Do Your Data Visualizations Need a Makeover?

Meagan Longoria
My Data Viz Journey

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Consultant, Denny Cherry & Associates
Microsoft Data Platform MVP
DataSavvy.Me
@mmarie
You are interviewing candidates for an open business analyst position and this guy shows up.

What are you thinking?
His outfit might be distracting from his message.
What Not To Wear: Data Viz Edition

Participants begin worried they will look boring, but recognize deeper issues and leave knowing how to convey the right message.

My goal for your data viz
Two Types of Analysis Facilitated By Data Visualization

Exploratory (sense-making)

Explanatory (communication)

This is what you do when you share a Power BI report
Miscommunication is human. It happens a lot.

Data visualization is communication.
Data visualization is a skill. Most practitioners aren’t trained. Neither are our users.
Bad data visualization is like a joke that falls flat.

You get one of three reactions:

- Boredom
- Confusion
- Disgust
The Reaction We Want
Is Interest
Or
Positive Engagement
Why Do We Fail?

1. Our definition of success is wrong
Why Do We Fail?

2. We don’t structure and order our information purposefully
Why Do We Fail?

3. We fail to consider how we interpret visual design.
Defining Success In Data Visualization
Data Visualization

Any effort to help people understand the significance of data by placing it in a visual context
Success Means

Not just understanding the data, but understanding its significance
In Other Words

Tell your intended audience what they need to know efficiently and effectively
Ultimately

Help your audience make a decision or take action
Not Your Goal #1

Show how many different chart types you can use
Novelty Over Clarity

Peak time for sports and leisure

@hnrklndbrg | Source: American Time Use Survey

https://twitter.com/hnrklndbrg/status/886181647003119616
Not Your Goal #2

Show off how many reporting features you can use
Look What I Can Do!

Not Your Goal #3

Make shiny things
Pretty, Useless Shapes

https://flowingdata.com/2012/01/10/pie-step-comment-bubble-3d-thing/
Not Your Goal #4

Display ALL of the data
No Data Point Left Behind

Spot Check: How Do Top Tech Employers Compare?

Want to know what it's like to work at a top tech firm like Google, Facebook, or Amazon? PayScale compared 18 tech employers on nine different data points. Which employer looks like the right fit for you?

Purposeful Structure and Order
My Mom

Lovely, kind... horrible storyteller

Gets stuck on unimportant details

Starts a story and then doesn’t finish it

Don’t let your data viz be like my mom
Storytelling

“Massage” data to make it more interesting
Show visuals one at a time
Purposeful structure and order on the page
Helpful navigation paths
Purposeful Order – Possible Option

Question #1

Important Context

Question #2

Important Context

Question #3

Important Context
Data Visualization Requires Empathy

Everyone is busy. People want to go home, or they want to accomplish more at work. Help them do that by giving them what they need.
Challenge

How do I tell a story that keeps my users engaged?

Sometimes you can’t delight, but you can still be efficient.
Tip

Whiteboarding and WYSIWYG editors help get a good flow.

You don’t feel as committed to keeping a visual when it’s easy to make and change.

Power BI is good for this!
Have The Right Inputs

If you don’t give me the right data, I’m not going to care.
Go all the way.

If you give me the data but don't tell me the full story, you are missing the last yard.
Understanding How We Interpret Visual Design
Visual Design

Color

Shape

Layout
Common and Fixable

ISSUES
Issue #1: Lack of Alignment

Projected Employment Changes By Occupation 2016 - 2026

Data retrieved from the Bureau of Labor and Statistics: [https://data.bls.gov/](https://data.bls.gov/)

Highest Growth Occupations By Percent Change

- Solar photovoltaic installers: 105%
- Wind turbine service technicians: 96%
- Home health aides: 47%
- Personal care aides: 37%
- Physician assistants: 37%

Lowest Growth Occupations By Percent Change

- Watch repairers: -79%
- Word processors and typists: -56%
- Parking enforcement workers: -35%
- Respiratory therapy technicians: -33%
- Locomotive firemen: -29%

