



Create Powerful Data Visualizations



CGDMS Webinar
6 May 2020

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Yogi Schulz
Biography

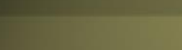
- ❑ Founder at Corvelle Consulting
- ❑ Information technology related management consulting
- ❑ IT World Canada columnist & CBC Radio guest
- ❑ Former PPDM Association board member
- ❑ Industry presenter:
 - Project World - 6 years
 - PMI – SAC - 10 years
 - PMI - Information Systems SIG - 2 years
 - PPDM Association - many years



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Topic Outline


- ❑ Introduction
- ❑ Learning objectives
- ❑ Powerful data visualizations:
 - Understand visualizations
 - Create visualizations
 - Refine visualizations
 - Practice and present visualizations
- ❑ Recommendations & actions




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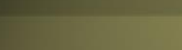
Vast Data Visualization Choice



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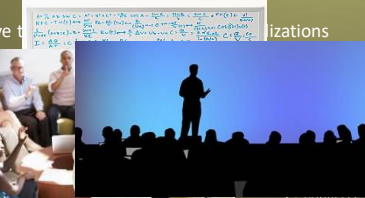


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Learning Objectives

- ❑ Understand design considerations that lead to powerful data visualizations
- ❑ Understand effective techniques for presenting data visualizations
- ❑ Understand best practices and tips for presenting data visualizations



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Understand Visualizations



A Brief History of Data Visualization
When a Chart hits our Eyes

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Whirlwind Tour of the History of Visualization

William Playfair
1786

Tables & Ledgers
1700's

Data in prose

Cave drawings
BCE

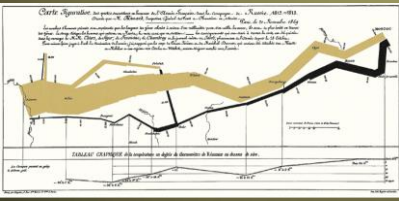



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Charles Minard 1861
First Infographic





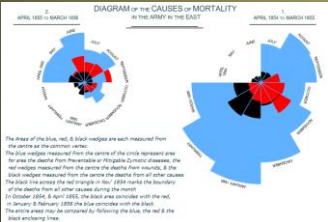
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Florence Nightingale's 'Coxcombs'

1858



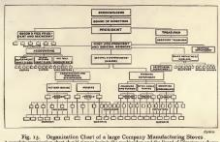


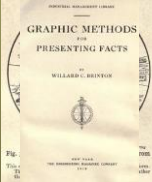
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Willard C. Brinton 1914
First business book about visualization





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□ Rules for presenting data

□ American consulting engineer

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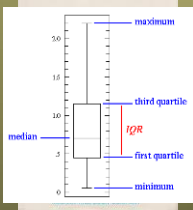
Mary Eleanor Spear
1952, 1969




□ Common-sense advice

□ Invented box plot

□ Worked for various US government agencies




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Jacques Bertin
1967



□ Principle of expressiveness:


- Say everything you want to say — no more, no less
- Don't mislead

□ Principle of effectiveness:

- Use the best method available for showing your data

□ Cartographer

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Create Powerful Data Visualizations

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Jacques Bertin
Seven Visual Variables

| Bertin's Original Visual Variables | |
|----------------------------------------------|--|
| Position changes in the x, y location | |
| Size change in length, area or repetition | |
| Shape define number of shapes | |
| Value changes from light to dark | |
| Colour changes in hue at a given value | |
| Orientation changes in alignment | |
| Texture variation in 'grain' | |

Position

Color

Size

Shape

Brightness value

Orientation

Texture

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Edward Tufte
1983

❑ Disciplined design principles

❑ Minimalist approach

❑ Professor emeritus at Yale University

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Jock Mackinlay
1986

❑ Automatically encode data with software

❑ Enable people to focus on ideas, concepts

❑ Added eighth variable to Bertin's list: motion

❑ VP of Research and Design, Tableau Software

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When a Chart hits our Eyes

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When a Chart hits our Eyes

❑ Visuals aren't read in a predictable, linear way

– Create charts spatially, from the visual outward

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When a Chart hits our Eyes

❑ Visuals aren't read in a predictable, linear way

– Create charts spatially, from the visual outward

❑ We see first what stands out

– Whatever stands out should support idea

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When a Chart hits our Eyes

❑ Visuals aren't read in a predictable, linear way


– Create charts spatially, from the visual outward

❑ We see first what stands out

– Whatever stands out should support idea

❑ We see only a few visuals at once

– Plot as few visual elements as possible



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When a Chart hits

❑ Visuals aren't read in a predictable, linear way

– Create charts spatially, from the visual outward

❑ We see first what stands out

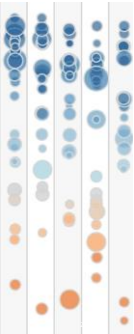
– Whatever stands out should support idea

