Omitting the baseline
- × Manipulating the Y axis
- × Cherry picking data
- × Going against conventions

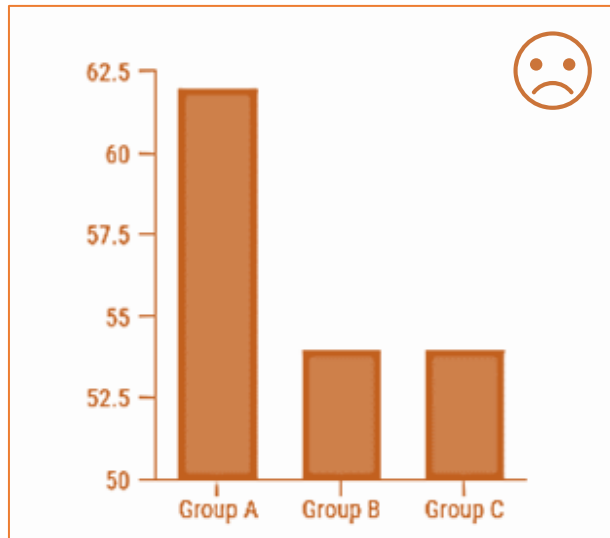
The job of the presenter is to inform the audience, not influence them

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Omitting the baseline

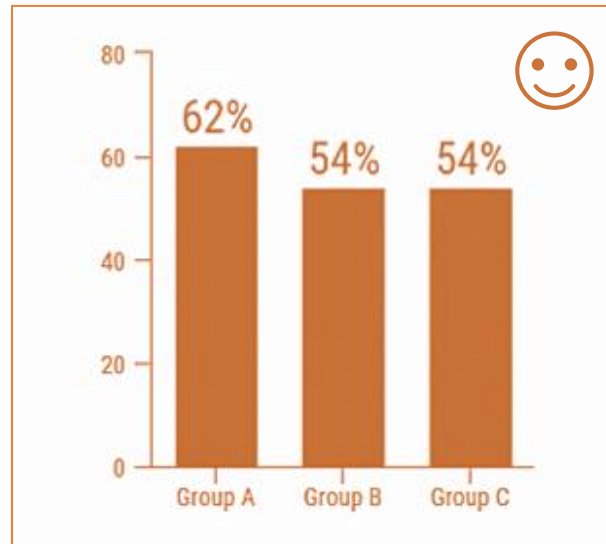
- In general, the baseline for a graph should always start from zero unless specified otherwise.
- By making the baseline start from a different number, the perception of data can be skewed.
- This technique is used to make the difference between data points seem to be greater than actual

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Starting the baseline from 50 makes a small difference between the groups seem massive

Group A seems to be much larger than the other two groups



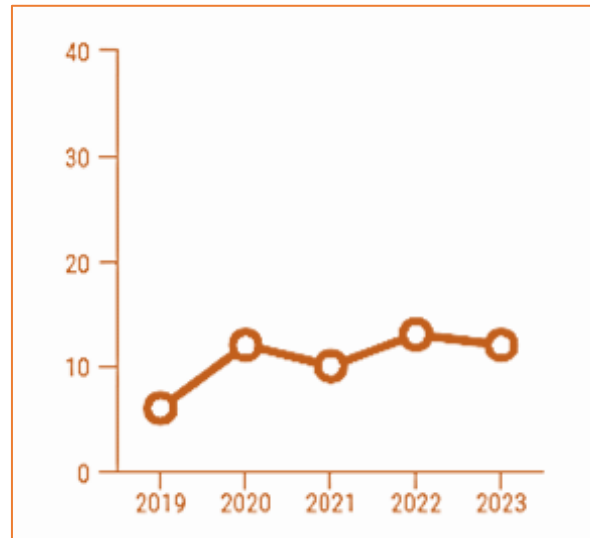
Starting the vertical axis from 0 offers a more accurate depiction of data

The difference between the groups is not as dramatic when visualized truthfully

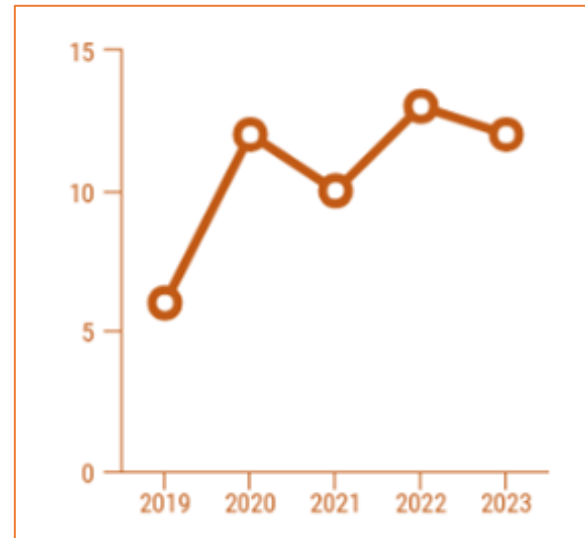
Manipulating the Y axis

- The Y axis marks should correspond to the data
- The highest value on the Y axis should be near about the maximum data value
- By having the Y axis with disproportionate marks, the meaning of data can be twisted.
- This technique is used to make the difference between data points seem to be lesser than actual

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The disproportionate scale makes the difference over time seem small

