

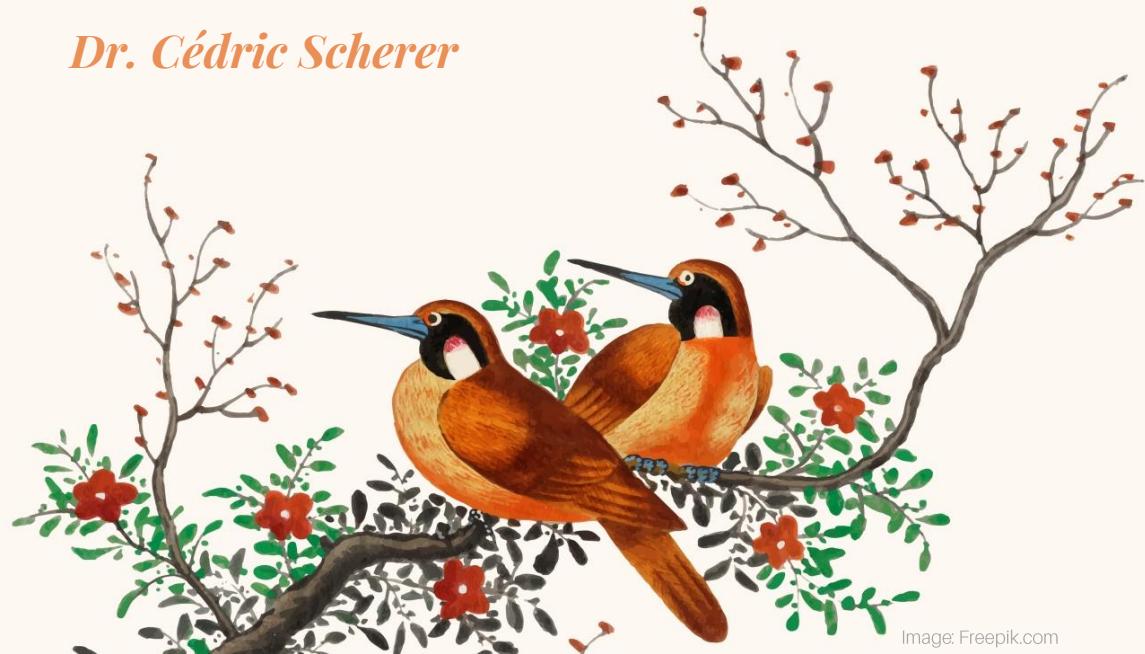


ggplot Wizardry

Extended Version

My Favorite Tricks and Secrets for Beautiful Plots in R

Dr. Cédric Scherer



MeetUp March 25, 2021

Image: Freepik.com

Scientist by Training



Computational Ecology at the Leibniz Institute for Zoo and Wildlife Research

DataVizard by Heart



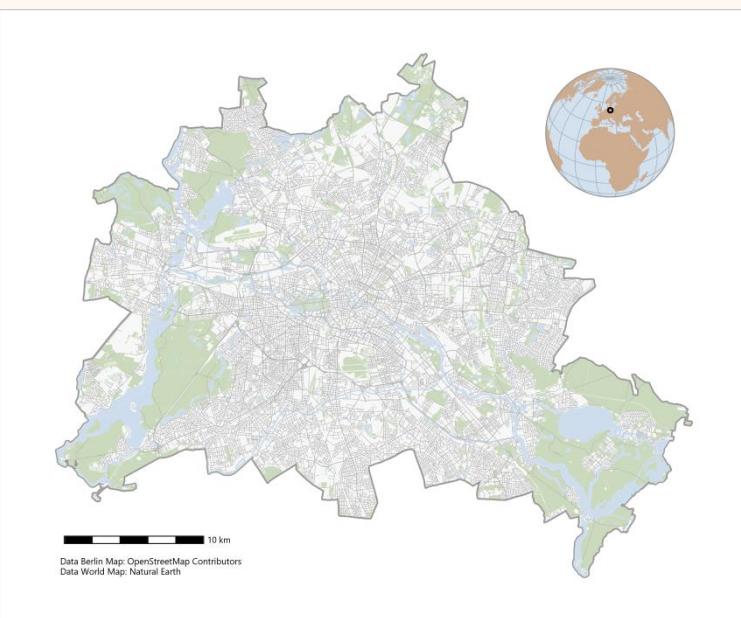
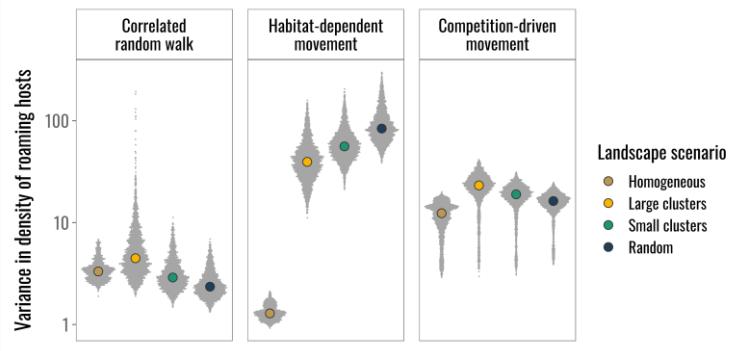
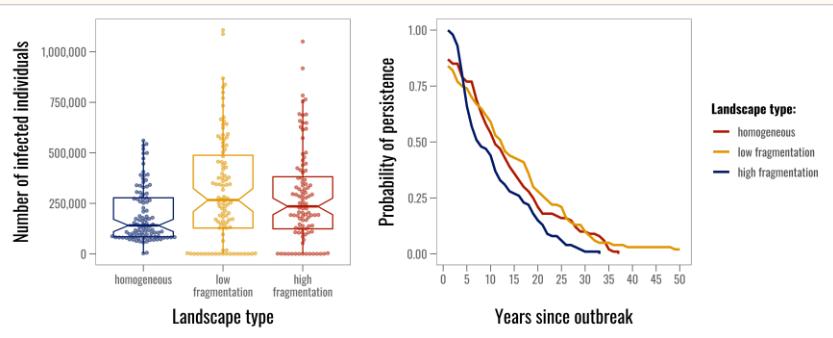
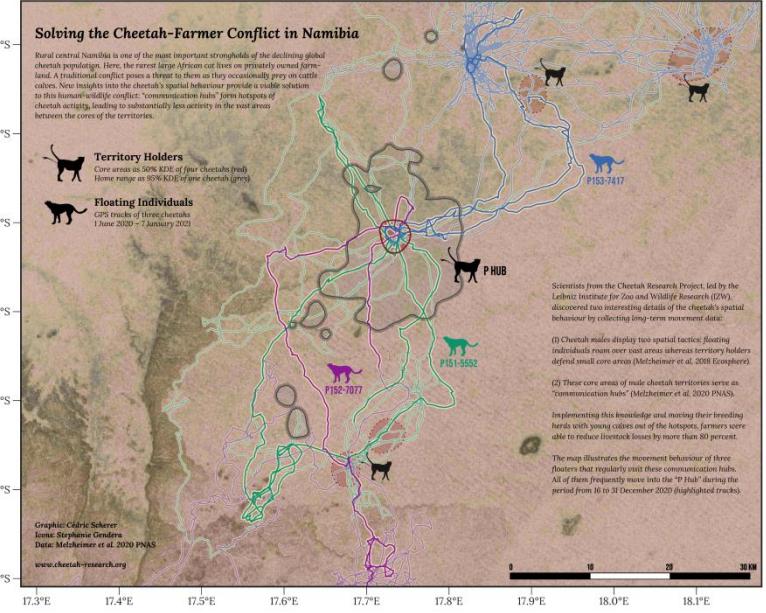
Self-employed Data Visualization Designer & Workshop Instructor

99% R | 95% ggplot2



- 2008 – my first time using R
- 2011 – frequent use of base R
- 2016 – discovered ggplot2 + rest of the tidyverse
- 2019 – using ggplot2 every day
- 2020 – freelancing with ggplot2 designs + courses





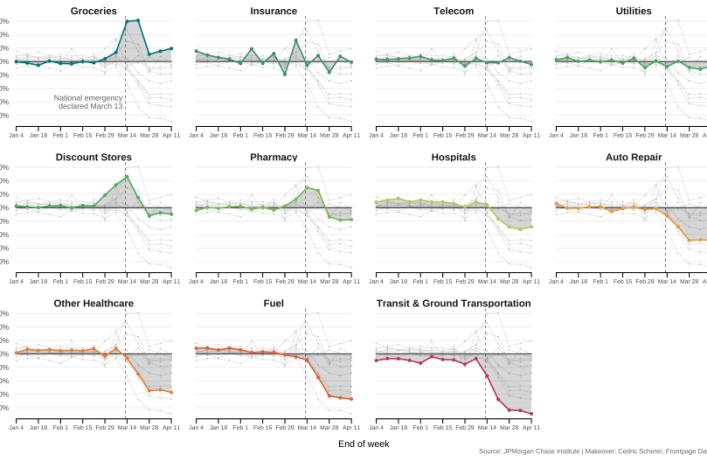
Top left:
BES MoveMap Contest –
Winner “Pretty Map” and
Runner-Up “Rmap”

Top right:
Scherer, Radchuk, Franz,
Thulke, Lange, Grimm &
Kramer-Schadt (2020)
Oikos 129 (5):651–667
(modified)

Bottom left:
Sciaini, Fritsch, Scherer
& Simpkins (2018)
*Methods in Ecology and
Evolution* 9 (11):2240–
2248 (modified)

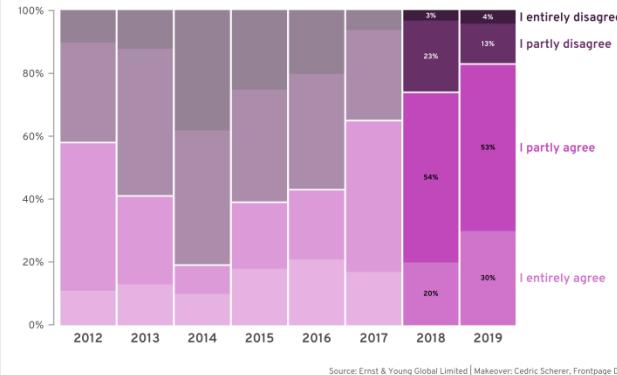
Bottom right:
Package to create
template maps of Berlin

Year-over-year percent change in spending by essential category

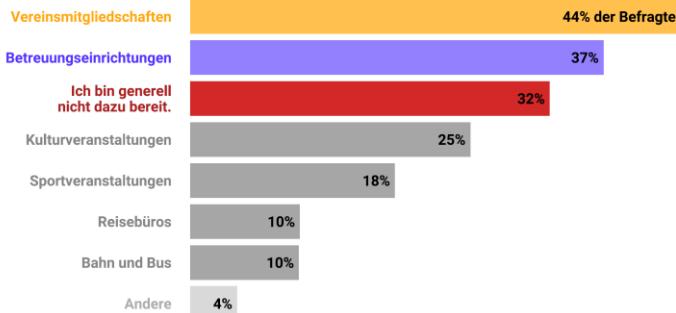


Do you agree with the following statement?

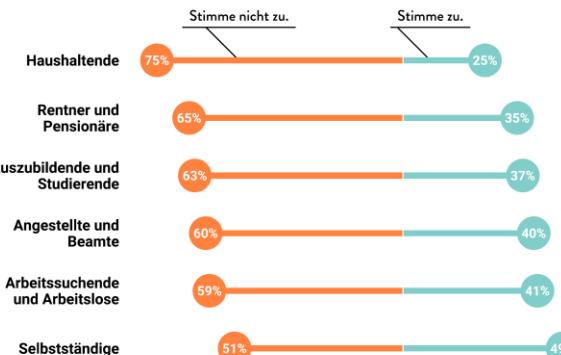
"The price of banking services will fall."



Ich bin bei diesen Betrieben bereit auf eine Rückerstattung zu verzichten.
(Mehrfachauswahl möglich)



Der Eventim-Chef Klaus-Peter Schulenberg sagt, dass die Pflicht zur Ticketerstattung der Kultur in Deutschland dauerhaft schadet.

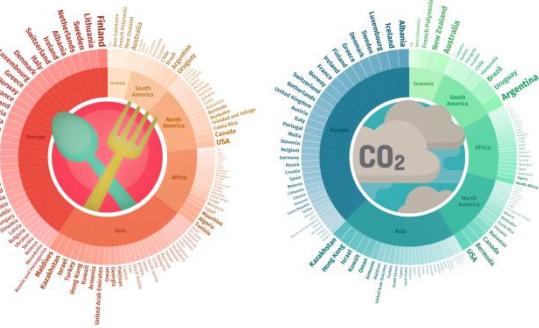


Upper row:
[Makeover examples for FrontPage Data](#)

Lower row:
[Survey on contract termination during the COVID-19 pandemic for kuendigung.org](#)

Food Carbon Footprint Index 2018

Global comparison of different diets in terms of **Average Consumption** (kg/person/year) of both animal and non-animal products as well as **Carbon Emissions** (kg CO₂/person/year) per continent and country. Font size and color intensity indicate each country's estimate with countries **printed in bold** belonging to the upper 50% of consumers and CO₂ emitters, respectively.



Visualization by Cedric Scherer • Data by Food and Agriculture Organization of the United Nations (FAO) via mca • Icons by Freepik

THE WHOLE WORLD IS GETTING WARMER

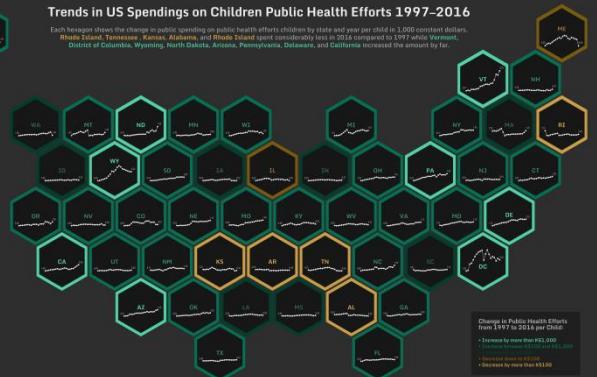
TEMPERATURE ANOMALIES BY COUNTRY 1880-2018 COMPARED TO 1850-1900 BASELINE



Visualization: Cedric Scherer • Data: GISTEMP (country-level data provided by Kevin Lipps)

Trends in US Spending on Children Public Health Efforts 1997–2016

Each hexagon shows the change in public spending on public health efforts children by the last year our child in 2010 completed school.
Rhode Island, Tennessee, & Kentucky All three Rhode Island spent considerably less in 2016 compared to 1997 while Vermont, District of Columbia, Wyoming, North Dakota, Arizona, Pennsylvania, Delaware, and California increased the amount by far.



Visualization by Cedric Scherer • Data: Census Bureau's Annual State and Local Government Finance Survey (Expenditure Variable E22)

THE RISE & FALL OF WOMEN'S COLLEGE BASKETBALL DYNASTIES

A women's college basketball dynasty is the rise of the NCAA basketball program that has emerged as one of the most dominant programs in the history of college basketball. The term "dynasty" typically refers to a team that has won multiple national championships in a short period of time.

The visualization shows the cumulative rise and fall of women's college basketball dynasties in the past decade from the early 2000s to 2016. It highlights the full life of a dynasty: its birthplace, peak power, and decline. The data is based on the number of consecutive years a team has won the national championship.