❑ We see only a few visuals at once

– Plot as few visual elements as possible

❑ We seek meaning and make connection

– Relate visual elements in a meaningful way



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When a Chart hits our Eyes

❑ Visuals aren't read in a predictable, linear way

– Create charts spatially, from the visual outward

❑ We see first what stands out

– Whatever stands out should support idea

❑ We see only a few visuals at once


– Plot as few visual elements as possible

❑ We seek meaning and make connection

– Relate visual elements in a meaningful way

❑ We rely on conventions and metaphors


– Embrace deeply ingrained conventions



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Example: USA Energy Resources



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Alternative Charts

DO YOU WANT ME TO PUT THE CHART ON ONE PAGE, WHICH WOULD MAKE THE TEXT TOO SMALL FOR YOUR AUDIENCE TO SEE?

OR DO YOU PREFER A MULTIPLE-PAGE APPROACH THAT IS CONFUSING AND UNPERSUASIVE?

IT'S PROBABLY BETTER IF NO ONE CAN READ IT.

I WON'T BOTHER USING REAL WORDS.



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Create Visualizations

What kind of visual communication do you want to create?

Better Visualizations in an Hour



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What kind of visual communication do you want to create?



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What kind of visual communication do you want to create?

1. Is my information conceptual or data-driven?

- Conceptual information is qualitative
- Data-driven information is quantitative

2. Are my visuals meant to be declarative or exploratory?

- A declarative purpose is to make a statement
- An exploratory purpose is to look for new ideas

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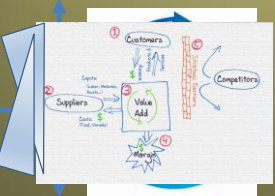
Four Types of Data Visualizations

Idea illustration

Idea generation

Declarative

Exploratory



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Four Types of Data Visualizations

Everyday dataviz

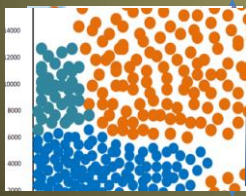
Visual discovery

Declarative

Exploratory

Data-Driven

Visual discovery



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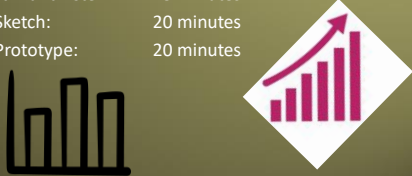
Better Visualizations in an Hour

Step 1. Preparation: 5 minutes

Step 2. Talk and listen: 15 minutes

Step 3. Sketch: 20 minutes

Step 4. Prototype: 20 minutes



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1.


Preparation: 5 minutes

☐ Create a workspace

☐ Put aside your data

☐ Write down basics as constant reminders:

- Who is in my audience?
- What is the setting?



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2.


Talk and listen: 15 minutes

Enlist a colleague

Write down words, phrases, and statements



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3.


Sketch: 20 minutes

Match keywords to chart types

Start sketching, try out multiple visuals



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Major Visualizations Types


| Visualizations Type | Purpose |
|---------------------|-------------------------------------------------|
| Comparison | To compare the magnitude of measures |
| Change over time | To display the changing trend of measures |
| Part-to-whole | To identify the parts making up a measure total |
| Flow | To display a flow or dynamic relations |
| Ranking | To rank measures in an order |
| Spatial | To display measures over spatial maps |
| Distribution | To display the distribution of values |
| Correlation | To show correlations between measures |
| Single | To present single values |
| Narrative | To tell a story with data |
| Filter | To control report filters |

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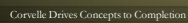


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Great article to read:  [Visualization types in Power BI](#)



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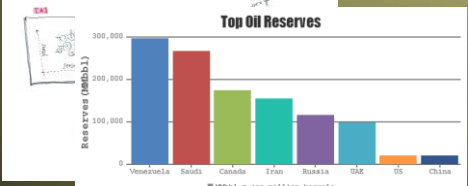


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4.

Prototype: 20 minutes

Prototype approach




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Example: Capital Exposure and Risk



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I don't have anything useful to say so I made this pie chart.

Identify a Valuable Message

THAT WORKED TOO WELL.

I PLEDGE MY LIFE AND MY FORTUNE TO THE PIE!

OOOH! IT MUST BE TRUE BECAUSE IT'S PIE.

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Refine Visualizations

Refine to Impress
Refine to Persuade
Persuasion or Manipulation?