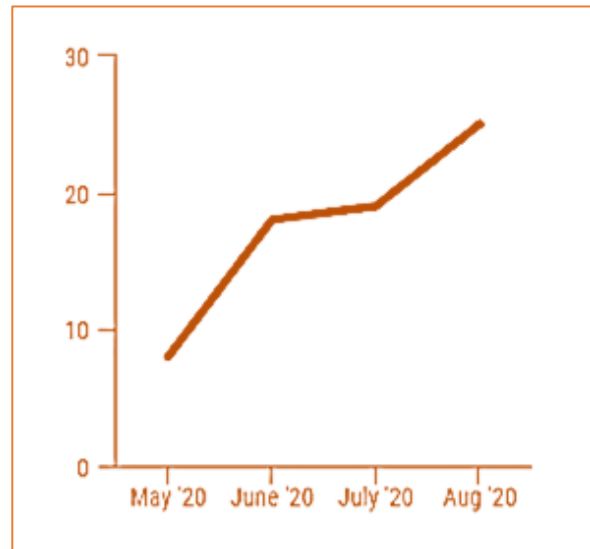


Proportionate scale shows the actual larger difference over time

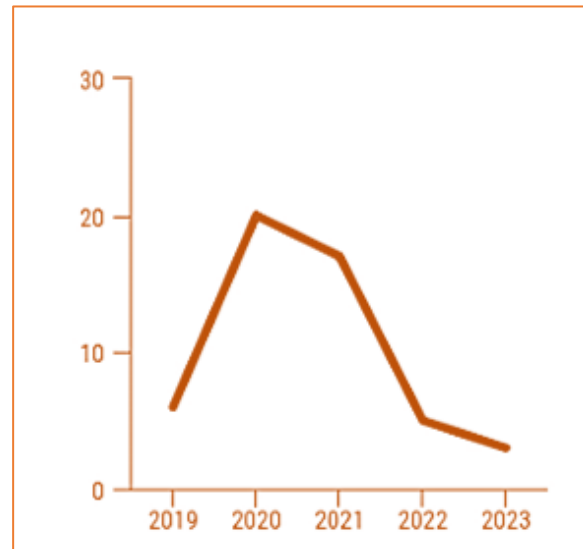
Cherry-picking data

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- Data plotted for prediction should be a larger range for correct analysis
- Cherry picking is when only a few data points are plotted to show a misleading trend



Only a few months are plotted depicting an upward trend

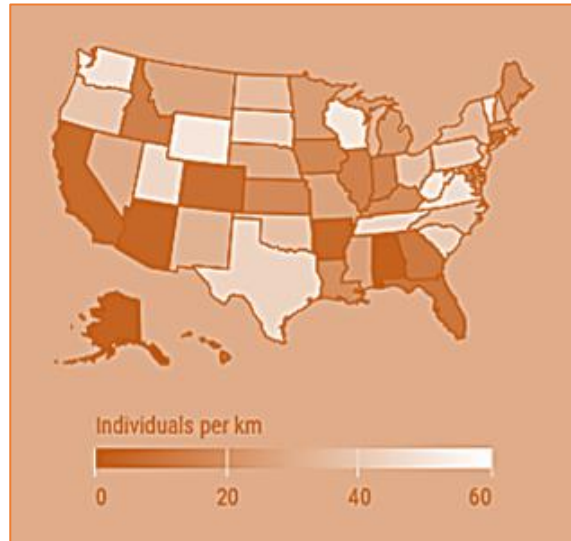


By plotting a wider range, the correct picture emerges

Going against the convention

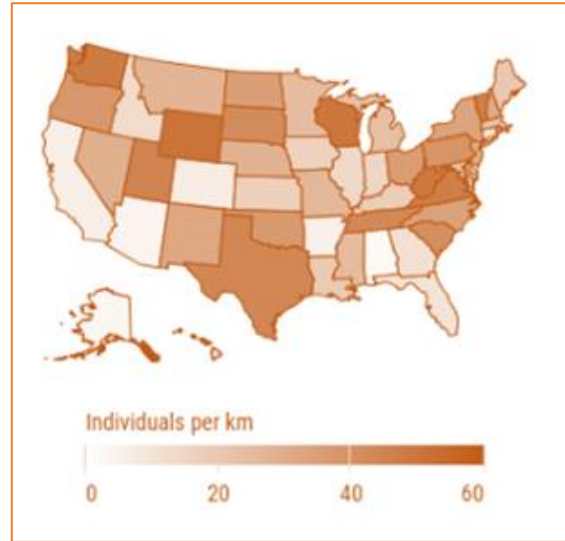
- There are certain conventions when plotting data
- A larger bar indicates greater value and bigger area represents higher number of data values
- By going against the convention, the viewer is deceived and led to a wrong deduction

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Darker shades indicate lower density which is against the convention

This depiction can confuse the readers



Conventional representation leads to correct conclusion

2. Know your audience

Show what you have to in a way they want to see

The data visualization should: -

- Resonate with the audience
- Display data according to job role
- Take into consideration the education and expertise of the audience
- Be sensitive to ethnicity and cultural values
- Focus on the literacy of the audience in terms of technical terms, statistics, language

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“Data is powerful. But with a good story, it is unforgettable” - Daniel Weisberg

Based on job roles

- Top level management should be shown high level data without too many details
- The various department heads should be shown an overall picture and more details of their specific department
- Use a dashboard for showing various parameters



The chart for top management can be as represented showing the profits of the company over time



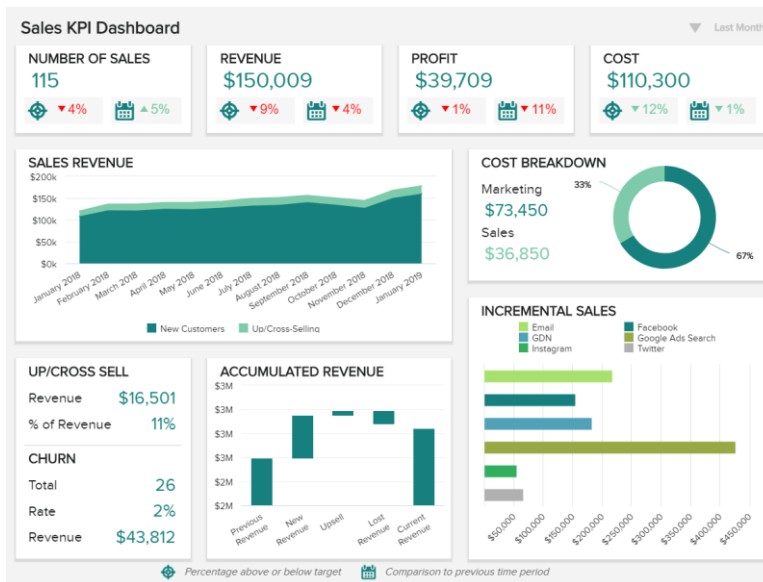
A dashboard with parameters like cost breakup, profits of various segments, employee performance, comparison of different products

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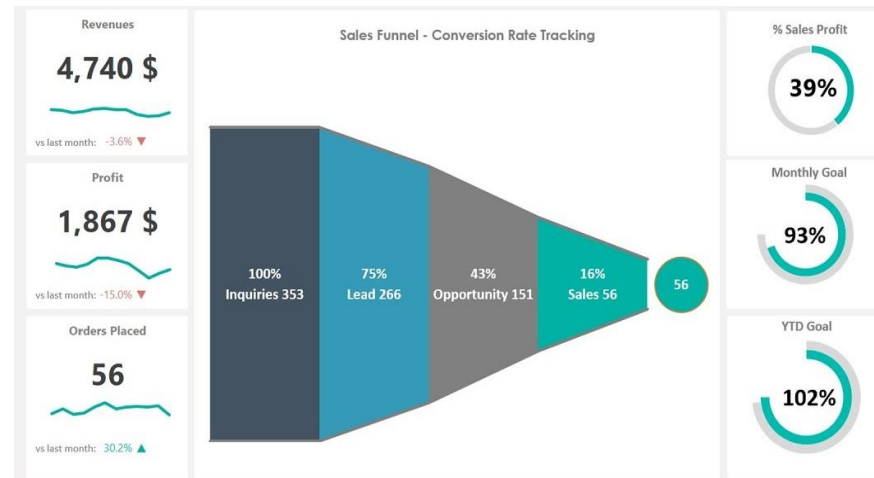
Based on technical literacy

