DESIGNING CHARTS & TABLES

How to Display Data that Enlightens and Informs

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CFDR Summer 2021 Workshop Series
Percentage of Children Living in Grandparent-Headed Households, 2009 and 2019
GOAL:
Help you to use charts and tables to more effectively...

• tell data stories
• communicate results
• clarify ideas
First, you will need to provide support above the usual level. If you do not have a device for this elevation, you will need to obtain one. Before you provide the elevation support, you will want to decrease the later resistance for all the critical contact points. After the elevation device has been utilized, you can complete the rotation of the critical contact points and exchange the impacted element. You will then want to re-engage the critical contact points and remove the device. You may continue to use the replacement element. If it is not adequate for long-term use, you may want to repair or replace the original element, at which point you will need to repeat the process.

*Design for How People Learn, p. 45, by Julie Dirksen, 2016.*
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TWO ELEMENTS, TWO PURPOSES

CHARTS

• Provide insights based on the shape(s) of the data.

• *Tell stories.*

• Enlighten and inform the reader.

TABLES

• Provide precise values.

• Use to supply data.
PRACTICE & EXPERIENCE

NOVICE  →  MASTER
THE RECIPE

Cooking Up A Good Data Viz
THE RECIPE
COOKING UP A GOOD DATA VIZ

Idea + Data + Geometry + Color = Good Data Visualization
THE RECIPE
COOKING UP A GOOD DATA VIZ

Data

• What format?
• What applications/programs are needed?
• What structure?
THE RECIPE
COOKING UP A GOOD DATA VIZ

Geometry

Your Visual Cues
• Position
• Length
• Angles
• Direction
• Area or Volume
THE RECIPE
COOKING UP A GOOD DATA VIZ

Color

The Other Visual Cue –

*I like to think of color as the *secrete sauce.*

- Accessibility?
- Branding strategy?
- Add to the story?
COLOR
ACCESSIBILITY

• Approximately 4.5% of the population has some type of color insensitivity.

• Section 508 of the Rehabilitation Act of 1973 sets a legal standard for the contrast level necessary between text and its background.

Source: https://designsystem.digital.gov/design-tokens/color/overview/
COLOR ACCESSIBILITY

- Approximately 4.5% of the population has some type of color insensitivity.
- Section 508 of the Rehabilitation Act of 1973 sets a legal standard for the contrast level necessary between text and its background.

Source: https://designsystem.digital.gov/design-tokens/color/overview/
BEST PRACTICES

• **Ratio:** Text and interactive elements should have a color contrast ratio of at least 4.5:1.

• **Color as indicator:** Color should **NOT** be the only indicator. For example, underline links, or mark a required field with an asterisk.

• **Color blindness:** Red/green color blindness is the most common, so avoid green on red or red on green.

Source: https://designsystem.digital.gov/design-tokens/color/overview/
COLOR
ACCESSIBILITY

ON-LINE RESOURCES

https://webaim.org/resources/contrastchecker/
http://colorsafe.co/
https://colorable.jxnblk.com/ffffff/6b757b
https://contrastchecker.com/
Powerful!
COLOR
BRANDING

DUNKIN'
COLOR
BRANDING

#4F2C1D

#FF7300
COLOR BRANDING

This is a screenshot of the BGSU official identity colors page.
COLOR  
BRANDING  

• This is a screenshot of the BGSU web identity guidelines page.  
• These guidelines take accessibility into account.
With accessibility and branding in mind...

Use color to make important ideas come forward.
1. GRAY IS YOUR FRIEND

First Divorce Rate for Women 18 and Older by Educational Attainment, 2019

- <HS: 15.4
- HS/GED: 15.1
- Some College: 18.7
- Associate's: 17.0
- Bachelor's: 13.2
- Master's+: 11.5

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2019
1. GRAY IS YOUR FRIEND

First Divorce Rate for Women 18 and Older by Educational Attainment, 2019

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2019
2. CONTRASTING DATA → USE CONTRASTING COLORS

Two colors from different segments of the color wheel are contrasting colors (AKA complementary or clashing colors).