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Refine to Impress
Creating that sense of good design

1. Focus on design structure and hierarchy:

- Include: title, subtitle, visual field, source line
- Align elements

Example Chart

Visual field

Source line

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Refine to Impress
Creating that sense of good design

1. Focus on design structure and hierarchy:

- Include: title, subtitle, visual field, source line
- Align elements

2. Focus on design clarity

- Make all elements support visual
- Remove ambiguity
- Use conventions and metaphors

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Refine to Impress
Creating that sense of good design

1. Focus on design structure and hierarchy:

- Include: title, subtitle, visual field, source line
- Align elements

2. Focus on design clarity

- Make all elements support visual
- Remove ambiguity
- Use conventions and metaphors

3. Focus on design simplicity

- Show only what's needed
- Minimize the number of colors

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Refine to Persuade
Making an accurate chart not enough

1. Hone main idea

- Start by saying I need to convince the audience

2. Make main idea

- Use simple
- Emphasize

3. Adjust w

- Manipulate
- Eliminate
- Add data to

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Persuasion or Manipulation?

1. Truncated Y-axis

A chart removes valid value ranges from the y-axis, thereby removing data from the visual field


2. Double Y-axis

A chart has two y-axes

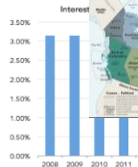
3. Map


A map to encourage a specific viewpoint

Interest Rates



Interest Rates





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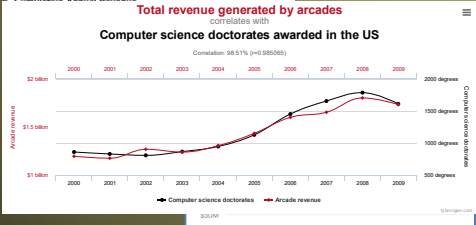
Example: Charting the Wrong Variable

Total revenue generated by arcades

correlates with

Computer science doctorates awarded in the US

Correlation: 98.51% (p=0.000000)




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Not so Effective Design


AS REQUESTED, I FIT MY PRESENTATION ON ONE POWERPOINT SLIDE.



I HAD TO USE ALL OF THE WHITE SPACE, BUT I THINK IT WAS WORTH IT TO FIT EVERYTHING ON ONE PAGE.



IT'S ACTUALLY ONLY ONE BULLET POINT, BUT IT'S A LONG ONE.




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Present and Practice Visualizations

Present to Persuade
Visual Critique

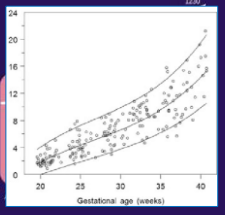


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Example of bar chart

Create beautiful charts online



□ Show the chart and stop talking

□ Talk

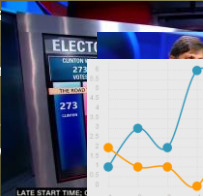
□ Guide

□ Use

□ Turn

□ Pre

□ Show



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Present to Persuade

Share of world population by region 1950

□ Create tension

□ Use time

□ Zoom

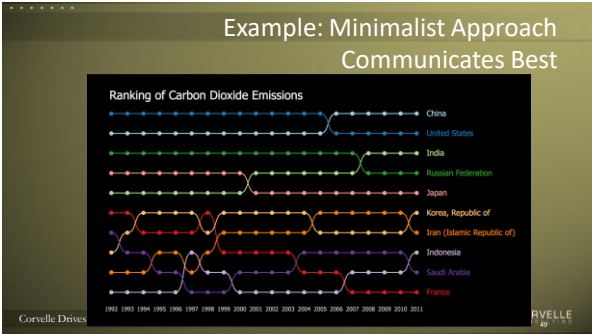
□ Deconstruct

□ Tell story



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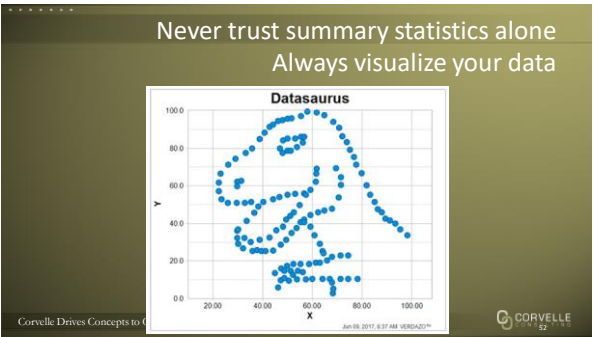
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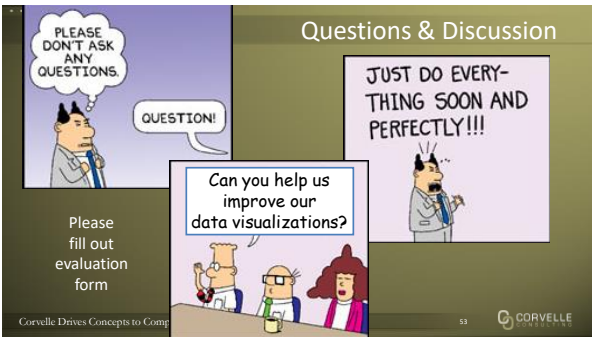
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