- Use charts and statistics based on the audience's knowledge of statistics and visualization
- Show more or less complicated information and graphs according to the end user

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For an informed audience, a detailed dashboard with various parameters and charts is very useful



Show basic figures and a simpler charts for audience with less technical exposure

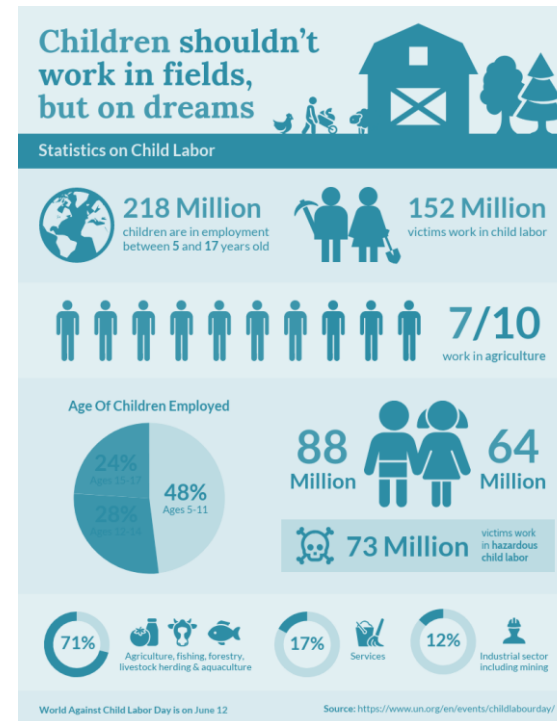
Based on background

- Focus on the facts and numbers in case of audience with prior knowledge of the issue
- Show more details and peripheral information when audience needs to be made aware of an issue

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Big numbers and facts presented to an audience familiar with child labor problem

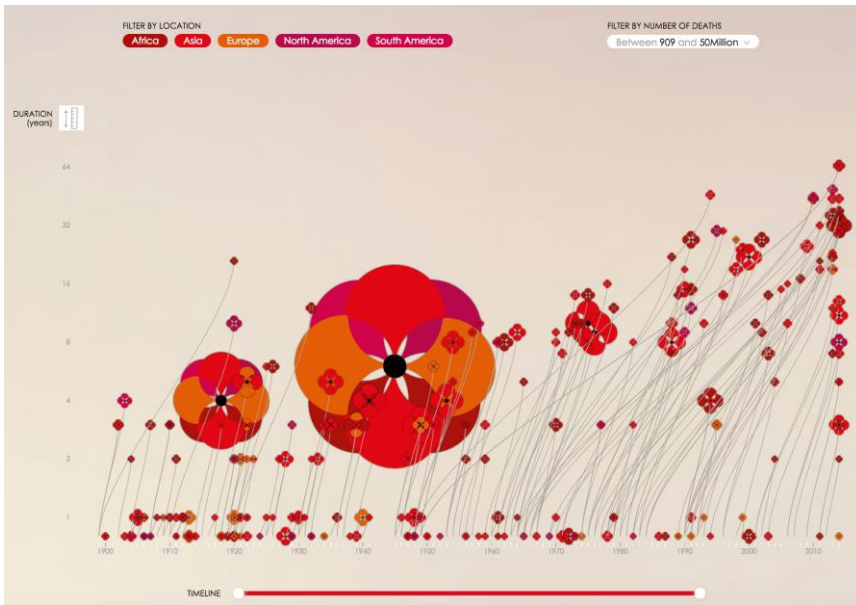


More informative visualization to enlighten audience about the issue of child labor

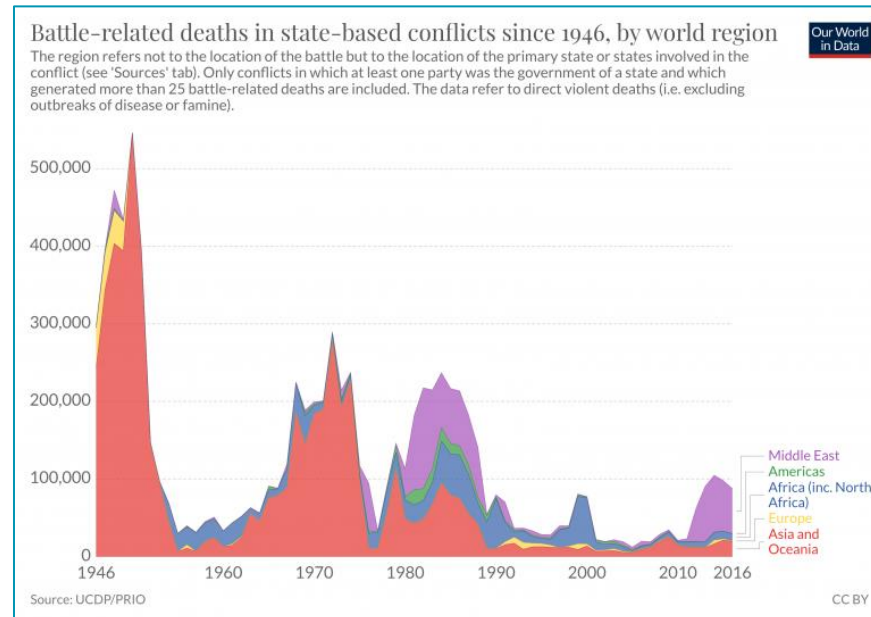
Based on emotional disposition

- Use emotional appeal with temperamental audience
- Focus more on better representation of facts with practical audience

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Size of flower indicates the casualties in the war and the reddish colors symbolize the bloodshed



A better representation of deaths in war and distinct colors to show the different regions of world

3. Choose the right chart

Right chart enhances information, wrong one conceals insights

- Choose the graph based on the kind of data and the message to be conveyed
- Do not use different graphs just for variety
- Specific graphs have their designated purpose
- If not required, do not use any chart - show only numbers
- Using a wrong graph risks missing the point