Wind Turbines in Canada

Each vertical stripe contains the same number of wind turbines.



Visualization by Cedric Scherer • Data: Government of Canada

ggplot2

[gee-gee-plot-two]

an R package

is a system for declaratively creating graphics
based on “The Grammar of Graphics”.



Related searches



map

scatter plots

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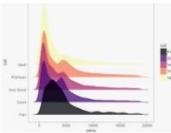
choropleth

geom



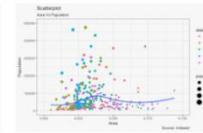
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timgrosenbacher.ch



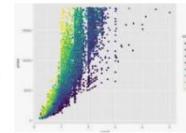
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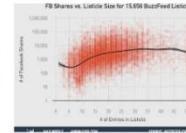
Top 50 ggplot2 Visualizations - The ...

r-statistics.co



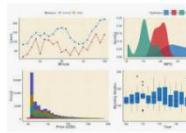
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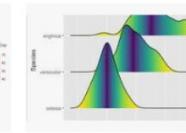
The gghthemr package - Theme and colour ...

shanehan.ie



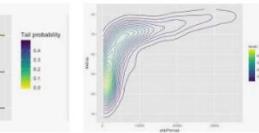
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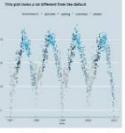
ggplot2 for More Powerful R Visualizations

mode.com



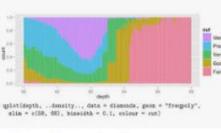
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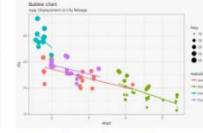
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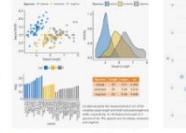
Create beautiful statistical graphics ...

blog.revolutionanalytics.com

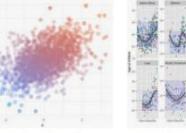


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Easy way to mix multiple graph... r-bloggers.com

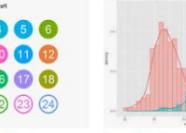


Pretty scatter plots with ggplot2 ...

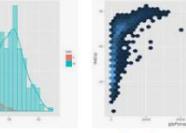
drsimonj.wb време



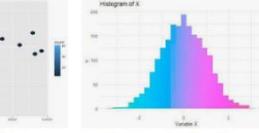
100+ Ggplot2 ideas | data visualiz... pintereset.com



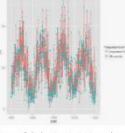
Beautiful network diagrams with ggplot2 ...



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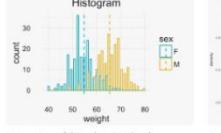


Pretty histograms with ggplot2 | R-blogger... r-bloggers.com



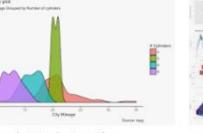
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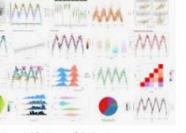
Create Beautiful Graphics in R (Book ...

sthda.com



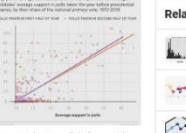
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ggplot2 Tutorial for Beautiful Plotting ...

pintereset.com

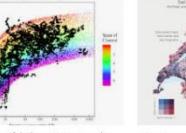


How to Make Beautiful Charts with ...

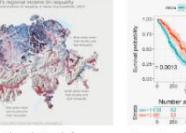
charlesbordet.com



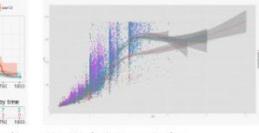
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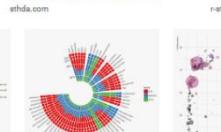


ggplot2 logo ...

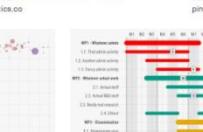


R, sf and ggplot2 - Part 2: Layers ...

r-bloggers.com



Polar coordinate / circular layo... stackoverflow.com



Bubble plot with ggplot2 - r-graph-gallery.com



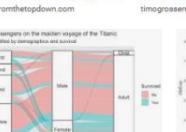
Create beautiful Gantt charts with ggplot2 ... morioh.com



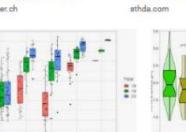
Beautiful plots with R and the ggplot2 ... hydrogeology.net



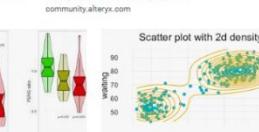
Beautiful plotting in R: A ggplot ... zevross.com



Data Visualization in R using ggplot2 ... lab.rady.ucsd.edu



Alluvial Plots in ggplot2 ... cran.r-project.org



Make Grouped Boxplots with ggplot2 ... cmdlinetips.com



Styling ggplot2 Graphics - Jumping Rivers

jumpingrivers.com



UC Business Analytics R Programming Guide

ucr.github.io



Beautiful plotting in R: A ggplot ... zevross.com



Complete Guide to ggplot2. Cre... medium.com



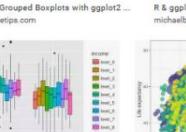
ggparty: Graphic Partying ... cran-project.org



Creating plots in R using ggplot2 ... t-redacty.io



ggplot2 for More Powerful R Visualizations ... mode.com

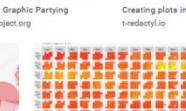


What is a good ggplot2 tutorial for a ... quora.com

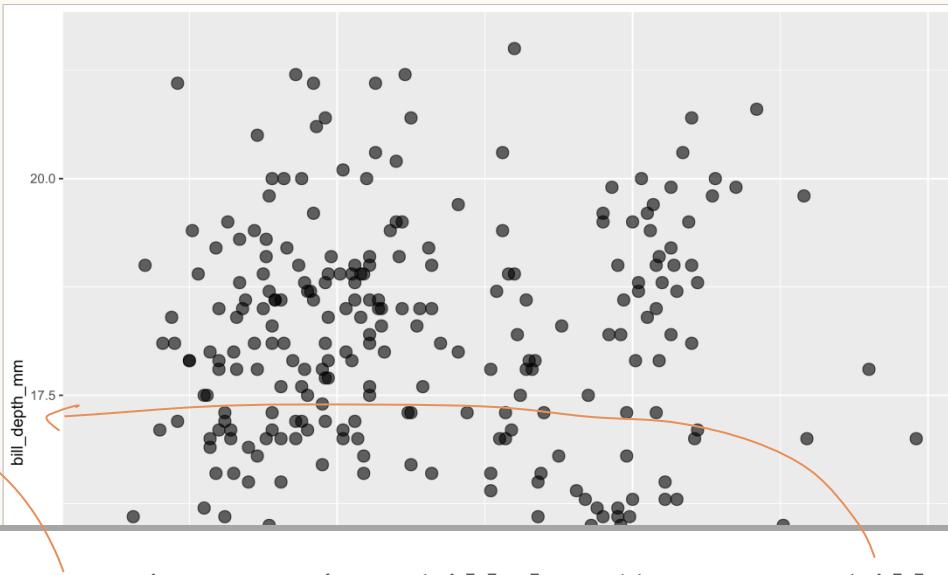


Beautiful Animations in R ... dataanova.com

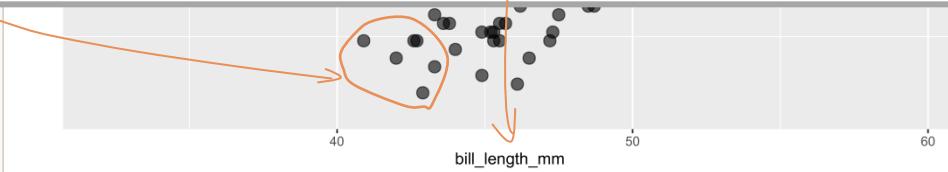
R Weekly 2017 Issue 7 | RWeekly.org ... rweekly.org



Violin plot ...



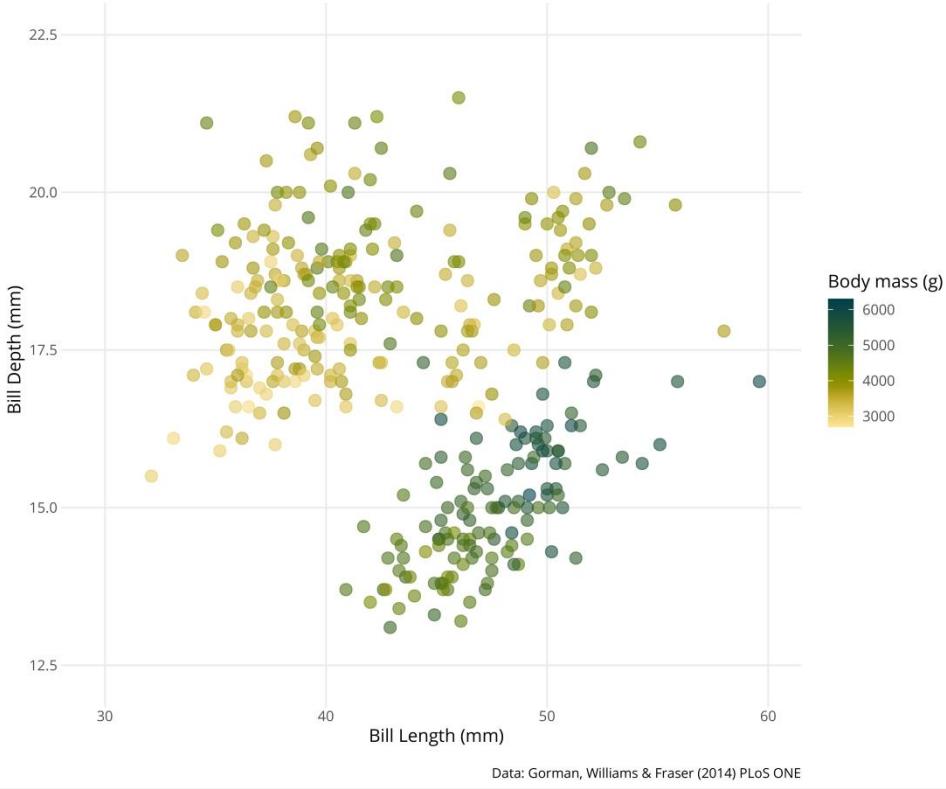
```
ggplot(data = penguins, aes(x = bill_length_mm, y = bill_depth_mm)) +  
  geom_point(alpha = .6)
```



You provide the data, tell ggplot2 how to map variables to aesthetics, what graphical primitives to use, and it takes care of the details.

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



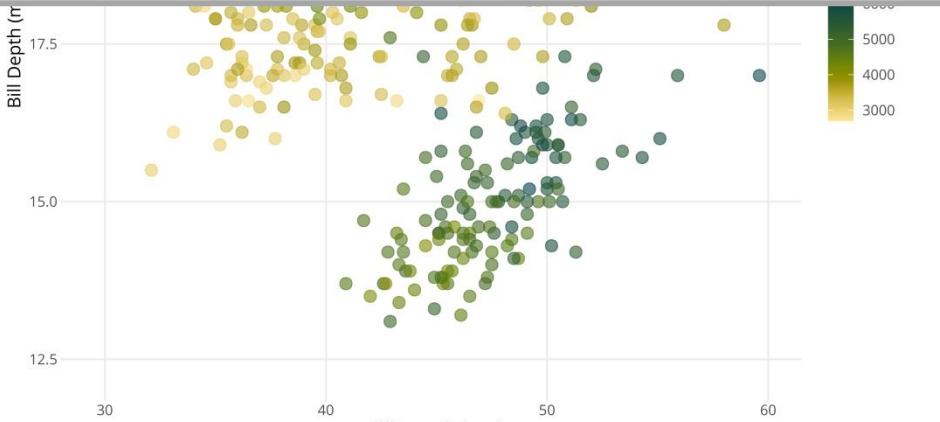
You provide the data, tell ggplot2 how to map variables to aesthetics, what graphical primitives to use, and it takes care of the details.

Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)

A scatter plot of bill depth versus bill length.

22.5

```
ggplot(data = penguins, aes(x = bill_length_mm, y = bill_depth_mm)) +  
  geom_point(aes(color = body_mass_g), alpha = .6) +  
  ## custom colors  
  scico::scale_color_scico(palette = "bamako", direction = -1)
```



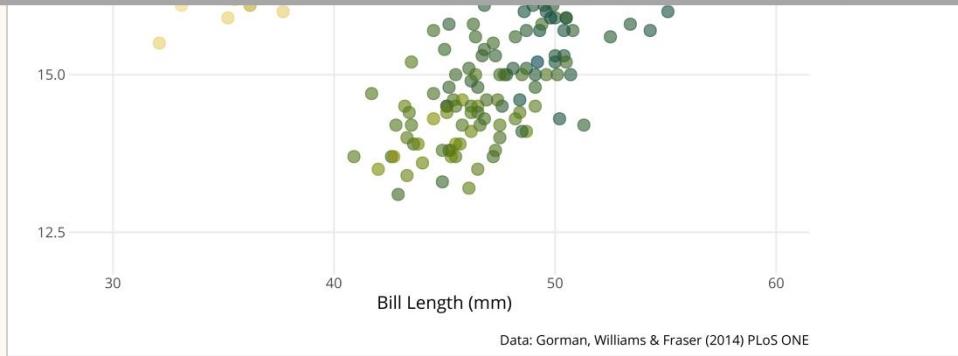
Data: Gorman, Williams & Fraser (2014) PLoS ONE

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Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)

A scatter plot of bill depth versus bill length.