Percent of Occupations By On-The-Job Training Required To Achieve Competency

- None: 38.34%
- Short-term on-the-job training: 21.00%
- Moderate-term on-the-job training: 28.69%
- Long-term on-the-job training: 6.96%
- Internship/residency: 3.17%
- Apprenticeship: 1.83%

Top Paying Occupations - High School Diploma or Less

- Nuclear power reactor operators: $91,170
- Transportation, storage, and distribution managers: $89,190
- First-line supervisors of police and detectives: $84,840

Top Paying Occupations - Associate’s Degree

- Air traffic controllers: $122,410
- Radiation therapists: $80,160
- Nuclear technicians: $79,140

Top Paying Occupations - Bachelor’s Degree

- Chief executives: $181,210
- Computer and information systems managers: $135,800
- Architectural and engineering managers: $134,730

Top Paying Occupations - Master’s Degree

- Nurse anesthetists: $160,270
- Political scientists: $114,290
- Computer and information research scientists: $111,840

Top Paying Occupations - Doctoral or Professional Degree

- Anesthesiologists: $208,000
- Obstetricians and gynecologists: $208,000
- Oral and maxillofacial surgeons: $208,000
- Orthodontists: $208,000
- Surgeons: $208,000
Issue #2: Diagonal Chart Labels
### Issue #3: Bold chart title background with low-intensity chart colors

#### Meagan Longoria
**Analytics Afficionado and Consultant**

**Skills By Years of Experience**

<table>
<thead>
<tr>
<th>Skill</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-user documentation</td>
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<tr>
<td>Requirements Gathering</td>
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<td>Business Intelligence</td>
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<td>Data Analytics</td>
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<td>Data Integration</td>
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<td>Data Warehousing</td>
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<td>End-user Training</td>
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<td>Technical documentation</td>
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<td>Business Process Improvement</td>
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<td>Database Design</td>
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<td>Dimensional Modeling</td>
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<td>Data Visualization</td>
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<td>Training Presentations/Camps</td>
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<td>Consulting</td>
<td>6</td>
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<tr>
<td>Demo story/script creation</td>
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<td>Master Data Management</td>
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**Work Experience**

- **Solution Architect, BlueGranite**
- **BI Solutions Consultant, Valorem Consulting**
- **Business Intelligence Analyst/Developer, Zillner**
- **Business Systems Analyst, Cerner Corporation**

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<td>1.3</td>
<td>3.4</td>
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**Technology**

- Excel
- Power BI
- MDX
- SSAS
- Power Query
- SQL Server DB
- Data Factory
- Polybase
- Azure Database
- Elastic Queries
- Azure SQL DB
- Writing

**Professional Activities**

<table>
<thead>
<tr>
<th>Organization/Platform</th>
<th>Role</th>
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<th>Activity URL</th>
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<td>Twitter</td>
<td>User: @Mmarie</td>
<td>June 2008</td>
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<td>PASS SQLSaturday</td>
<td>Organizer &amp; Speaker</td>
<td>June 2012</td>
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<td>DataSavvy.me</td>
<td>Blogger</td>
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<td>Stack Overflow</td>
<td>User/contributor: mmarie</td>
<td>July 2013</td>
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<td>Gst</td>
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<td>August 2016</td>
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<td>Microsoft MVP</td>
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<td>October 2016</td>
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<td>Denver SQL Server User Group</td>
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<td>Whelpaper: Planning a Power BI Enterprise Deployment</td>
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<td>Let Her Finish: Voices From the Data Platform</td>
<td>Author</td>
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<td>SpeakingMentors.com</td>
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<td>February 2018</td>
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**Professional Training & Certifications**

- Cloud Platform University: Practical Data Analytics with the Microsoft Cortana Intelligence Suite
- Crucial Conversations BlueGranite
- Information Dashboard Design and Visual Data Analysis