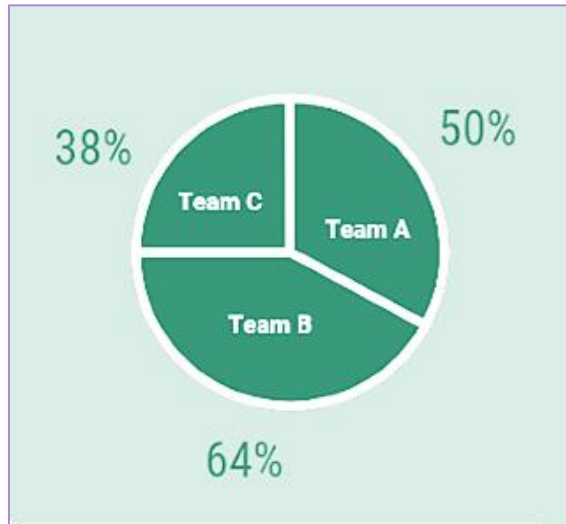
Using a wrong chart is like having the right intentions but messed up execution

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Bar graph instead of pie chart

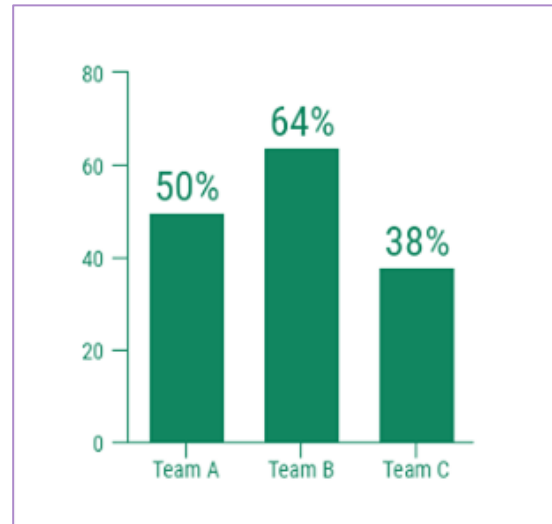
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- When showing comparisons, a bar chart is always better than a pie chart
- It is easier to make out difference in length of bars than size of pies



Pie charts are useful to compare parts of a whole rather than difference between groups

It is difficult to gauge proportion difference in pies



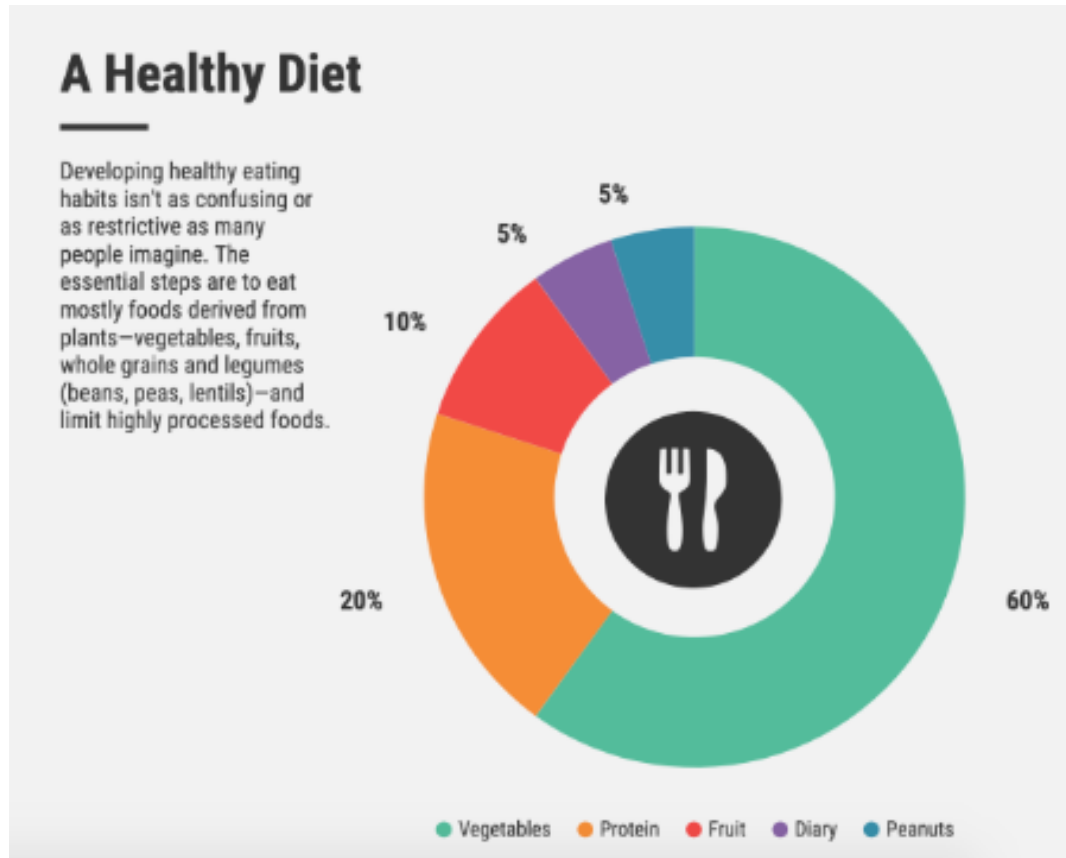
Bar graphs are great for showing difference between groups

Bars show a distinct difference between the data points

When pie charts are suitable

- When showing parts of a whole, pie charts are most useful
- When there are limited parts and difference between them is distinct