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ggplot(data = penguins, aes(x = bill_length_mm, y = bill_depth_mm)) +  
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  ## custom colors  
  scico::scale_color_scico(palette = "bamako", direction = -1) +  
  ## custom axes scaling  
  scale_x_continuous(breaks = 3:6 * 10, limits = c(30, 60)) +  
  scale_y_continuous(breaks = seq(12.5, 22.5, by = 2.5), limits = c(12.5, 22.5))
```



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Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)

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  scale_y_continuous(breaks = seq(12.5, 22.5, by = 2.5), limits = c(12.5, 22.5))
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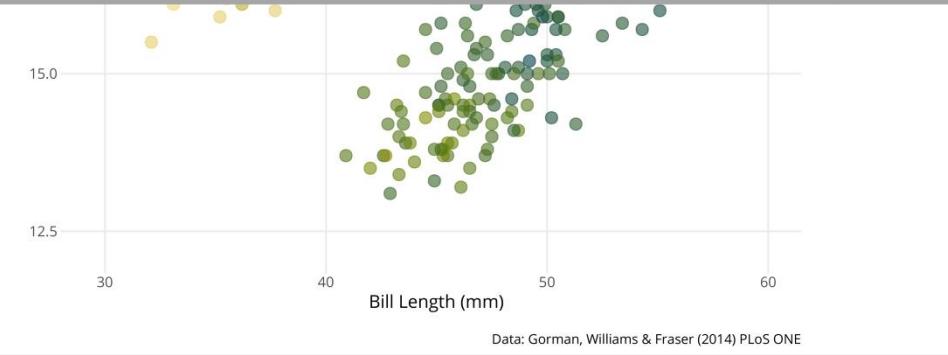


mikefc

@coolbutuseless

R. Graphics. Code.
he/him.

🔗 coolbutuseless.com

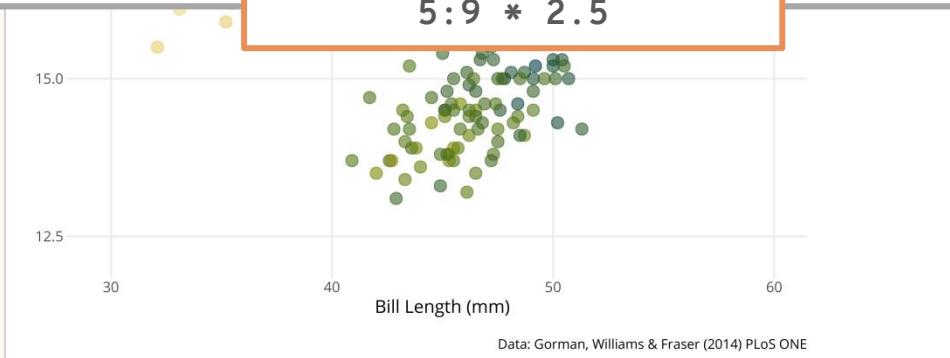


You provide the data, tell ggplot2 how to map variables to aesthetics, what graphical primitives to use, and it takes care of the details.

Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)

A scatter plot of bill depth versus bill length.

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  geom_point(aes(color = body_mass_g), alpha = .6) +  
  ## custom colors  
  scico::scale_color_scico(palette = "bamako", direction = -1) +  
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  ## custom axes scaling  
  scale_x_continuous(breaks = 3:6 * 10, limits = c(30, 60)) +  
  scale_y_continuous(breaks = seq(12.5, 22.5, by = 2.5), limits = c(12.5, 22.5)) +  
  ## custom labels  
  labs(  
    title = 'Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)',  
    subtitle = 'A scatter plot of bill depth versus bill length.',  
    caption = 'Data: Gorman, Williams & Fraser (2014) PLoS ONE',  
    x = 'Bill Length (mm)',  
    y = 'Bill Depth (mm)',  
    color = 'Body mass (g)'  
)
```

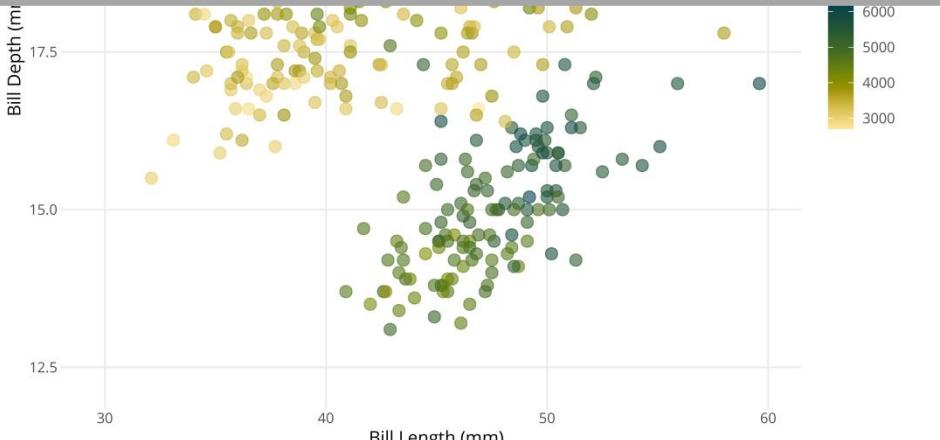
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Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)

A scatter plot of bill depth versus bill length.

Run before plotting!
(or add via +)

```
## change global theme settings (for all following plots)
theme_set(theme_minimal(base_size = 12, base_family = "Open Sans"))
```



Data: Gorman, Williams & Fraser (2014) PLoS ONE

You provide the data, tell ggplot2 how to map variables to aesthetics, what graphical primitives to use, and it takes care of the details.

Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)

A scatter plot of bill depth versus bill length.



Run before plotting!
(or add via +)

```
## change global theme settings (for all following plots)
theme_set(theme_minimal(base_size = 12, base_family = "Open Sans"))

## modify plot elements globally (for all following plots)
theme_update(
  axis.ticks = element_line(color = "grey92"),
  axis.ticks.length = unit(.5, "lines"),
  panel.grid.minor = element_blank(),
  legend.title = element_text(size = 12),
  legend.text = element_text(color = "grey30"),
  plot.title = element_text(size = 18, face = "bold"),
  plot.subtitle = element_text(size = 12, color = "grey30"),
  plot.caption = element_text(size = 9, margin = margin(t = 15))
)
```

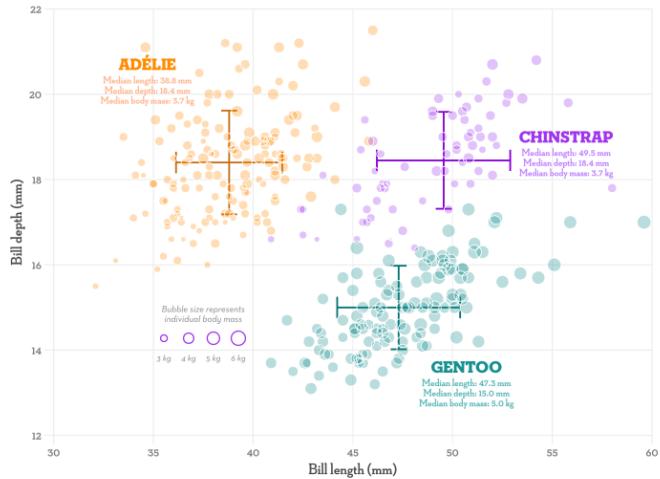
You provide the data, tell ggplot2 how to map variables to aesthetics, what graphical primitives to use, and it takes care of the details.

BILL DIMENSIONS OF BRUSH-TAILED PENGUINS

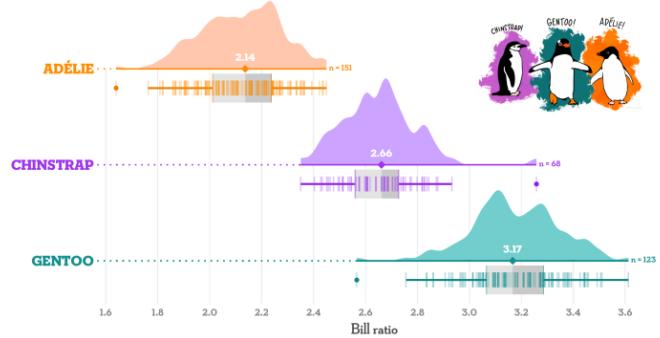
Pygoscelis adeliae (Adélie penguin) • *P. antarctica* (Chinstrap penguin) • *P. papua* (Gentoo penguin)



A. Scatterplot of bill length versus bill depth (median +/- sd)



B. Distribution of the bill ratio, estimated as bill length divided by bill depth

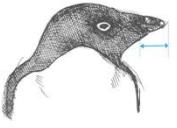


Note: In the original data, bill dimensions are recorded as "culmen length" and "culmen depth". The culmen is the dorsal (upper) ridge of a bird's bill.
Visualization: Cédric Scherer • Data: Gorman, Williams & Fraser (2014) DOI: 10.1371/journal.pone.0090001 • Illustrations: Alison Horst

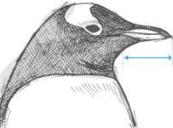
Palmer Penguins Bill Length

Palmer Archipelago is a group of islands off the northwestern coast of the Antarctic Peninsula.
The histograms show that females have shorter bills than males in every species.

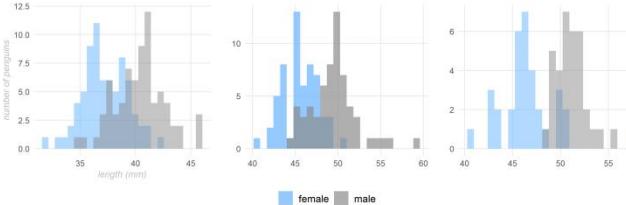
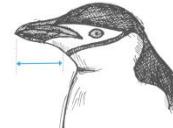
ADELIE



GENTOO



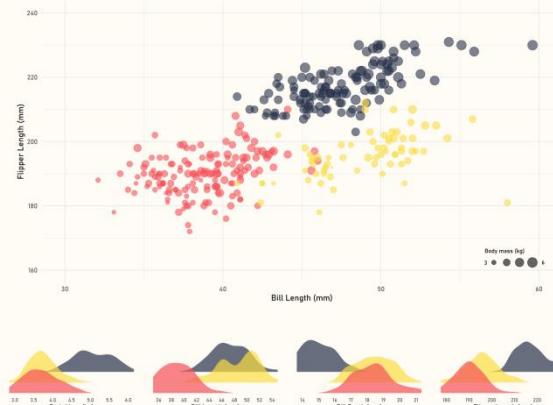
CHINSTRAP



Visualization: Laura Navarro Soler | Data: Gorman, Williams & Fraser (2014)

Measurements of body mass, bill length, bill depth, and flipper length in **Adélie**, **Gentoo**, and **Chinstrap** penguins, collected from 3 islands in the Palmer Archipelago, Antarctica.

Data: Dr. K. Gorman, Dr. A. Horst, & Dr. A. Hill. alisonhorst/palmerpenguins
Visualization: Joseph Shaw / @JosephShaw.



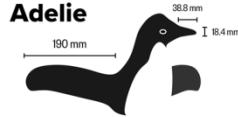
#TidyTuesday Contributions by

- ← myself
- ↖ Laura Navarro
- ↙ Joe Shaw
- ↓ Georgios Karamanis

Palmer Penguins

Median length of flipper, length and depth of bill,
of 342 penguins recorded between 2007 and 2009

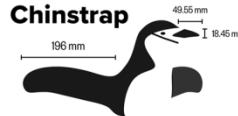
Adelie



Recorded penguins by species

151

Chinstrap



68

Gentoo



123

Source: Dr. Kristen Gorman and the Palmer Station, Antarctica LTER | Graphic: Georgios Karamanis

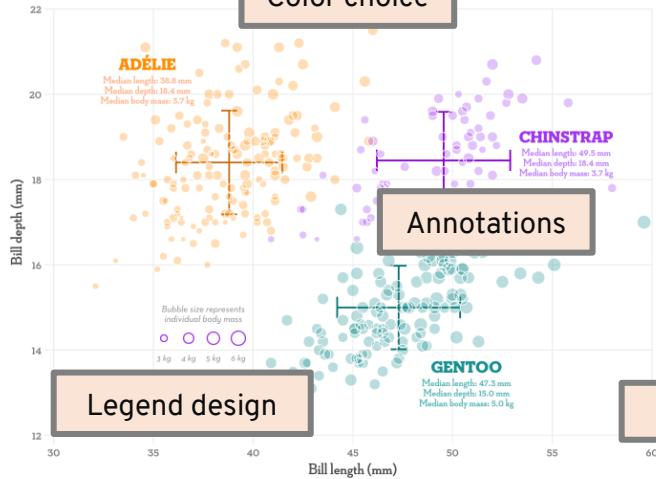
BILL DIMENSIONS OF BRUSH-TAILED PENGUINS

Pygoscelis adeliae (Adélie penguin) • *P. antarctica* (Chinstrap penguin) • *P. papua* (Gentoo penguin)

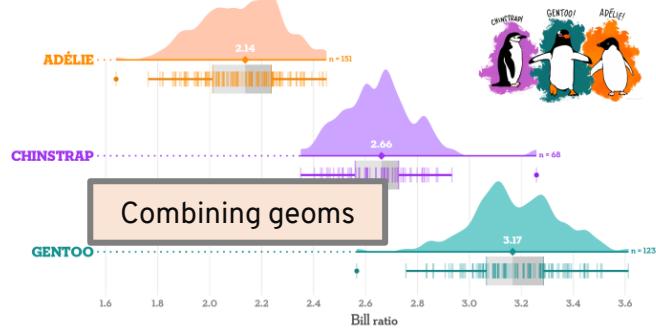


A. Scatterplot of bill length versus bill depth.

Color choice



B. Distribution of the bill ratio, estimated as bill length divided by bill depth



Note: In the original data, bill dimensions are recorded as "culmen length" and "culmen depth". The culmen is the dorsal (upper) ridge of a bird's bill.

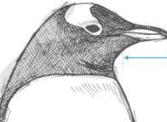
Palmer Penguins Bill Length

Palmer Archipelago is a group of islands off the northwestern coast of the Antarctic Peninsula. The histograms show that females have shorter bills than males in every species.

ADELIE



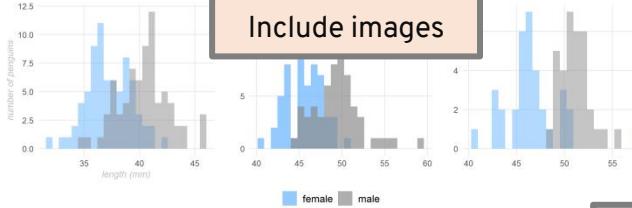
GENTOO



CHINSTRAP



Include images



Text styling

Measurements of body mass, bill length, bill depth, and flipper length in **Adelie**, **Gentoo**, and **Chinstrap** penguins, collected from 3 islands in the Palmer Archipelago, Antarctica.

Data: Dr. K. Gorman, Dr. A. Horst, & Dr. A. Hill. [allisonhorst/palmerpenguins](#)

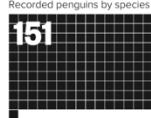
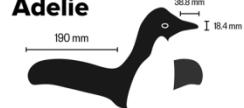
Visualization: Joseph Shaw / [@JosephShaw](#).

Spacing

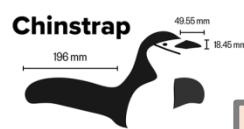
Palmer Penguins

Median length of flipper, length and depth of bill, of 342 penguins recorded between 2007 and 2009

Adelie



Chinstrap



Gentoo



Unusual geoms



Source: Dr. Kristen Gorman and the Palmer Station, Antarctica LTER | Graphic: Georgios Karamanis

#TidyTuesday Contributions by

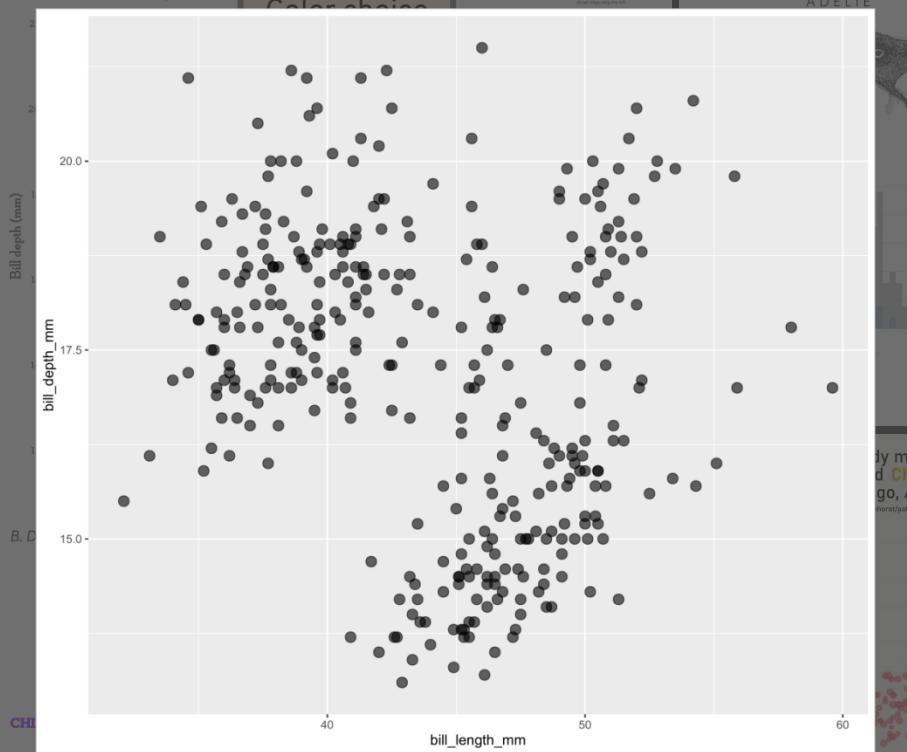
- ← myself
- ↖ Laura Navarro
- ↙ Joe Shaw
- ↓ Georgios Karamanis

BILL DIMENSIONS OF BRUSH-TAILED PENGUINS

Pygoscelis adeliae (Adélie penguin) • *P. antarctica* (Chinstrap penguin) • *P. papua* (Gentoo penguin)



A. Scatterplot of bill length versus bill depth



Combining geoms

GENTOO



Note: In the original data, bill dimensions are recorded as "culmen length" and "culmen depth". The culmen is the dorsal (upper) ridge of a bird's bill.