<table>
<thead>
<tr>
<th>Presence of Biological, Adopted, Step, or Foster Children of the Householder Under Age 18 Among Coupled Households by Couple Type, 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male/Female</td>
</tr>
<tr>
<td>Female Same-Sex</td>
</tr>
<tr>
<td>Male Same-Sex</td>
</tr>
<tr>
<td>Male/Female</td>
</tr>
<tr>
<td>Female Same-Sex</td>
</tr>
<tr>
<td>Male Same-Sex</td>
</tr>
</tbody>
</table>

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2019
2. CONTRASTING DATA → USE CONTRASTING COLORS

Two colors from different segments of the color wheel are contrasting colors (AKA complementary or clashing colors).
WE INTERRUPT THIS PROGRAM

EMERGENCY BROADCAST SYSTEM
DATA

<table>
<thead>
<tr>
<th></th>
<th>Est</th>
<th>LB</th>
<th>UB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cohabiting Couples</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male Same-Sex</td>
<td>3.5%</td>
<td>1.0%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Female Same-Sex</td>
<td>18.8%</td>
<td>2.3%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Male/Female</td>
<td>37.5%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Married Couples</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male Same-Sex</td>
<td>11.5%</td>
<td>1.7%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Female Same-Sex</td>
<td>32.5%</td>
<td>2.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Male/Female</td>
<td>54.3%</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

HOW DO YOU ADD THEM IN EXCEL?

ADD CHART ELEMENT
CONFIDENCE INTERVALS
HOW DO YOU ADD THEM IN EXCEL?

FORMAT ERROR BARS

SPECIFY VALUES
Welcome back to your regularly scheduled programming...
4. Data ranges →

Use low saturation/ paler/ whiter colors for lower values

and

Use higher saturation/ richer/ darker colors for higher values

Source: NCFMR analyses of U.S. Census Bureau, American Community Survey, 1-yr. est., 2019
3. Groups of data → Use the same or similar colors

Twenty-five Years of Change in the Share of Women (18-49) Who Ever Married by Racial/Ethnic Status

5. Don’t use too many colors.

→ Find the “lowest common denominator” that allows you to still tell your story.
CHARTS
CATEGORICAL DATA

GOAL: Bring structure to data by grouping people, places and things
Uses visual cues such as position, length, angles, direction, area or volume, and color
CATEGORICAL DATA

Categories

BAR GRAPH

Useful for direct comparisons where length is used as the visual cue

Percentage of Children Living in Grandparent-Headed Households, 2009 and 2019

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2009 and 2019
CATEGORICAL DATA

**Parts of a Whole**

**PIE CHART**

Parts sum to 100 and best if categories are kept to 3 or less

---

Children Living in Grandparent-Headed Households by Presence of Parent, 2019

Yes 74%

No 26%

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2019
CATEGORICAL DATA

Parts of a Whole

DOUGHNUT CHART

Parts sum to 100 and best if categories are kept to 3 or less

Children Living in Grandparent-Headed Households by Presence of Parent, 2019

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2019
CATEGORICAL DATA

Parts of a Whole

GAUGE CHART

Parts sum to 100 and best if categories are kept to 3 or less

Children Living in Grandparent-Headed Households by Presence of Parent, 2019

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2019
CATEGORICAL DATA

Parts of a Whole

STACKED BAR CHART

Each bar can sum to 100 or can be used to show raw counts

Children Living in Grandparent-Headed Households by Presence of Parent and Age of Child, 2019

Data Source: U.S. Census Bureau, American Community Survey, 1-year Estimates, 2019
CATEGORICAL DATA

BEWARE of defaults when using Excel!

- REMEMBER - position and length are visual cues.
GEOMETRY: LENGTH & POSITION MATTERS

Figure A

Figure B

Figure C

Source: NCFMR analyses of the American Community Survey 1-year estimates, 2019
GEOMETRY: LENGTH & POSITION MATTERS

Figure A

Figure B

Figure C

Source: NCFMR analyses of the American Community Survey 1-year estimates, 2019
GEOMETRY: LENGTH & POSITION MATTERS

**Source:** NCFMR analyses of the American Community Survey 1-year estimates, 2019
TIME SERIES DATA

GOAL: See what has passed, what is different, what is the same, and by how much
TIME SERIES DATA