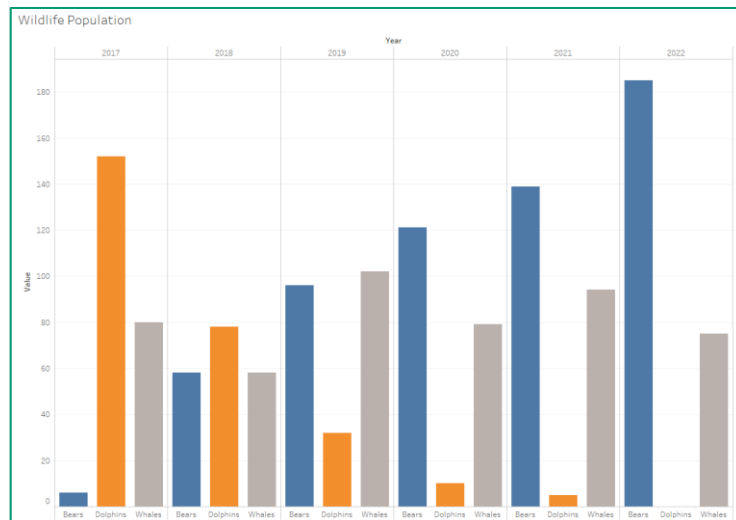
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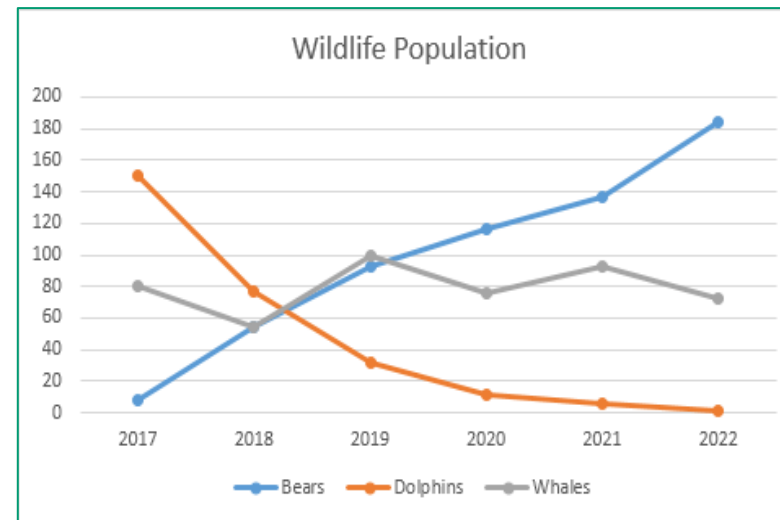
Line graph instead of bar graph

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- When showing comparison over time, line graphs are most suitable
- Line charts are also useful to show trends or patterns



It is difficult to compare the various data points over time by briefly looking at the bar graph

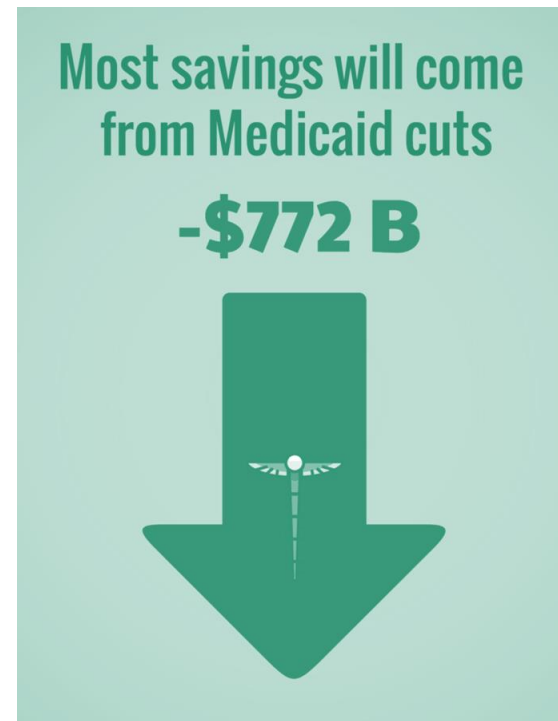


It can be easily observed that there is an upward trend in population of bears while dolphins are becoming endangered

Numbers only

- When there is a specific figure to be highlighted, use only numbers without any charts
- One or two numbers are easy to grasp and make a greater impact

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4. Emphasize the important

Omit the unimportant to highlight the important

- Data visualization can have many data points
- Highlight the important facts to convey the message faster and more impactfully
- Remove noise
 - Remove unnecessary gridline
 - Remove unnecessary axes and labels
- Use color, size, pattern to emphasize

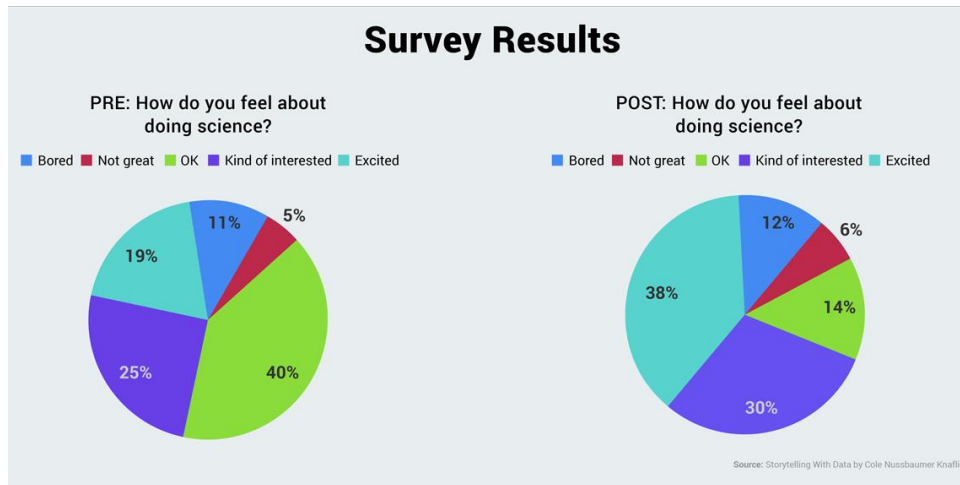
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“There is no such thing as information overload. There is only bad design.” – Edward Tufte

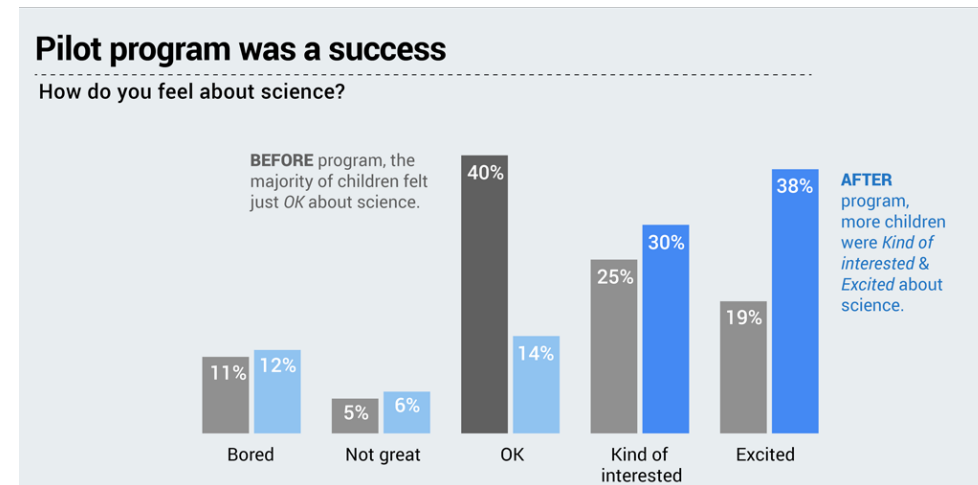
Eliminate distractions

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- Along with using the right chart, it is important to use only required colors
- If there is a conclusive result, enhance that in the visualization
- Remove all unnecessary color, text, labels