**Formal Education**

- **Masters of Business Administration**
- **Bachelor of Science in Business Administration**
- **University of Kansas**
- **International Business**
- **University of Nebraska**
Issue #4: Too many data labels
Issue #5: Non-strategic Use of Color Contrast
Issue #6: Overuse of Chart Borders
Issue #7: Bar charts with axis that doesn’t start at 0
Issue #8: Too many charts on a page
Your Turn

What would you add to the list of common mistakes?
Cognitive Load

Information requires brain power

Brain power (aka working memory) is limited

Be intentional about the information you present
Preattentive Attributes

Visual properties we notice without conscious effort within ~200 ms of exposure

Color
Form
Spacial Positioning
Movement
Gestalt Principles

Our brains simplify objects so we see the whole or outline before we see all the components.

We like things to be:
   Simple
   Symmetrical
   Orderly
   Regular
Your Data Viz Needs a Makeover If...
Cognitive Load

✓ Charts are off message
✓ Too much jargon, lack of supplemental information to explain terminology or data gathering techniques
✓ Super intense colors everywhere
✓ Redundant information within a chart (gridlines + axis labels + data labels)
✓ Inconsistent design across report pages (slicer bank in different places, different use of bookmarks)

✓ My dog is really cute
✓ Too much jargon, lack of supplemental information to explain terminology or data gathering techniques
✓ Super intense colors everywhere
✓ Redundant information within a chart (gridlines + axis labels + data labels)
✓ Inconsistent design across report pages (slicer bank in different places, different use of bookmarks)
Cognitive Load

✓ Too much jargon, lack of supplemental information to explain terminology or data gathering techniques
Cognitive Load

- Super intense colors everywhere
Cognitive Load

✓ Redundant information that is repeated within a chart (gridlines + axis labels with data labels)
Cognitive Load

✓ Inconsistent design across report pages (slicer bank in different places, different use of bookmarks)
Preattentive Attributes

✓ Bright colors on information that doesn't require attention
Preattentive Attributes

✓ Using multiple colors without purpose
Preattentive Attributes

✓ Rotated axis labels
Preattentive Attributes

✓ Bar charts that don't start at 0
Preattentive Attributes

✓ Bright colors on information that doesn't require attention
✓ Using multiple colors without purpose
✓ Rotated axis labels
✓ Bar charts that don't start at 0
✓ Misaligned visuals on a page
✓ Dark titles or title backgrounds that are more prominent than the rest of the chart
✓ Dark, intense borders
Preattentive Attributes

✓ Dark titles or title backgrounds that are more prominent than the rest of the chart
Preattentive Attributes

✓ Dark, intense borders
Gestalt Principles

✓ Poorly ordered bars in a bar chart
✓ Uneven spacing between charts on a page without purpose
✓ Using multiple colors without purpose
✓ Reusing multiple colors for different purposes
✓ Background colors that stand out more than the chart elements
Gestalt Principles

✓ Uneven spacing between charts on a page without purpose
Gestalt Principles

✓ Using multiple colors without purpose
Gestalt Principles

✓ Reusing multiple colors for different purposes
Gestalt Principles

✓ Background colors that stand out more than the chart elements
Squint Test

✓ Foreground elements not standing out against background
Squint Test

✓ Background or border elements that unintentionally draw more attention than more important data elements
Squint Test

✓ The most eye-catching element on your report page is not an important element
Squint Test

✓ Foreground elements not standing out against background

✓ Background or border elements that unintentionally draw more attention than more important data elements

✓ The most eye-catching element on your report page is not an important element

✓ Charts not in an appropriate order on the report page

✓ Elements not spaced appropriately so that objects that are closer to each other have some type of relationship
Squint Test

✓ Elements not spaced appropriately so that objects that are closer to each other have some type of relationship
Get the Power BI Visualization Usability Checklist:
https://datasavvy.me/pbi-data-viz-checklist/
Most data viz blunders are due to lack of focus on your intended audience

This report design would be GREAT if it weren’t for the users!

Art by Kendra Little