effectiveplots\_summary

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# PART I - Principles

## Principles for Creating Effective Visualizations

### Quick tips for Getting Started (Exploratory Phase)

1. Tidy data!
2. List variables
3. List data types & relationships of interest
4. Produce many, quick visualizations

Helpful chart chooser: <https://www.data-to-viz.com/#explore>

### Principles for Effective Visualization (Presentation Phase)

1. Articulate the main idea your graphic should convey FIRST
2. Run through checklist of best practices

* Avoid Common Pitfalls of Misleading Graphs
* Go for Simplicity
* Look at Text
* Look at Color

1. Test your graphic on others – with no hints

# PART II - Applying Principles + Visualization Resources

## Applying Effective Visualization Principles in R

Going to be using RStudio on myadroit.princeton.edu.  
Before launching RStudio, need to load packages on head node of Adroit.

### Upload Dataset in Adroit

Create ‘effectiveplots’ directory.  
Upload files.

### Install & Load Packages

On Adroit’s head node:

ssh <netid>@adroit.princeton.edu # Log into Adroit.  
module load rh/devtoolset/8 # Load modules.  
R # Start R.

Once in R:

install.packages("dplyr")  
install.packages("gpplot2")   
install.packages("scales")

*NOTE:* Package installation only needs to be done once.

### Open RStudio on MyAdroit

library(dplyr) # to manipulate data  
library(ggplot2) # to make plots  
library(scales) # to use use "commas" in label argument for scale\_y\_continuous()  
  
# load in dataset  
d\_covid <- read.csv("effectiveplots/covid\_pop\_latlong\_2020-07-23.csv")   
  
# get variable names  
names(d\_covid)  
head(d\_covid)

### Default Plot

ggplot - Data, Aesthetics, Geometries

“An aesthetic is a visual property of the objects in your plot. Aesthetics include things like the size, the shape, or the color of your points.”

ggplot(data = ) +   
 geom\_col()

### Improved Plot

# Adjustments to Data  
#\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
# for AVOID COMMON PITFALLS OF MISLEADING GRAPHS  
# to arrange bars from highest to lowest  
d\_covid\_gg <- d\_covid %>%   
 arrange() %>%   
 mutate()   
  
# for COLOR  
# if want to highlight nj  
d\_covid\_nj <- d\_covid %>%   
 filter()  
  
# Plotting  
#\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
  
ggplot(data = d\_covid\_gg) +  
 geom\_col(aes(x = state, y = total\_cases)) +  
   
 # 1. ARTICULATING MAIN IDEA  
 # Add labels  
 labs(title = "",  
 subtitle = "",  
 caption = "") +  
   
 # 2. BEST PRACTICES  
   
 # AVOID COMMON PITFALLS OF MISLEADING GRAPHS  
 coord\_flip() +  
 scale\_y\_continuous() +  
   
 # SIMPLICITY  
 theme\_classic() +  
 theme(  
 panel.background = element\_blank(), # remove color of background panel  
 panel.grid.major.y = element\_blank(), # remove major Y grid lines  
 panel.grid.major.x = element\_line(), # define major X grid lines   
 panel.grid.minor = element\_blank(), # remove minor grid lines  
 axis.line = element\_blank(),  
 axis.ticks = element\_blank(),  
   
 # TEXT  
 plot.caption = element\_text(),   
 plot.title.position = "plot",  
 plot.caption.position = "plot",   
 plot.title = element\_text(),   
 plot.subtitle = element\_text(),  
 axis.text = element\_text(),  
 axis.title.x.bottom = element\_text())   
 ) +  
 ylab("") +  
 xlab() +  
   
 # COLOR  
 geom\_col(data = , mapping = aes())

### Save Your Plot

ggsave("<insert-your-file-path>/covid\_nj.png")

### Resources

ggplot2 cheatsheet  
<https://rstudio.com/wp-content/uploads/2015/03/ggplot2-cheatsheet.pdf>

ggplot2 Main Page  
(see section ‘Learning ggplot2’)  
<https://ggplot2.tidyverse.org/>

ggplot2 Themes  
<https://ggplot2.tidyverse.org/reference/theme.html>

ggplot2 Theme Elements  
<https://ggplot2.tidyverse.org/reference/element.html>

Various graphs and corresponding code, made in R with ggplot2:  
<https://www.r-graph-gallery.com/index.html>

## Need help? Visualization Services at Princeton

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### PRINCETON INSTITUTE FOR COMPUTATIONAL SCIENCE AND ENGINEERING (PICSciE)

*Area of expertise:* General visualization (exploration / design / creation / storytelling / troubleshooting) and GIS training and support  
<https://researchcomputing.princeton.edu/systems-and-services/visualization>

**PICSciE/Research Computing’s Visualization Staff**

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**Help Through Email**  
[cses@princeton.edu](mailto:cses@princeton.edu)

**In-Person Help**  
Help Sessions (usually 245 Lewis Science Library, now on Zoom)  
Tuesdays 10:30 – 11:30 am  
Thursdays 2:00 – 3:00 pm  
<https://researchcomputing.princeton.edu/education/help-sessions>

**Project Consultations**  
Have a visualization you or your group would like to build, but want help getting there?  
You can apply to work with our visualization analysts over a semester to help you build the visualizations you need.  
Contact Carolina Roe-Raymond at ([c.roe-raymond@princeton.edu](mailto:c.roe-raymond@princeton.edu)) to apply.

**Workshops**  
<https://researchcomputing.princeton.edu/workshops>

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### GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING AT PRINCETON UNIVERSITY; MAPS AND GEOSPATIAL INFORMATION

*Area of expertise:* GIS training, support, and data  
Library: <https://library.princeton.edu/collections/pumagic>  
Research Computing/OIT: <https://researchcomputing.princeton.edu/vis-lab/gis>

**Staff**  
Tsering Wangyal Shawa  
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**Training available through…**

* Princeton courses
* Workshops
  + Register at: <http://library.princeton.edu/collections/pumagic/workshops>
* Esri self-paced e-Learning classes
  + <http://training.esri.com>, contact Wangyal or Bill

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### CeDAR

*Area of expertise:* Tableau training and support  
<https://cedar.princeton.edu/>

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### VIS-E LAB

*Area of expertise:* Ethnographic data visualization  
<https://anthropology.princeton.edu/research-programs/vize-lab>

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### DATA AND STATISTICAL SERVICES

*Area of expertise:* Data and statistical consulting  
<https://dss.princeton.edu/>

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### STOKES LIBRARY - STOKES VIZ HUB

*Area of expertise:* Digital research and data visualization grounded in qualitative analysis  
<https://library.princeton.edu/stokes/stokes-viz-hub>

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### OFFICE OF POPULATION RESEARCH

*Area of expertise:* Offers workshop on graph design (among other topics)  
<https://opr.princeton.edu/workshops/>