There are too many colors without any purpose and no conclusive result is easily understood

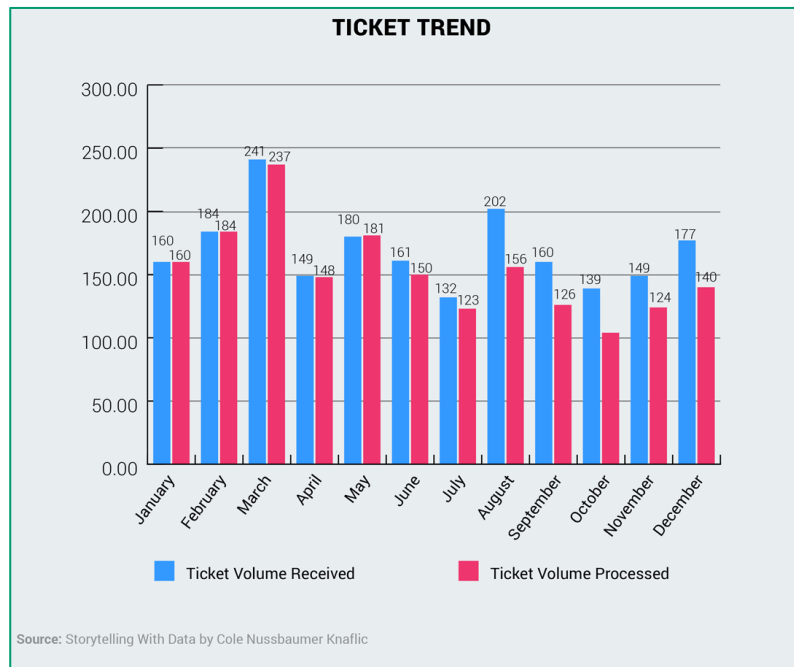


The dual color scheme makes it easy to compare and the highlighted bars with text convey the conclusion clearly

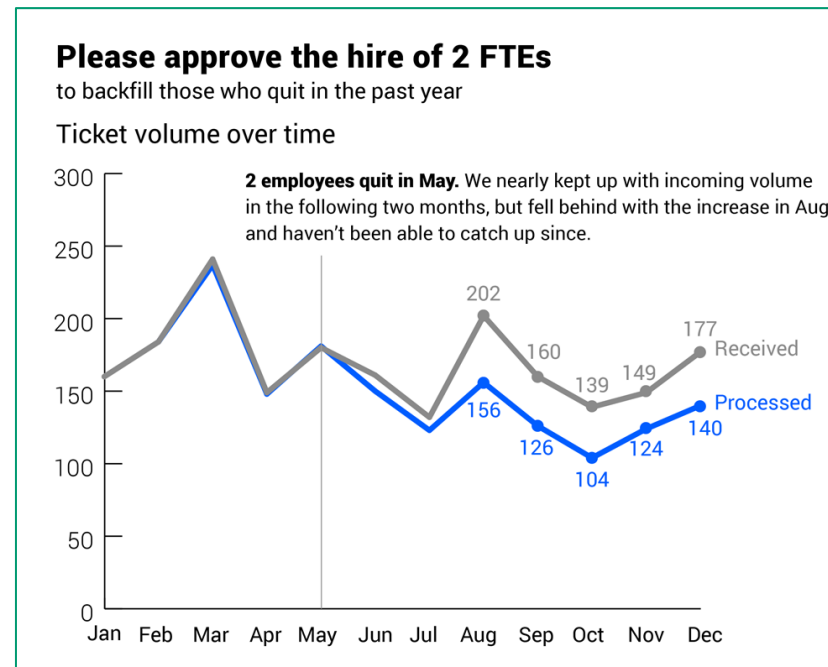
Enhance the essential

1. Tell the truth
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- Use the title to convey essential information
- Remove any unnecessary gridlines, labels and disturbing colors
- Use reference lines and text to draw attention to specific points



The graph provides no helpful information and does not aid in any decision making



A clear trend is observed, and the line chart supports the suggestion thereby helping in decision making.

Highlight the significant

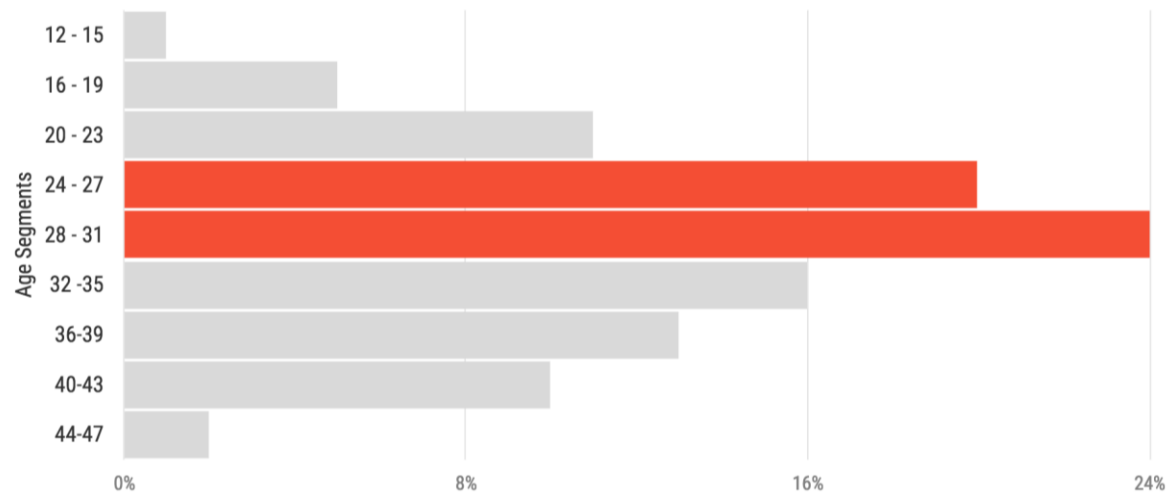
- Use color to indicate specific data points
- Highlight the attention areas and make the rest of the areas less focused