Visualization Cedric Scherer • Data Cormac Williams & Fraser (2014) DOI: 10.1371/journal.pone.0090081 • Illustrations Alison Horst

Palmer Penguins Bill Length

Palmer Archipelago is a group of islands off the northwestern coast of the Antarctic Peninsula.
The histograms show that females have shorter bills than males in every species.

ADELIE

GENTOO

CHINSTRAP

How to draw an owl

1.



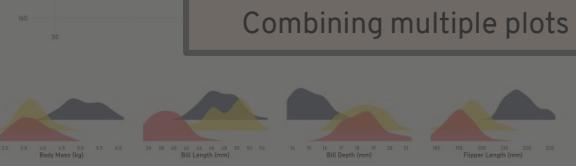
2.



1. Draw some circles

2. Draw the rest of the fowl owl

Combining multiple plots



Unusual geoms



123

Source: Dr. Kristen German and the Palmer Station, Antarctica LTER | Graphics: Georgios Karanikas

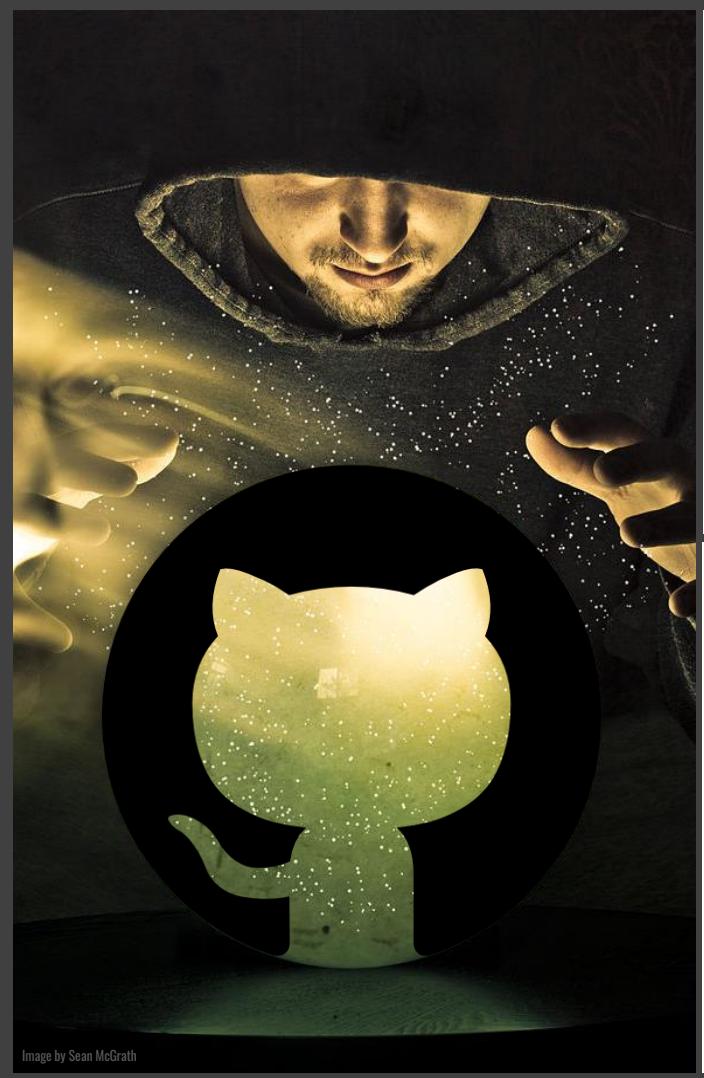
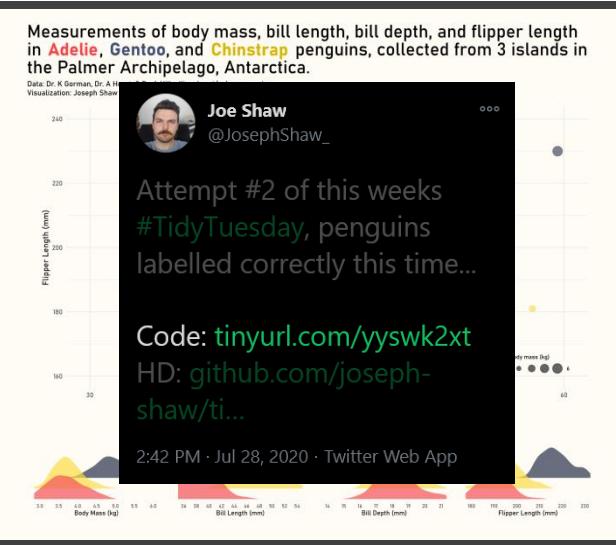
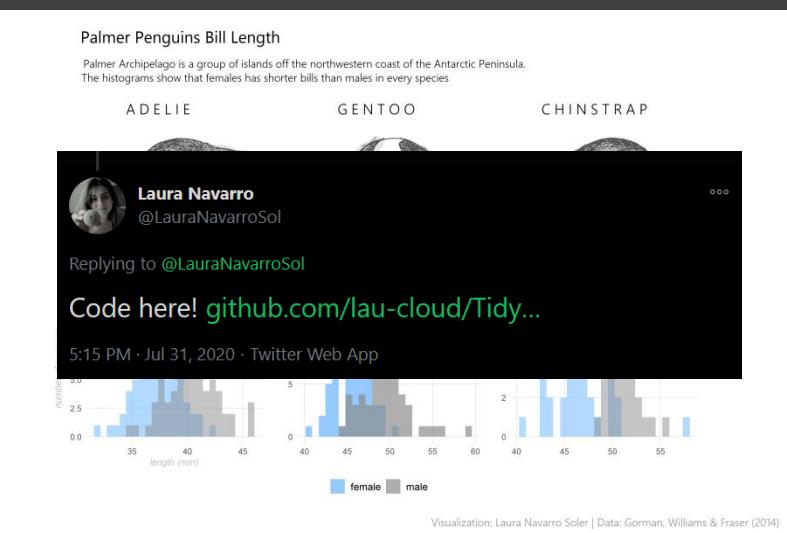
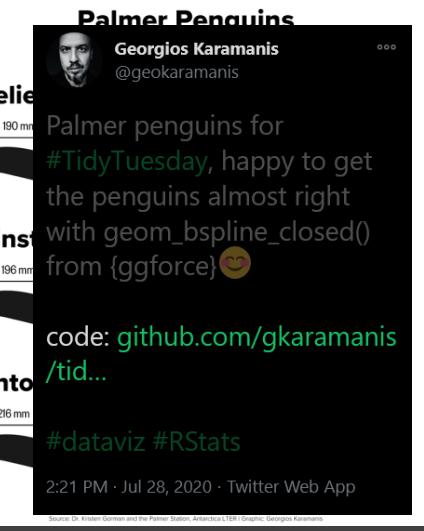


Image by Sean McGrath



#TidyTuesday Contributions by

- ← myself
- ↖ Laura Navarro
- ↙ Joe Shaw
- ↓ Georgios Karamanis



Tidy Tuesday

A weekly data project in R from the
R4DS online learning community

#TIDYTUESDAY on Twitter • RFORDATASCIENCE/TIDYTUESDAY on GitHub • R4DS on Slack



“I’m not looking to necessarily practice my skills as much as I am **to be inspired and know what I can do** based on what other people share.”

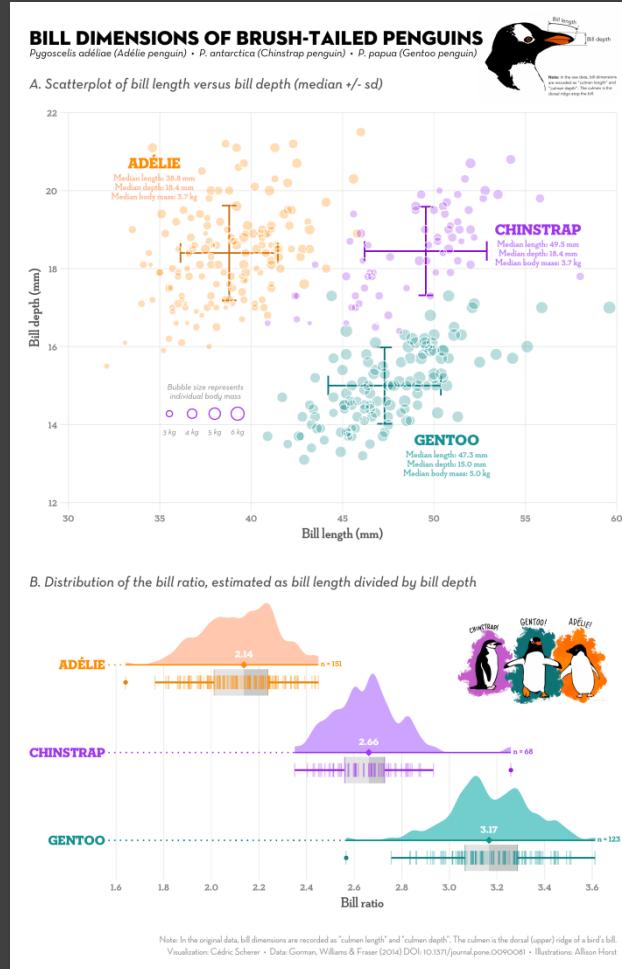
P3 in *Proc. ACM Hum.-Comput. Interact.* 37, 4, Article 111

“#TidyTuesday became a ‘choose your own adventure game’, which allowed participants **to ‘pursue something really weird’ beyond traditional visualizations.**”