Uses visual cues such as length, direction, and position
TIME SERIES DATA

BAR GRAPH

Useful for discrete points in time

Ohio Monthly Unemployment Rate
June 2019-June 2021

Data Source: Bureau of Labor Statistics
LINE CHART

Lines can make it easier to see trends

Ohio Monthly Unemployment Rate
June 2019-June 2021

Data Source: Bureau of Labor Statistics
TIME SERIES DATA

DOT PLOT

Distinct points — adding a line can emphasize trend

Ohio Monthly Unemployment Rate
June 2019-June 2021

Data Source: Bureau of Labor Statistics
**TIME SERIES DATA**

**DOT-BAR GRAPH**

Draws focus to the endpoints more effectively than a bar graph

*Ohio Monthly Unemployment Rate*
June 2019-June 2021

Data Source: Bureau of Labor Statistics
TIME SERIES DATA

**BEWARE** of line charts when you have unequal time points

Ohio Monthly Unemployment Rate
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Data Source: Bureau of Labor Statistics
TIME SERIES DATA

LINE CHART

SCATTER CHART

Unemployment Rate

Data Source: Bureau of Labor Statistics
TIME SERIES DATA

BEWARE of line charts when you have unequal time points

Data Source: Bureau of Labor Statistics
From 1880-1940, trends are similar

Following 1940 until 1980, the patterns are not as similar

Since 1980, both the crude and adjusted rates have declined at a similar rate
SPATIAL DATA

GOAL: Represent where (you) are, were (you)’ve been, where (you) want to go
I love maps.
SPATIAL DATA

CHOROPLETH MAP

Defined regions colored by data

Women’s State-Level Median Age at First Marriage by Quartile, 2019

Source: NCFMR analyses of the American Community Survey 1-year estimates, 2019
Percentage of Children Living in Grandparent-Headed Households, 2009 and 2019

Group Observations
TABLES

In Excel Word
Where is your table going to be viewed and by whom?
Details About Submitting to JMF:

- Call for Papers: Transformative Family Scholarship — Deadline July 15, 2021
- Guidelines for First Submission to JMF
- Guidelines for Resubmission to JMF
- JMF Style Guide
- Format for JMF Tables
- Responsibilities and Rights of Authors
- Frequently Asked Questions
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Professors in the Sociology Department at BGSU were asked:

What are the most common errors students make when creating tables?
Survey says...

<table>
<thead>
<tr>
<th>DECIMAL POINTS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Tables

- Format consistently—typically two digits

<table>
<thead>
<tr>
<th>Age of Younger Partner</th>
<th>2015</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-49</td>
<td>21.53%</td>
<td>22.57%</td>
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<td>37.84%</td>
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- Format consistently—typically two digits
- **Align your decimals**

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Align correctly by using an extra column

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Survey says...
• ALWAYS put the data source at the bottom of your table (and your charts, too)

\[ p < .1; \quad * p < .05; \quad ** p < .01; \quad *** p < .001 \]

Source: Current Population Survey

Notes:

\(^a\) Marital and cohabitation status was included in the roster but not released.
\(^b\) Only 16 same gender couples who are both Black in the old roster data.
P.S. FOREST PLOTS

https://mbounthavong.com/blog/tag/forest+plots
DATA PRESENTATION

• Published papers
• Conference posters
• Blog posts
• Research briefs
• Infographics

DATA EXPLORATION

You can use data visualization as an...

• Analysis tool!
• Avoiding Data Pitfalls: How to Steer Clear of Common Blunders When Working with Data and Presenting Analysis and Visualizations. Ben Jones

• Data Points: Visualization that Means Something. Nathan Yau

• Data Story: Explain Data and Inspire Action Through Story. Nancy Duarte

• Design for How People Learn. Julie Dirksen


• How Charts Lie: Getting Smarter about Visual Information. Alberto Cairo

• How to Lie with Statistics. Darrell Huff

• Now You See It. Stephen Few

• Show Me the Numbers: Designing Tables and Graphs to Enlighten. Stephen Few

• Slideology: The Art and Science of Creating Great Presentations. Nancy Duarte

• Storytelling with Data: A Data Visualization Guide for Business Professionals. Cole Nussbaumer Knaflic


• Turning Number Into Knowledge. Jonathan Koomey

• Visualize This: The FlowingData Guide to Design, Visualization, and Statistics. Nathan Yau