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Market Segmentation Report

Consumer Profile: Age Demographics

Primary consumer segments are ages 24-27 and 28-31



5. Form should follow function

Purpose of data visualization is insights, not pictures

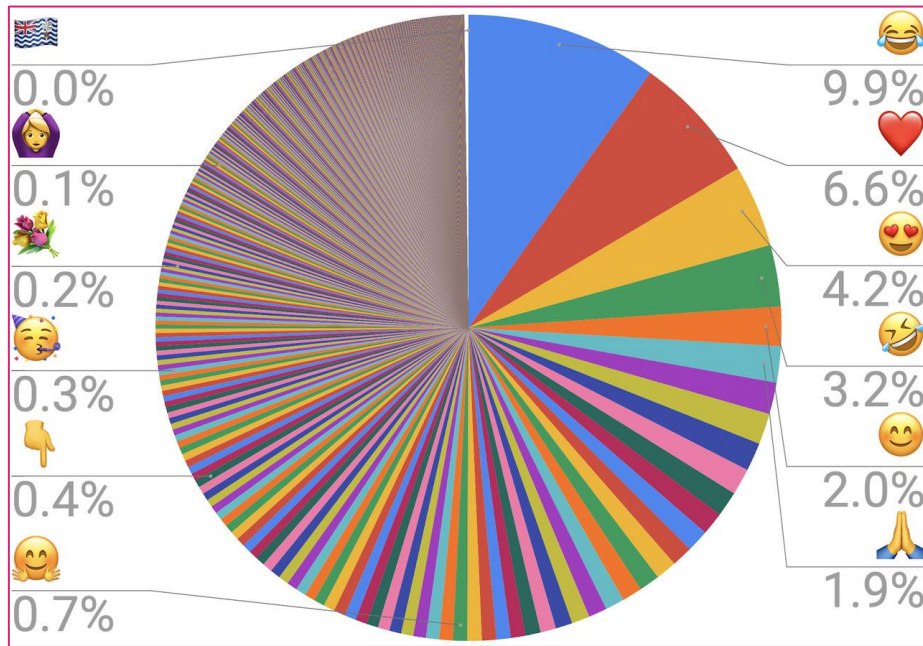
- Aesthetics is a significant part of data presentation but not at the cost of missing the point
- It is more vital to communicate the message clearly than have the graph look pretty but offer no valuable insights
- Intuitive design is more important than appealing charts
- Use graphs that convey the meaning of data in an easy to understand manner

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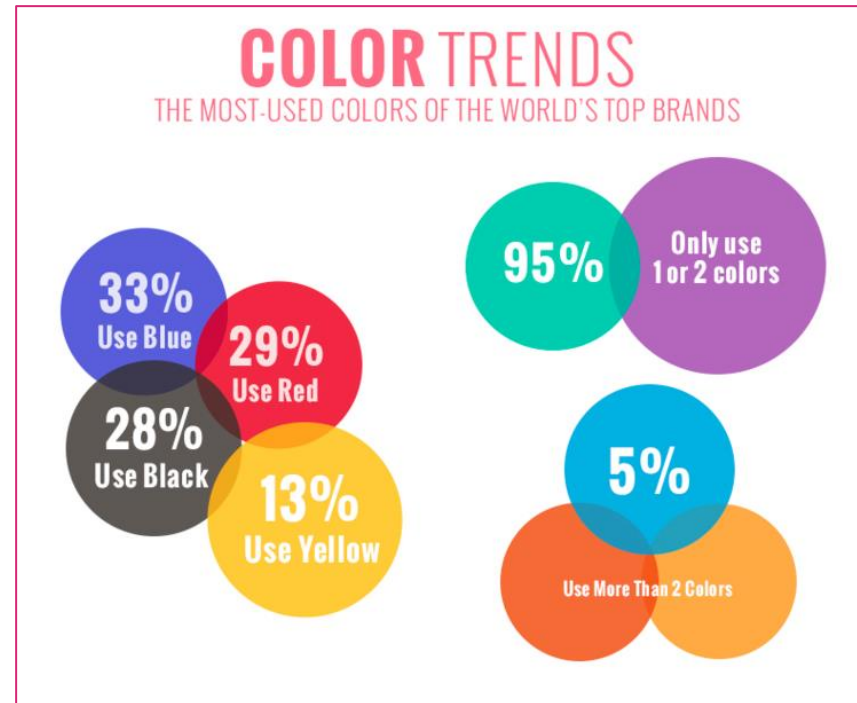
“Graphical elegance is simplicity of design with complexity of data” – Edward Tufte

Beautiful charts with little or no value

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There are too many data points and colors with no apparent information about most of them. Also the colors have no usefulness.