I17 and P16 in *Proc. ACM Hum.-Comput. Interact.* 37, 4, Article 111



The Showcase



with the help of
{ggdist} & {ggttext} & {patchwork}

mjskay.github.io/ggdist

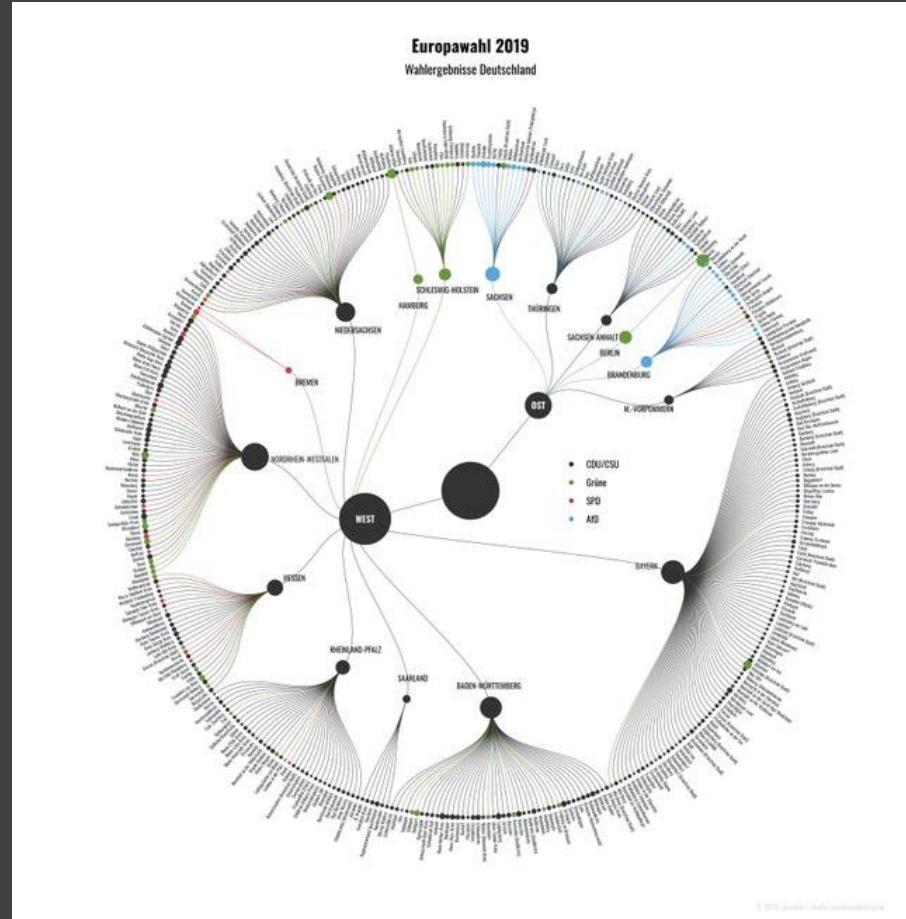
wilkelab.org/ggttext/

patchwork.data-imaginist.com

My Contribution to #TidyTuesday 2020/31

The Showcase

Tree Diagrams + Networks



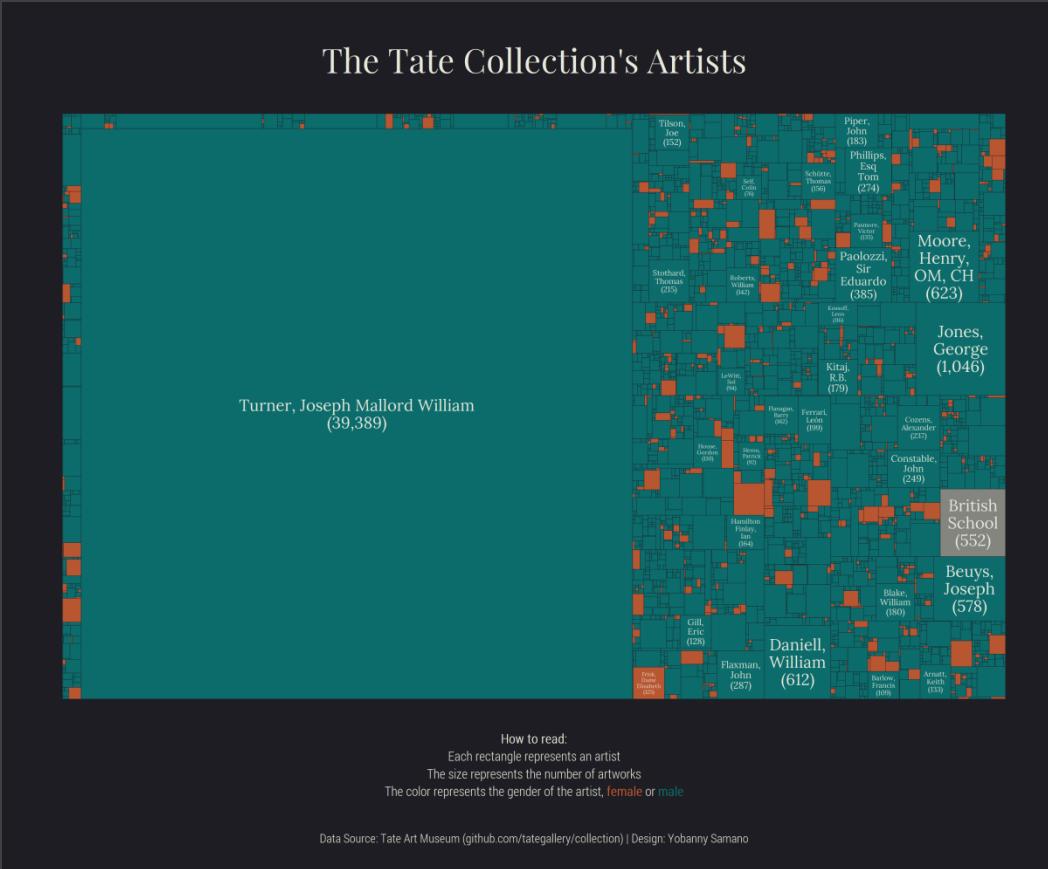
with the help of
{ggraph}

graph.data-imaginist.com

Thorsten Sprenger

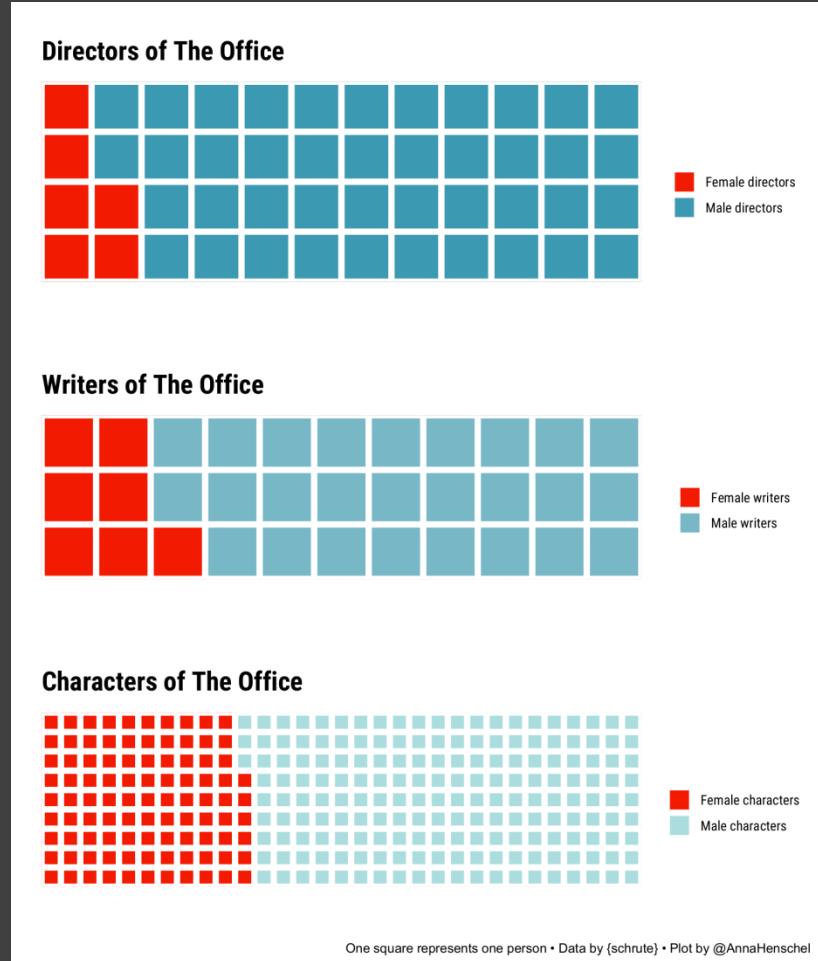
The Showcase

Treemaps



The Showcase

Waffle Charts



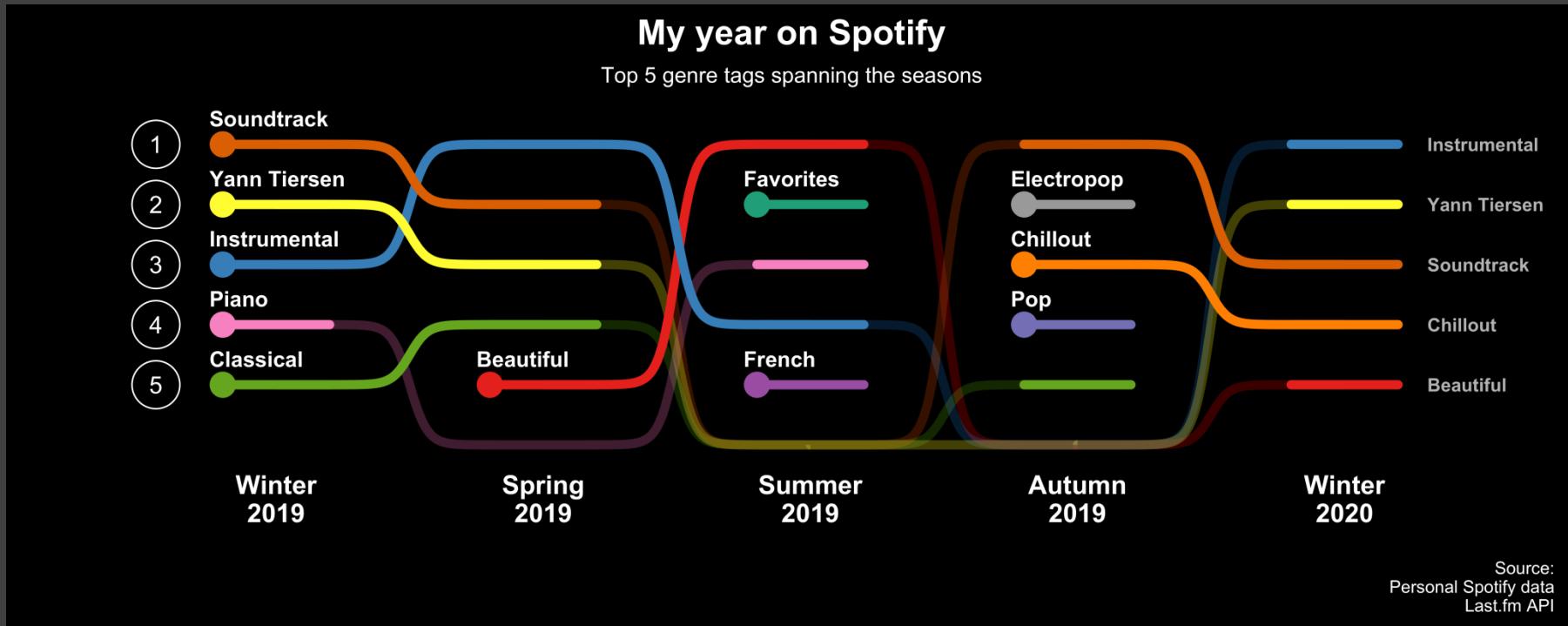
with the help of
{waffle}

github.com/hrbrmstr/waffle

Anna Henschel, #TidyTuesday 2020/12

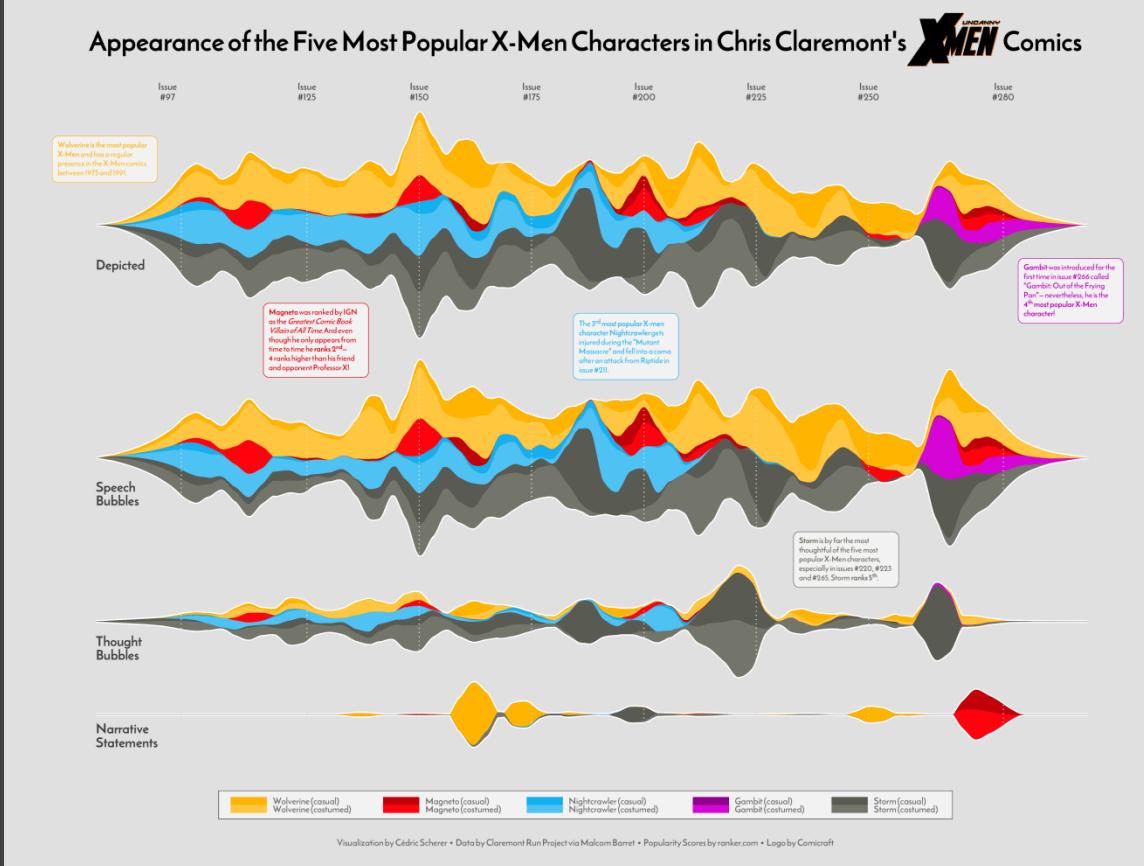
The Showcase

Bump Charts



The Showcase

Streamgraphs

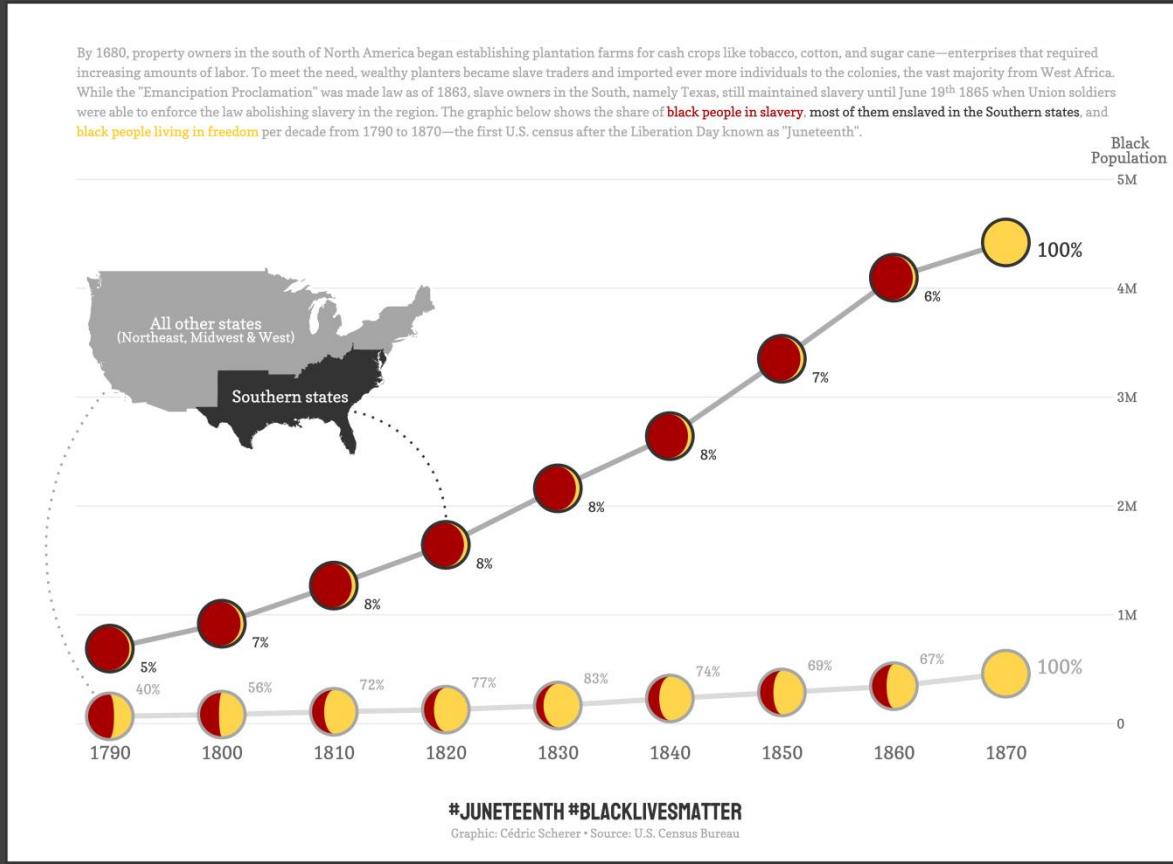


with the help of
{ggstream}
github.com/davidsjoberg/ggstream

My Contribution to #TidyTuesday 2020/27

The Showcase

Streamgraphs

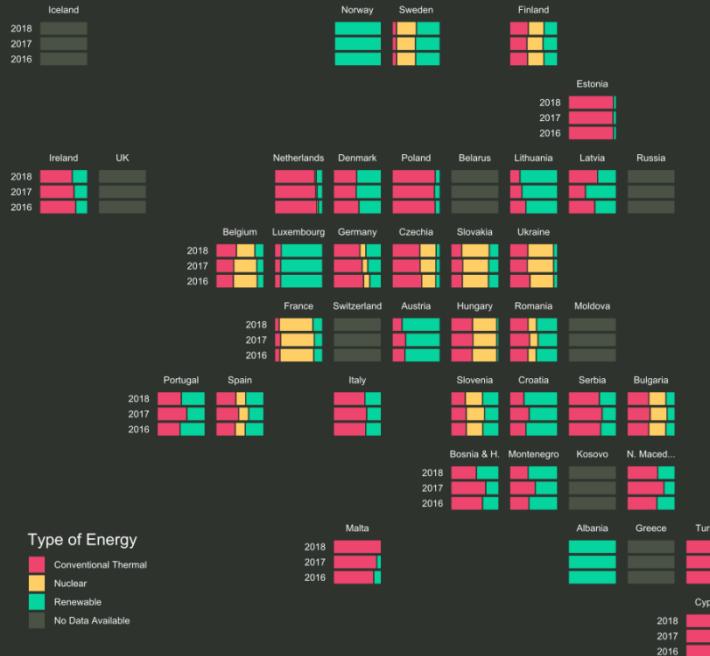


The Showcase

Geofacets

EUROPEAN ENERGY GENERATION

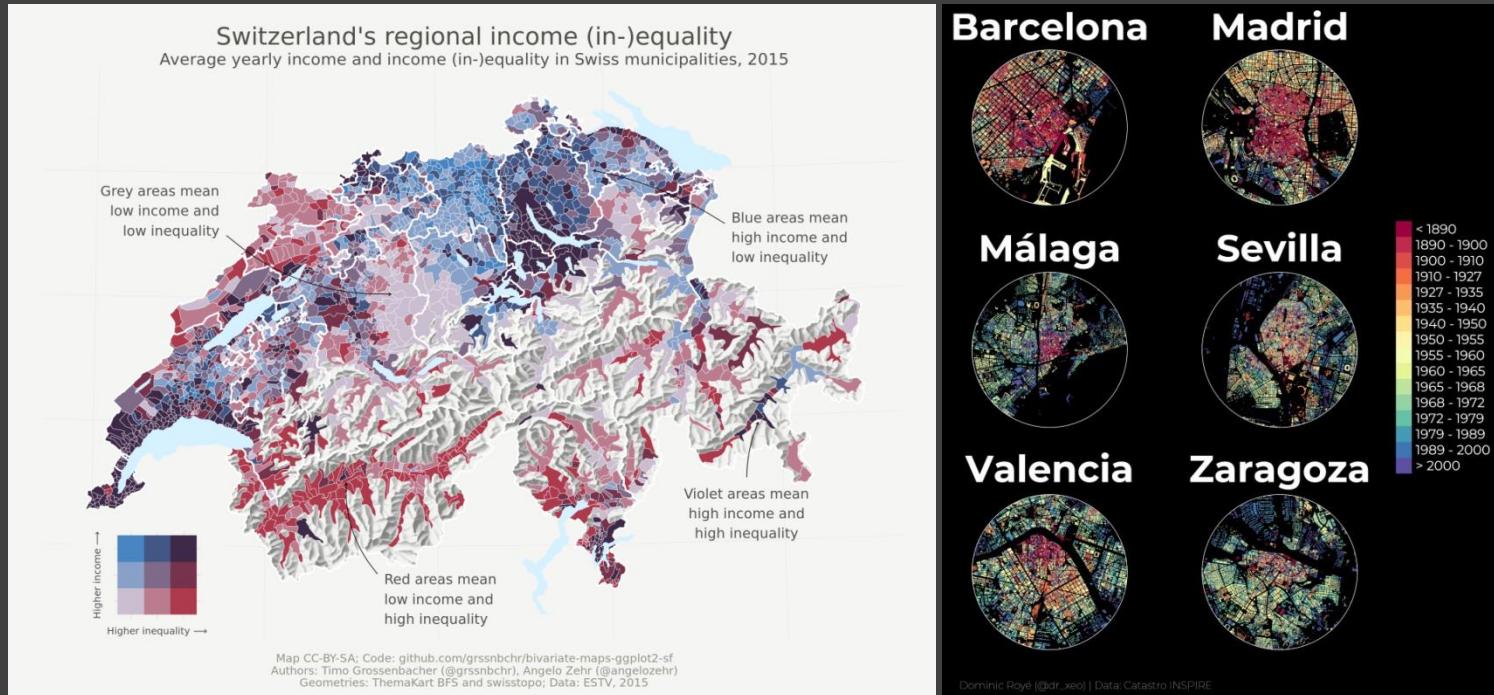
Each bar represents the **total energy generation** for each country per year.
The colours represent the proportion of energy generated a) using **conventional thermal power plants**, which is to say those that use coal, oil or natural gas,