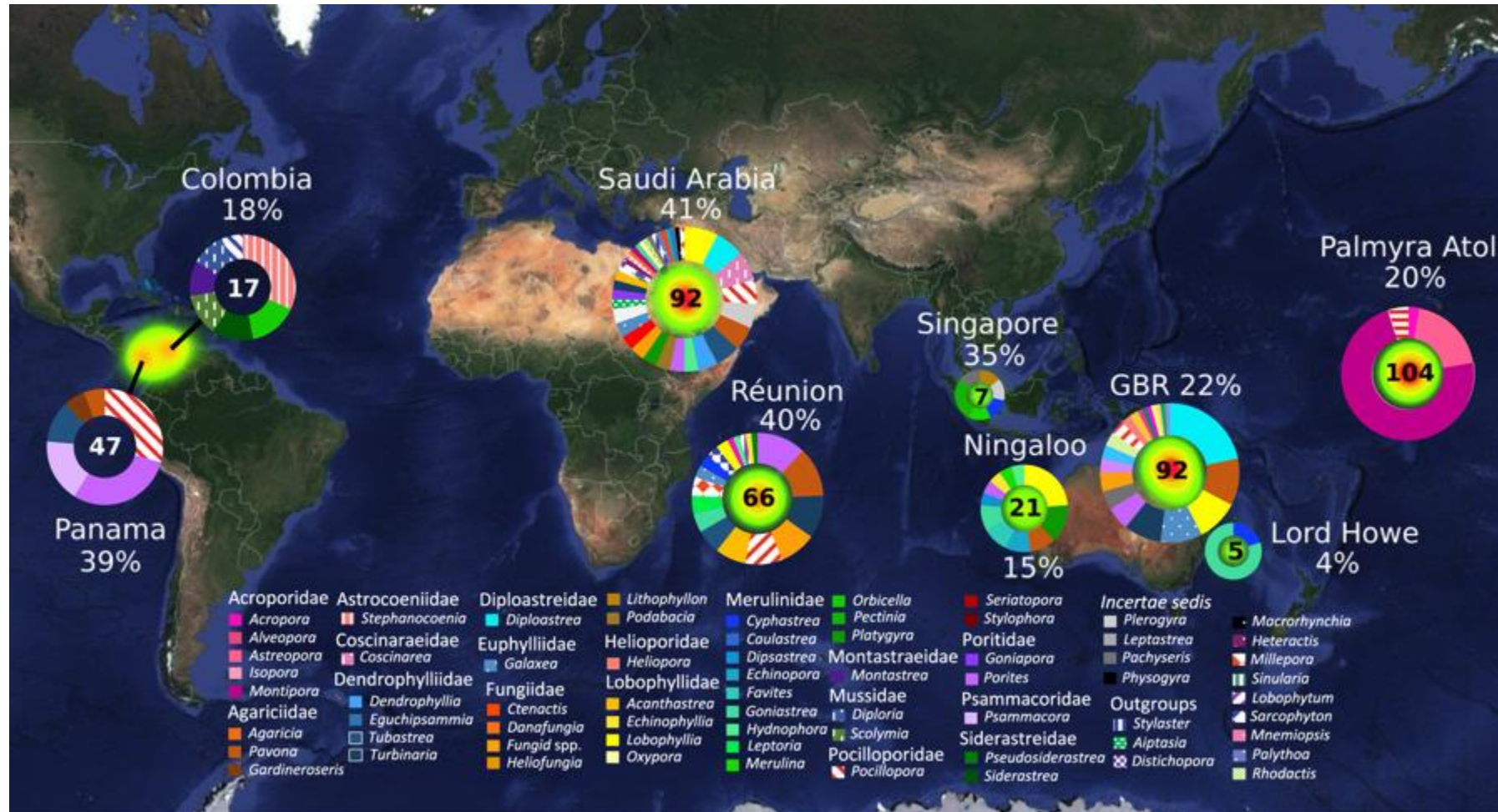


The size of the circles are disproportionate to the value inside them and the colors of the circles on the right have no purpose

A hotchpotch of colors and patterns

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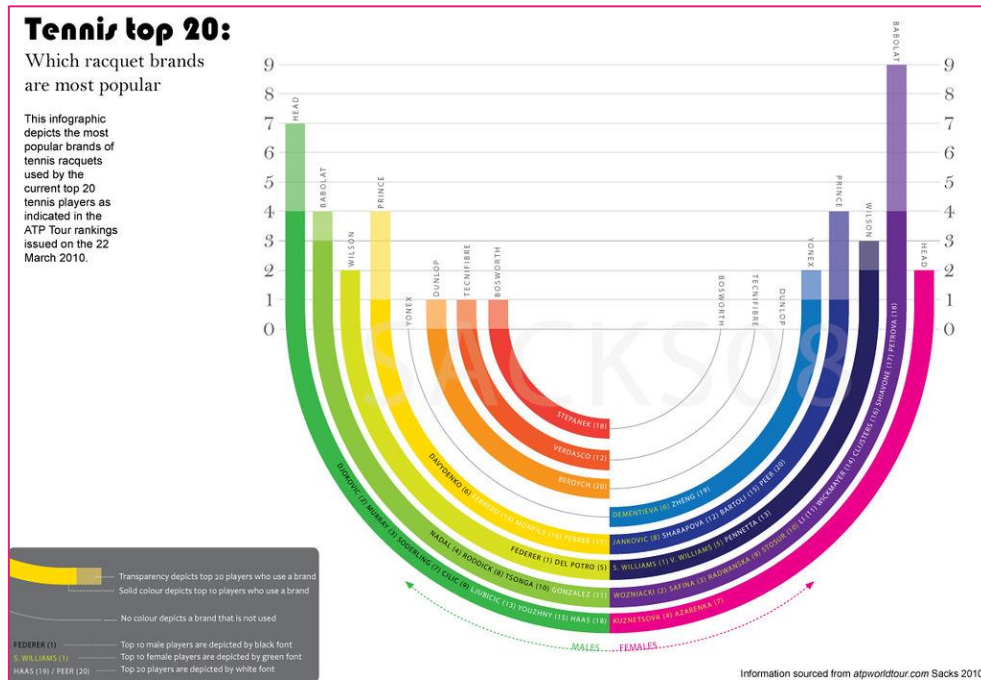
- There is no title and no information about what this visualization is representing
- Bad selection of chart type, too many colors and too many patterns



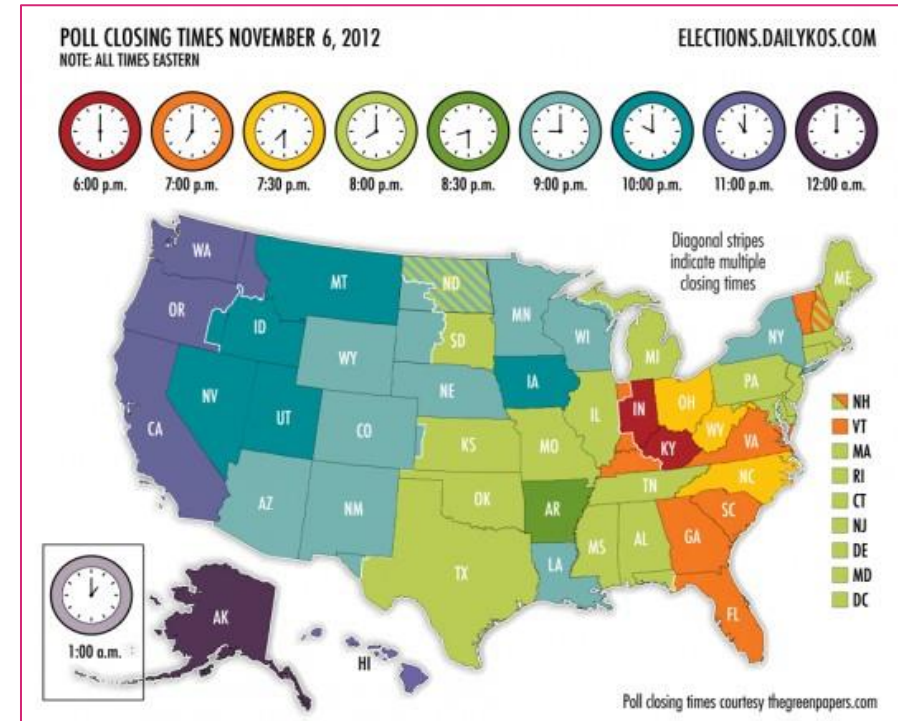
Purpose of colors

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- Using colors only to make the chart look pretty not only makes it confusing but also defeats the purpose of colors



- Males with green and females with pink was a great idea but the color palette as a whole doesn't make sense
- Shades or varying intensity of greens and pinks for each different brand might be a better palette



- Use of lot of colors but the colors have some significance and help determine the different times of poll closing across states
- Since time is not indicative of any measure, the color palette is independent of conventional rules

"If we have data, let's look at data. If all we have are
opinions, let's go with mine."

— Jim Barksdale

Thank you



References

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