b) using **nuclear power stations**, and c) using other **renewable sources**.



Data from 'Electricity generation statistics - First Results' (ec.europa.eu/eurostat/statistics-explained)
Visualisation by Jack Davison (@JDavison_)
Code found at github.com/jack-davison

The Showcase

Maps



The Showcase

Cartograms

What do most people die from?

Cardiovascular Diseases



Cancers

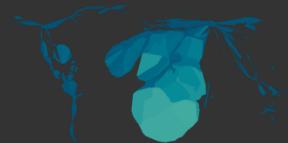


Diabetes



The leading causes of death across the world still vary significantly.
These cartograms show causes of deaths in 2016 that exceeded 20 percent of total deaths in at least 1 country.

HIV Infections & Aids



Malaria Infections



Wars & Conflicts



The data refers to the specific cause of death, which is distinguished from risk factors for death, such as air pollution, diet and other lifestyle factors.

with the help of
{cartogram}

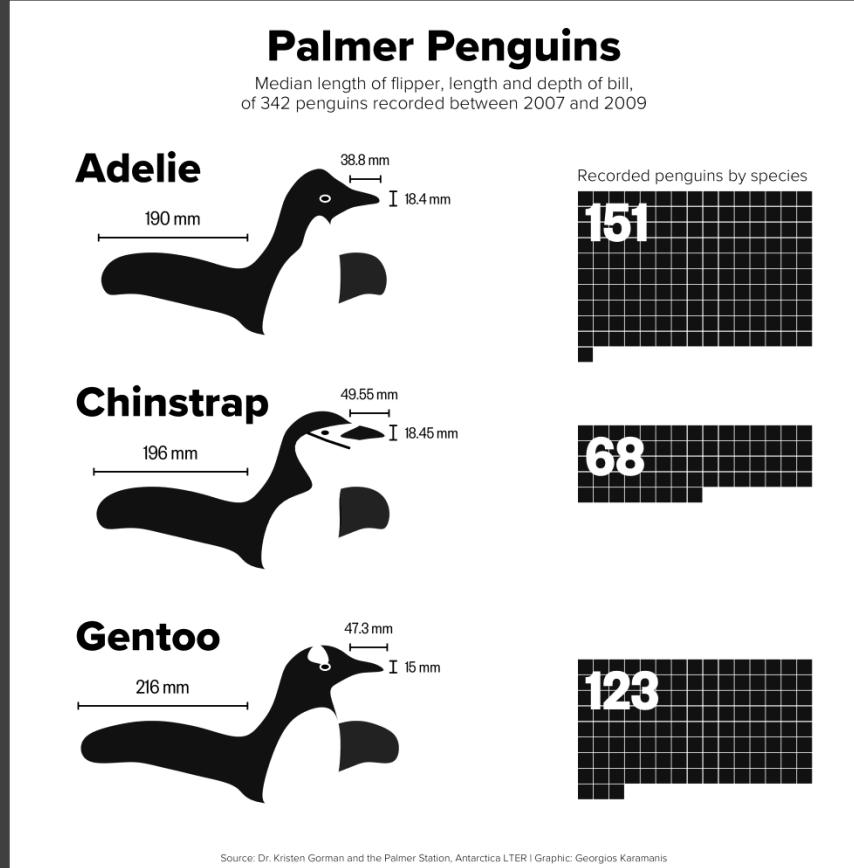
github.com/sjewo/cartogram

Visualization by Cédric Schefer • Data by OurWorldInData.org

My Contribution to the #30DayMapChallenge 2019, Topic *Polygons*

The Showcase

Drawings



The Showcase

Tables

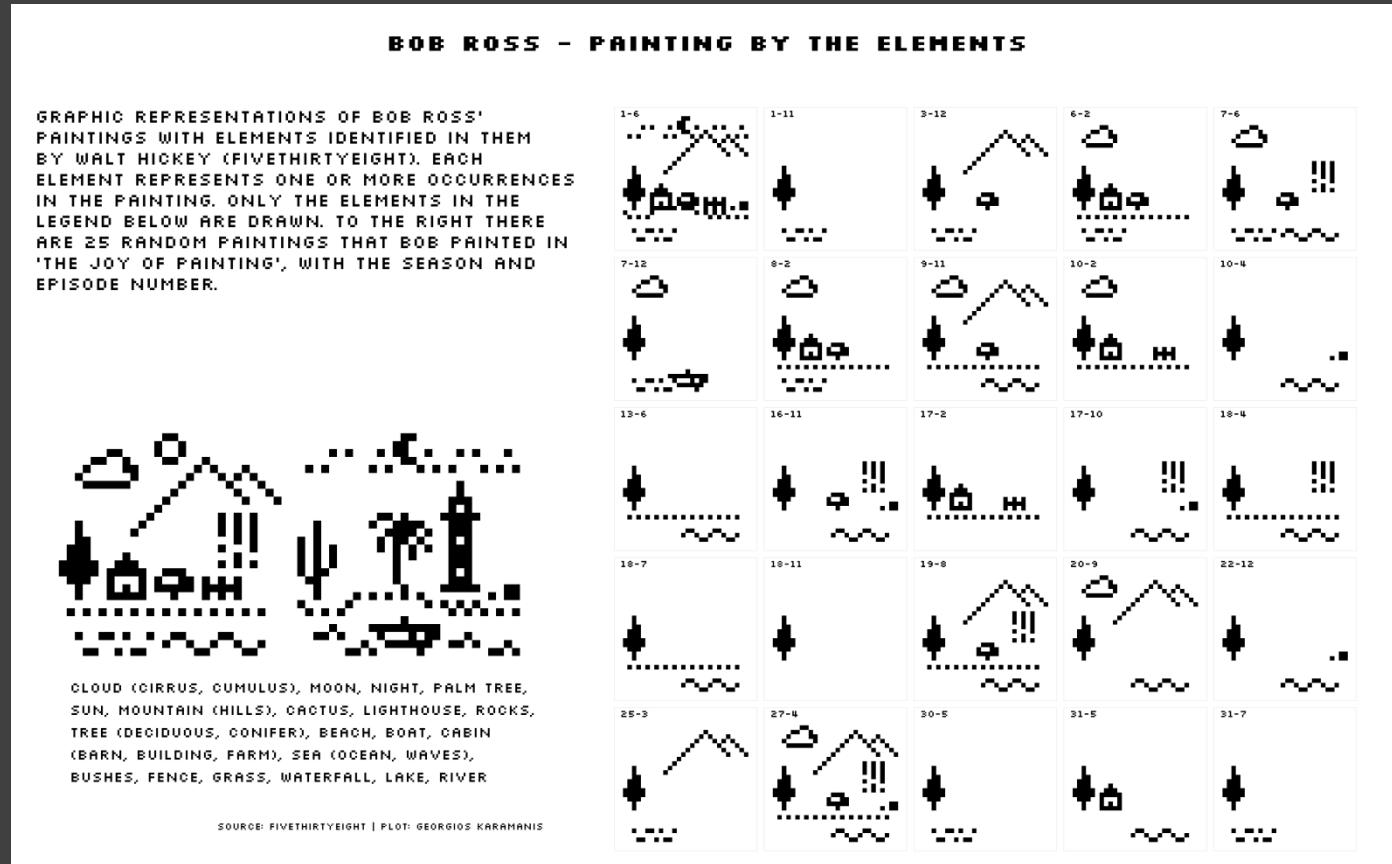
Tour de France Winners

Source: alastairrushworth/tdf & kaggle.com/jaminliu | Graphic: Georgios Karamanis

YEAR	DISTANCE	WINNER	TEAM	AVERAGE SPEED	TOTAL TIME	YEAR
1985	0	8000 km				
1986	2428	René Gavet (FRA)	La Française	0	60 km/h	1986
1987	4488	Henri Cornet (FRA)	Gemini	25.3	+ 96.1	1987
1988	4754	Louis Trousselier (FRA)	Peugeot-Motul			1988
1989	4754	René Gavet (FRA)	Peugeot-Motul			1989
1990	4754	Lucien Petit-Breton (FRA)	Peugeot-Motul			1990
1991	4754	René Gavet (FRA)	Peugeot-Motul			1991
1992	5287	François Faber (LUX)	Acylon-Bulutop			1992
1993	5287	Gustave Serrigno (FRA)	Acylon-Bulutop			1993
1994	5287	Olivie Decroix (FRA)	Acylon-Bulutop			1994
1995	5287	Philippe Thys (BEL)	Peugeot-Motul	26.7	+ 197.9	1995
1996	5287	Philippe Thys (BEL)	Peugeot-Motul			1996
1997	5287	Philippe Thys (BEL)	Peugeot-Motul			1997
1998	5287	Philippe Thys (BEL)	Peugeot-Motul			1998
1999	5287	Philippe Thys (BEL)	Peugeot-Motul			1999
2000	5287	Philippe Thys (BEL)	Peugeot-Motul			2000
2001	5287	Philippe Thys (BEL)	Peugeot-Motul			2001
2002	5287	Philippe Thys (BEL)	Peugeot-Motul			2002
2003	5287	Philippe Thys (BEL)	Peugeot-Motul			2003
2004	5287	Philippe Thys (BEL)	Peugeot-Motul			2004
2005	5287	Philippe Thys (BEL)	Peugeot-Motul			2005
2006	5287	Philippe Thys (BEL)	Peugeot-Motul			2006
2007	5287	Philippe Thys (BEL)	Peugeot-Motul			2007
2008	5287	Philippe Thys (BEL)	Peugeot-Motul			2008
2009	5287	Philippe Thys (BEL)	Peugeot-Motul			2009
2010	5287	Philippe Thys (BEL)	Peugeot-Motul			2010
2011	5287	Philippe Thys (BEL)	Peugeot-Motul			2011
2012	5287	Philippe Thys (BEL)	Peugeot-Motul			2012
2013	5287	Philippe Thys (BEL)	Peugeot-Motul			2013
2014	5287	Philippe Thys (BEL)	Peugeot-Motul			2014
2015	5287	Philippe Thys (BEL)	Peugeot-Motul			2015
2016	5287	Philippe Thys (BEL)	Peugeot-Motul			2016
2017	5287	Philippe Thys (BEL)	Peugeot-Motul			2017
2018	5287	Philippe Thys (BEL)	Peugeot-Motul			2018
2019	5287	Philippe Thys (BEL)	Peugeot-Motul			2019
1915-1918 Tour suspended because of World War I						
1919	5583	Pierre Lefèvre (FRA)	La Sportive	24.1	+ 228.6	1919
1920	5583	Philippe Thys (BEL)	La Sportive			1920
1921	5583	León Scieur (BEL)	La Sportive			1921
1922	5583	Emile Georget (FRA)	Peugeot			1922
1923	5386	Henri Pélissier (FRA)	Autosport-Hutchinson	24.2	+ 222.3	1923
1924	5386	Ottavio Bottecchia (ITA)	Autosport-Hutchinson			1924
1925	5745	Lucien Buysse (BEL)	Autosport-Hutchinson	24.1	+ 238.7	1925
1926	5745	Nicolas Frantz (LUX)	Autosport-Hutchinson			1926
1927	5745	Nicolas Frantz (LUX)	Autosport-Hutchinson			1927
1928	5745	Nicolas Frantz (LUX)	Autosport-Hutchinson			1928
1929	5287	André Leducq (FRA)	Acylon-Bulutop	28.3	+ 184.7	1929
1930	5287	André Leducq (FRA)	Acylon-Bulutop			1930
1931	5287	André Leducq (FRA)	Acylon-Bulutop			1931
1932	5287	André Leducq (FRA)	France	29	+ 154.2	1932
1933	5287	André Leducq (FRA)	France			1933
1934	5287	Antonio Rigo (ITA)	France			1934
1935	4338	Rouelin Haes (BEL)	Belgium	38.7	+ 141.4	1935
1936	4338	Sylvère Maes (BEL)	Belgium			1936
1937	4338	Roger Lapebie (FRA)	France			1937
1938	4338	Sylvère Maes (BEL)	Belgium	31.6	+ 148.1	1938
1939	4338	Sylvère Maes (BEL)	Belgium			1939
1940-1946 Tour suspended because of World War II						
1947	4222	Jean Robic (FRA)	France	33.4	+ 167.2	1947
1948	4222	Giaco Bartali (ITA)	Italy			1948
1949	4222	Fausto Coppi (ITA)	Italy			1949
1950	4222	René Vietto (FRA)	France			1950
1951	4499	Hugo Koblet (SUI)	Switzerland	32.9	+ 142.5	1951
1952	4499	Paul Koechlin (FRA)	France			1952
1953	4499	Louis Bobet (FRA)	France			1953
1954	4458	Louis Bobet (FRA)	France	33.2	+ 148.1	1954
1955	4458	Roger Wileman (FRA)	France			1955
1956	4458	Jacques Anquetil (FRA)	France	34.4	+ 135.7	1956
1957	4469	Charly Gaul (LUX)	Luxembourg			1957
1958	4469	René Pottier (FRA)	France			1958
1959	4469	Gaston Nencini (ITA)	Italy	37.2	+ 112.1	1959
1960	4373	Jacques Anquetil (FRA)	France			1960
1961	4373	Jacques Anquetil (FRA)	France			1961
1962	4138	Jacques Anquetil (FRA)	France			1962
1963	4138	Jacques Anquetil (FRA)	France	36.5	+ 113.5	1963
1964	4138	Jacques Anquetil (FRA)	France			1964
1965	4138	François Dandurand (FRA)	France			1965
1966	4138	François Dandurand (FRA)	France	36.0	+ 117.6	1966
1967	4138	Roger Pinçon (FRA)	Peugeot-GP-Michelin			1967
1968	4117	Eddy Merckx (BEL)	Peugeot-GP-Michelin	35.4	+ 116.3	1968
1969	4117	Eddy Merckx (BEL)	Peugeot-GP-Michelin			1969
1970	3846	Eddy Merckx (BEL)	Molteni	35.5	+ 108.3	1970
1971	3846	Eddy Merckx (BEL)	Molteni			1971
1972	3846	Eddy Merckx (BEL)	Molteni			1972
1973	3846	Eddy Merckx (BEL)	Molteni			1973
1974	3846	Eddy Merckx (BEL)	Molteni			1974
1975	3846	Eddy Merckx (BEL)	Molteni			1975
1976	3846	Eddy Merckx (BEL)	Ullens-Campagnolo	34.9	+ 114.6	1976
1977	3846	Eddy Merckx (BEL)	Ullens-Campagnolo			1977
1978	3908	Bernard Thévenet (FRA)	Peugeot-Esses-Michelin	34.1	+ 108.3	1978
1979	3908	Bernard Thévenet (FRA)	Peugeot-Esses-Michelin			1979
1980	3753	Bernard Hinault (FRA)	Renault-Gitane			1980
1981	3753	Bernard Hinault (FRA)	Renault-Gitane	39	+ 96.3	1981
1982	3753	Bernard Hinault (FRA)	Renault-Gitane			1982
1983	3753	Laurent Fignon (FRA)	Renault-Gitane			1983
1984	4821	Laurent Fignon (FRA)	Renault-Gitane	35.9	+ 112.1	1984
1985	4821	Laurent Fignon (FRA)	Renault-Gitane			1985
1986	4821	Greg LeMond (USA)	La Vie Claire			1986
1987	4231	Pedro Delgado (ESP)	Concepción-Pain-Vayphond	36.6	+ 115.5	1987
1988	4231	Pedro Delgado (ESP)	Concepción-Pain-Vayphond			1988
1989	3564	Greg LeMond (USA)	Z-Tosnado	38.6	+ 99.7	1989
1990	3564	Greg LeMond (USA)	Z-Tosnado			1990
1991	3714	Miguel Indurain (ESP)	Banesto			1991
1992	3714	Miguel Indurain (ESP)	Banesto	58.7	+ 96	1992
1993	3714	Miguel Indurain (ESP)	Banesto			1993
1994	3714	Miguel Indurain (ESP)	Banesto			1994
1995	3746	Miguel Indurain (ESP)	Banesto			1995
1996	3746	Jan Ulrich (DEU)	Team Telekom	39.2	+ 96	1996
1997	3746	Jan Ulrich (DEU)	Team Telekom			1997
1998	3487	Lance Armstrong (USA)	U.S. Postal Service	48.3	+ 91.5	1998
1999	3487	Lance Armstrong (USA)	U.S. Postal Service			1999
2000	3487	Lance Armstrong (USA)	U.S. Postal Service			2000
2001	5272	Lance Armstrong (USA)	U.S. Postal Service	39.9	+ 82.1	2001
2002	5272	Lance Armstrong (USA)	U.S. Postal Service			2002
2003	5272	Lance Armstrong (USA)	U.S. Postal Service			2003
2004	5272	Lance Armstrong (USA)	U.S. Postal Service			2004
2005	3593	Oscar Pereiro (ESP)	Caisse d'Épargne-Illles Balears	41.7	+ 86.3	2005
2006	3593	Oscar Pereiro (ESP)	Caisse d'Épargne-Illles Balears			2006
2007	3559	Alberto Contador (ESP)	Discovery Channel	40.5	+ 87.9	2007
2008	3559	Alberto Contador (ESP)	Astana			2008
2009	3559	Cadel Evans (AUS)	BMC Racing Team			2009
2010	3438	Alberto Contador (ESP)	Astana	39.8	+ 86.2	2010
2011	3438	Alberto Contador (ESP)	Astana			2011
2012	3438	Chris Froome (GBR)	Team Sky			2012
2013	3438	Chris Froome (GBR)	Team Sky			2013
2014	3668.5	Chris Froome (GBR)	Team Sky	40.7	+ 99	2014
2015	3548	Chris Froome (GBR)	Team Sky			2015
2016	3548	Chris Froome (GBR)	Team Sky			2016
2017	3548	Chris Froome (GBR)	Team Sky	41	+ 86.3	2017
2018	3548	Graeme Obree (GBR)	Team Sky			2018
2019	3548	Graeme Obree (GBR)	Team Sky			2019

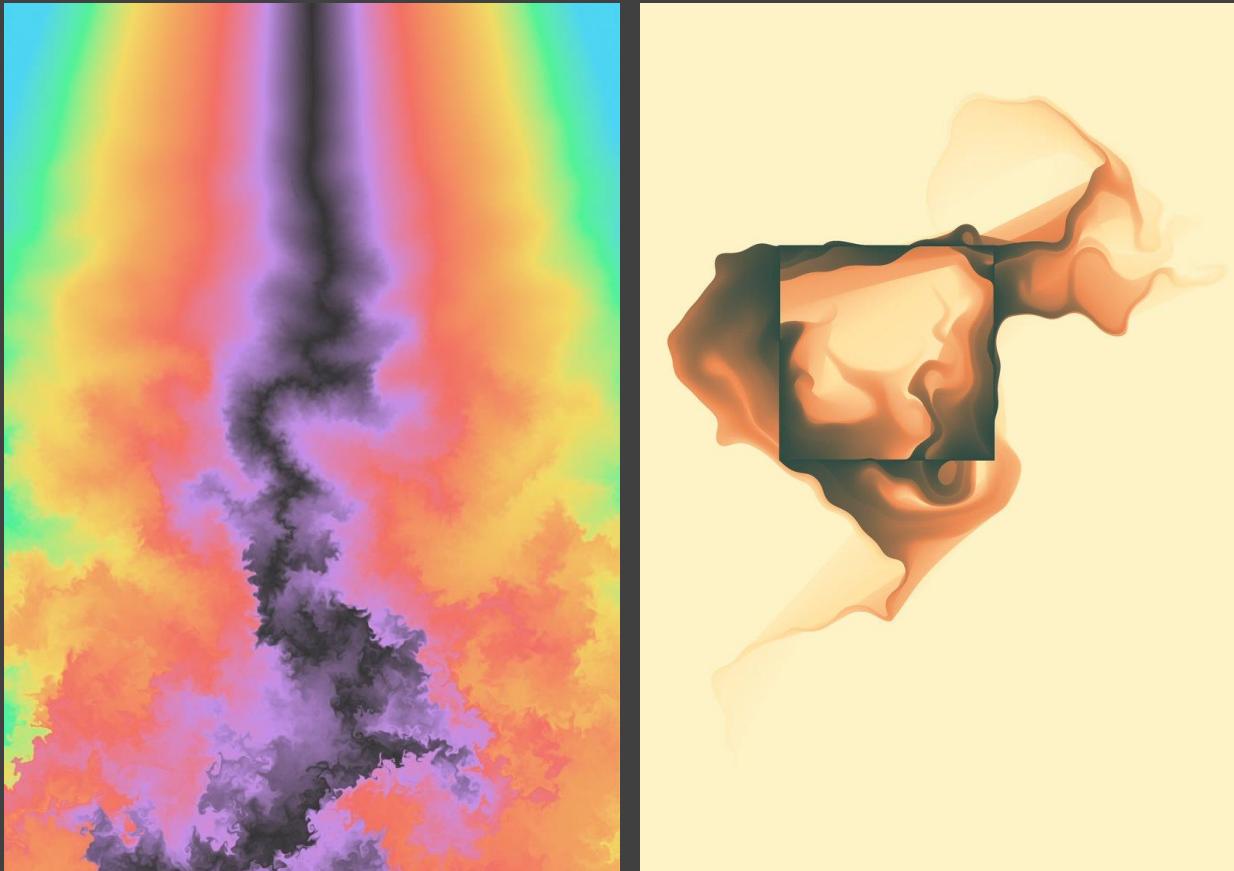
The Showcase

Pixel Art



The Showcase

Generative Art

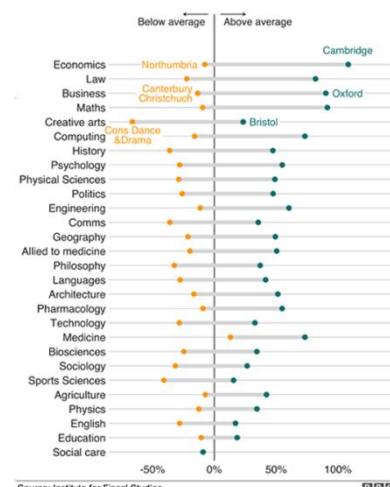
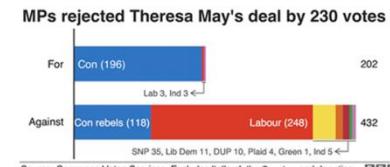
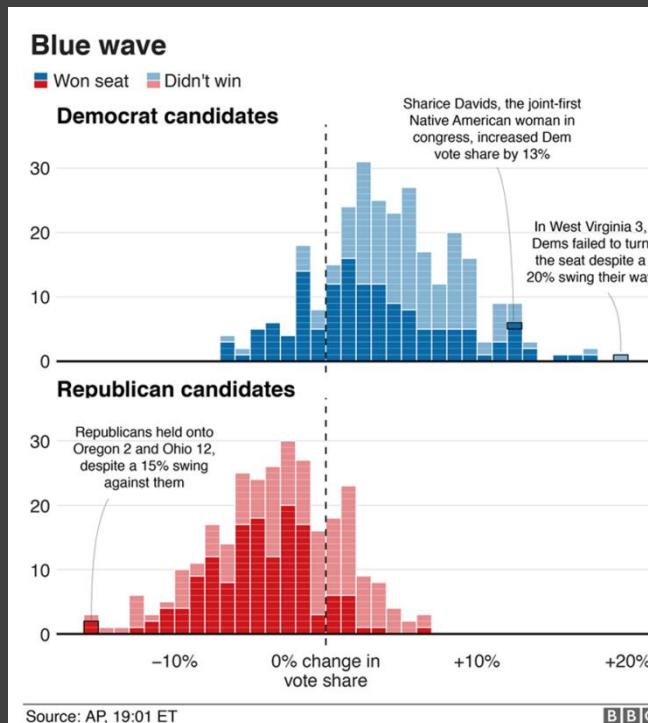


with the help of



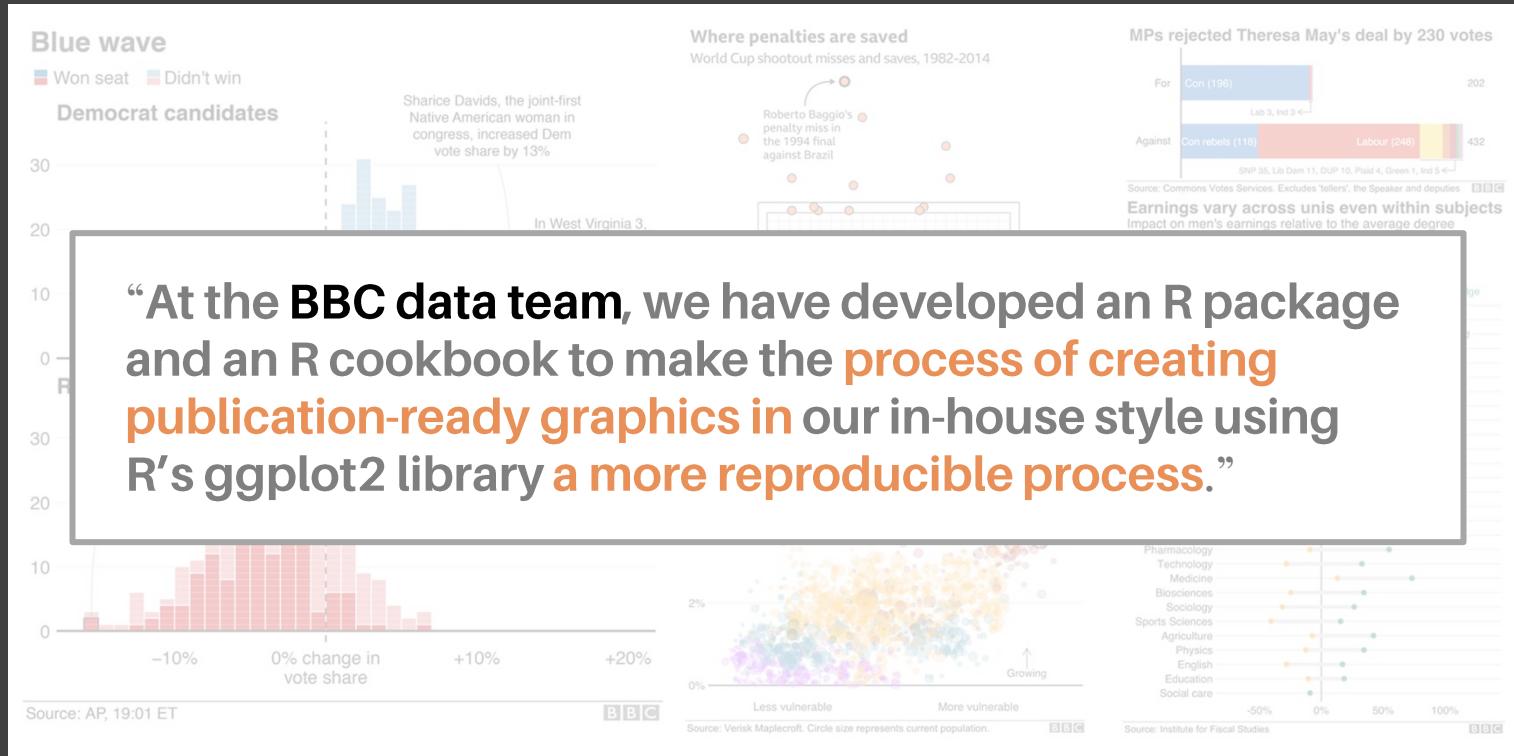
Thomas Lin Pedersen

The Showcase



The Showcase

Consistent Theming + Reproducibility





[†] I extracted all functions starting with `geom` or `stat` from my Rmd files containing the code for all my #TidyTuesday contributions (thanks Georgios for the idea and script). For the contributions from 2019 ($n = 26$) and 2020 ($n = 40$) I calculated the frequency of usage per year for each geom/stat as times used divided by the number of contributions. Note that some geom's which usually appear together (e.g. `treemapify::geom_treemap` functions) or behave very similarly (e.g. `ggforce::geommark` functions) were grouped together.



More Text Labels, Less Bar Charts.

— More often used in 2020 — More often used in 2019

Compared to 2019, I used more geom's to add text labels in my #TidyTuesday scripts in 2020[†] while the number of bar charts per script decreased tremendously. Besides text labelling, points were by far the most used geometry (even though less used than in 2019). The most used extension packages were (ggtext) and (ggforce) but also (ggdist), (gstreamer), and (gggibbous) played an important role for the first time in 2020. Interestingly, I did not use as many tiles and not any beeswarms at all.

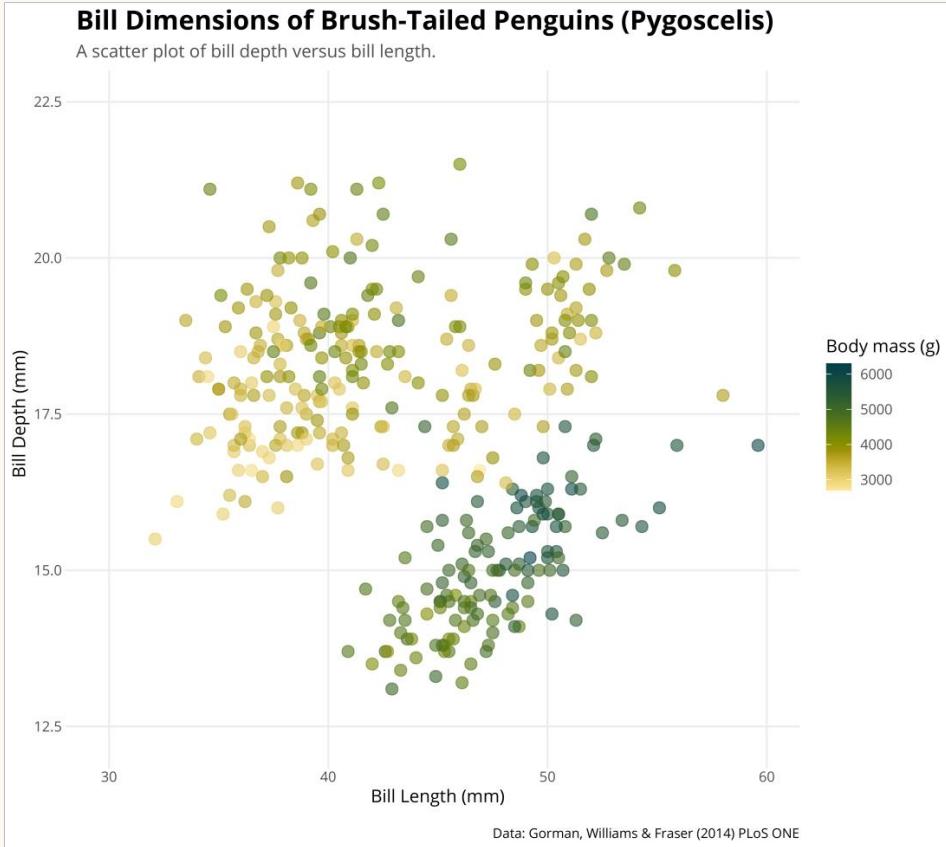
Visualization: Cédric Scherer • Data: My 66 #TidyTuesday Scripts from 2019 and 2020[†]

[†] I extracted all functions starting with `geom` or `stat` from my Rmd files containing the code for all my #TidyTuesday contributions (thanks Georgios for the idea and script). For the contributions from 2019 ($n = 26$) and 2020 ($n = 40$) I calculated the frequency of usage per year for each geomist as times used divided by the number of contributions. Note that some geom's which usually appear together (e.g. `treemapify::geom_treemap` functions) or behave very similarly (e.g. `ggforce::geommark` functions) were grouped together.

{ggtext}

Improved Text Rendering Support

{ggtext} Improved Text Rendering Support



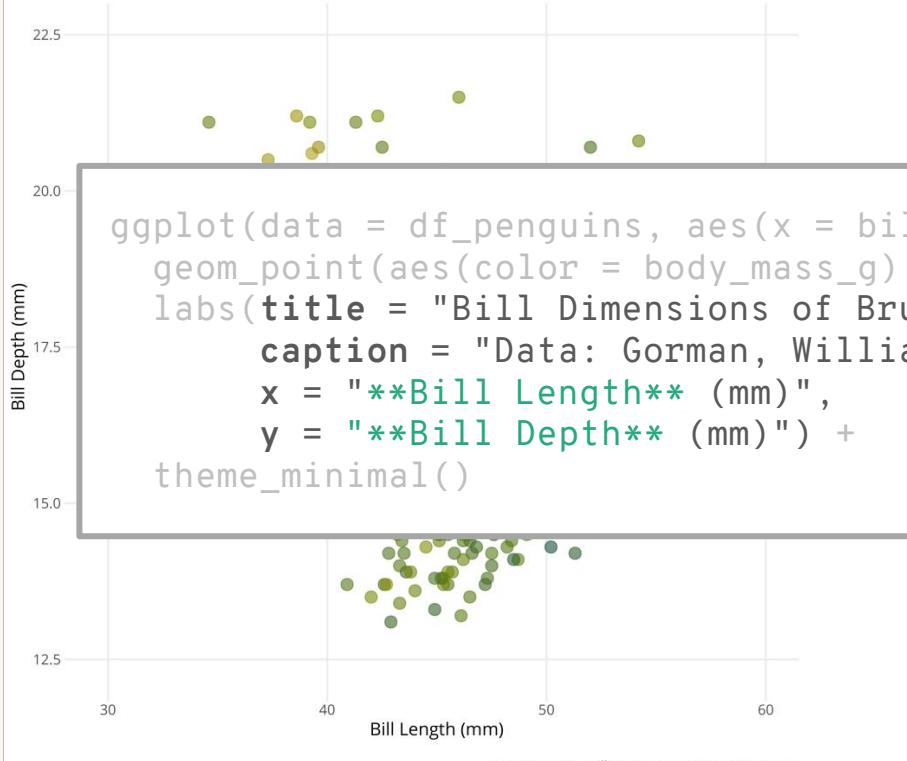
`element_markdown()`

→ formatted text elements,
e.g. titles, caption, axis text, striptext

{ggtext} Improved Text Rendering Support

Bill Dimensions of Brush-Tailed Penguins (Pygoscelis)

A scatter plot of bill depth versus bill length.



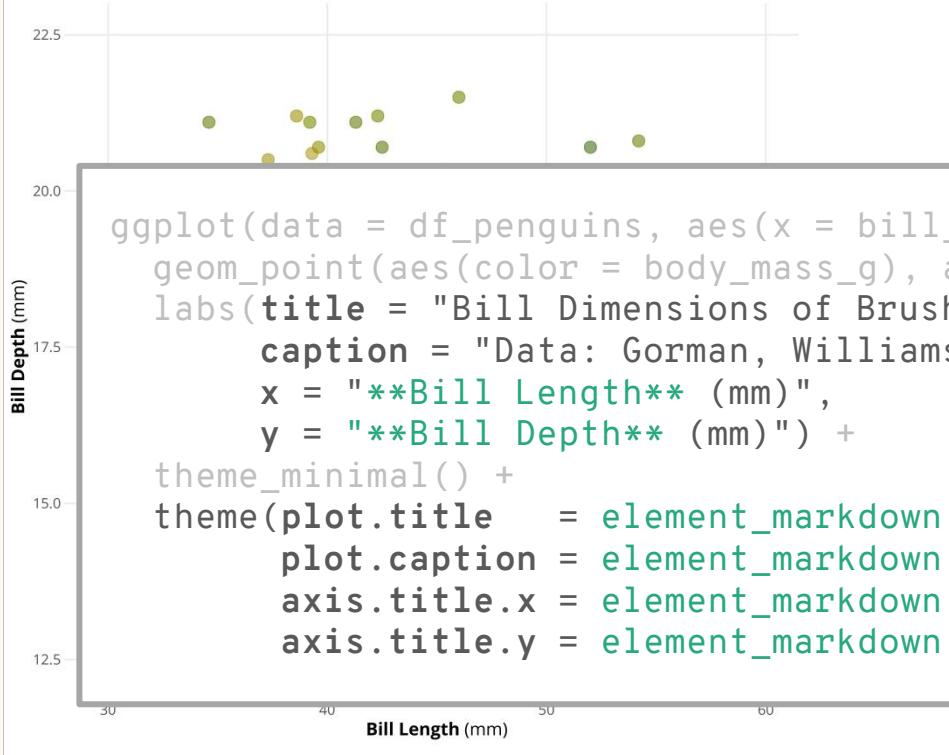
element_markdown()

- formatted text elements,
e.g. titles, caption, axis text, striptext

{ggtext} Improved Text Rendering Support

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



element_markdown()

→ formatted text elements,
e.g. titles, caption, axis text, striptext

{ggtext} Improved Text Rendering Support

```
<i style='color:#28A87D;'>Pygoscelis</i>
```

Bill Dimensions of Brush-Tailed Penguins *Pygoscelis*

```
<b style='font-size:32pt;font-family:blacksword;'>Pygoscelis</b>
```

Bill Dimensions of Brush-Tailed Penguins *Pygoscelis*

```
<img src='https://cedricscherer.com/img/pygoscelis.jpg', width='10' />
```

Bill Dimensions of Brush-Tailed Penguins



Chats about Friends and their Past, Present, and Future Partners

Mentions of the main characters and their most popular partners in dialogues* during the ten seasons of Friends.



Font Color
Font Face

*For each of the 67,373 dialogues in 236 episodes it was determined whether the two names occur in the same text.
The area and luminance of the squares is mapped to the number of overall mentions of the two names per season.

Visualization by Cédric Scherer • Data by Emil Hvitfeldt via the *(friends)* R package

Contribution to #TidyTuesday 2020/37

Chats about Friends and their Past, Present, and Future Partners

```
tibble(  
  key = c("Chandler", "Joey", "Monica", "Monica &  
         Chandler", "Phoebe", "Rachel", "Rachel &  
         Joey", "Ross", "Ross & Rachel"),  
  color = c("#48508c", "#55331d", "#a64d64",  
           "#774f78", "#5b7233", "#ba2a22",  
           "#882f20", "#f6ab18", "#d86b1d"))  
)
```

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face

Chats about Friends and their Past, Present, and Future Partners

```
tibble(  
  key = c("Chandler", "Joey", "Monica", "Monica &  
          Chandler", "Phoebe", "Rachel", "Rachel &  
          Joey", "Ross", "Ross & Rachel"),  
  color = c("#48508c", "#55331d", "#a64d64",  
           "#774f78", "#5b7233", "#ba2a22",  
           "#882f20", "#f6ab18", "#d86b1d"))  
)
```

key	color
Ross	#f6ab18
Chandler	#48508c
Ross & Rachel	#d86b1d

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face



Chats about Friends and their Past, Present, and Future Partners

```
tibble(  
  key = c("Chandler", "Joey", "Monica", "Monica &  
    Chandler", "Phoebe", "Rachel", "Rachel &  
    Joey", "Ross", "Ross & Rachel"),  
  color = c("#48508c", "#55331d", "#a64d64",  
    "#774f78", "#5b7233", "#ba2a22",  
    "#882f20", "#f6ab18", "#d86b1d"))  
) %>%  
right_join(df_friends, by = "key")
```

key	color	partners	episode
Ross	#f6ab18	Ross & Carol	S01E01
Chandler	#48508c	Chandler & Janice	S01E03
Ross & Rachel	#d86b1d	Ross & Rachel	S01E04

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face

Chats about Friends and their Past, Present, and Future Partners

```
tibble(
  key = c("Chandler", "Joey", "Monica", "Monica &
         Chandler", "Phoebe", "Rachel", "Rachel &
         Joey", "Ross", "Ross & Rachel"),
  color = c("#48508c", "#55331d", "#a64d64",
            "#774f78", "#5b7233", "#ba2a22",
            "#882f20", "#f6ab18", "#d86b1d")
) %>%
right_join(df_friends, by = "key") %>%
mutate(partners = if_else(
  key == partners,
  glue::glue("<b style='color:{color};'>
              {partners}</b>"),
  str_replace(partners, key,
             glue::glue("<b style='color:{color};'>
              {key}</b>")))
))
```

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face

Chats about Friends and their Past, Present, and Future Partners

key	color	partners
Ross	#f6ab18	Ross & Carol Ross & Julie Ross & Bonnie Ross & Emily Ross & Elizabeth Ross & Mona Ross & Charlie Ross & Rachel Rachel & Barry Rachel & Paolo Rachel & Tag Rachel & Joshua Rachel & Paul Rachel & Joey Joey & Kathy Joey & Janine Joey & Charlie Monica & Richard Monica & Pete Monica & Chandler Chandler & Janice Chandler & Kathy Phoebe & David Phoebe & Gary Phoebe & Mike
Ross & Rachel	#d86b1d	

```
right_join(df_friends, by = "key") %>%  
  mutate(partners = if_else(  
    key == partners,  
    glue::glue("<b style='color:{color};'>  
              {partners}</b>"),  
    str_replace(partners, key,  
               glue::glue("<b style='color:{color};'>  
              {key}</b>"))  
)
```

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face

Visualization by Cédric Scherer • Data by Emil Hvitfeldt via the (friends) R package

Chats about Friends and their Past, Present, and Future Partners

key	color	partners	
Ross	#f6ab18	Ross & Carol	FALSE
Chandler	#48508c	Chandler & Janice	FALSE
Ross & Rachel	#d86b1d	Ross & Rachel	TRUE

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face

```
right_join(df_friends, by = "key") %>%  
  mutate(partners = if_else(  
    key == partners,  
    glue::glue("<b style='color:{color};'>  
              {partners}</b>"),  
    str_replace(partners, key,  
               glue::glue("<b style='color:{color};'>  
              {key}</b>"))  
)
```

Visualization by Cédric Scherer • Data by Emil Hvitfeldt via the (friends) R package

Chats about Friends and their Past, Present, and Future Partners

key	color	partners	
Ross	#f6ab18	Ross & Carol	FALSE
Chandler	#48508c	Chandler & Janice	FALSE
Ross & Rachel	#d86b1d	<b style="color:#d86b1d;">Ross & Rachel	

```
right_join(df_friends, by = "key") %>%
  mutate(partners = if_else(
    key == partners,
    glue::glue("<b style='color:{color};'>
                {partners}</b>"),
    str_replace(partners, key,
               glue::glue("<b style='color:{color};'>
                           {key}</b>")))
  ))
```

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face

Visualization by Cédric Scherer • Data by Emil Hvitfeldt via the (friends) R package

Chats about Friends and their Past, Present, and Future Partners

key	color	partners
Ross	#f6ab18	<b style='color:#f6ab18;'>Ross & Carol
Chandler	#48508c	<b style='color:#48508c;'>Chandler & Janice
Ross & Rachel	#d86b1d	<b style='color:#d86b1d;'>Ross & Rachel

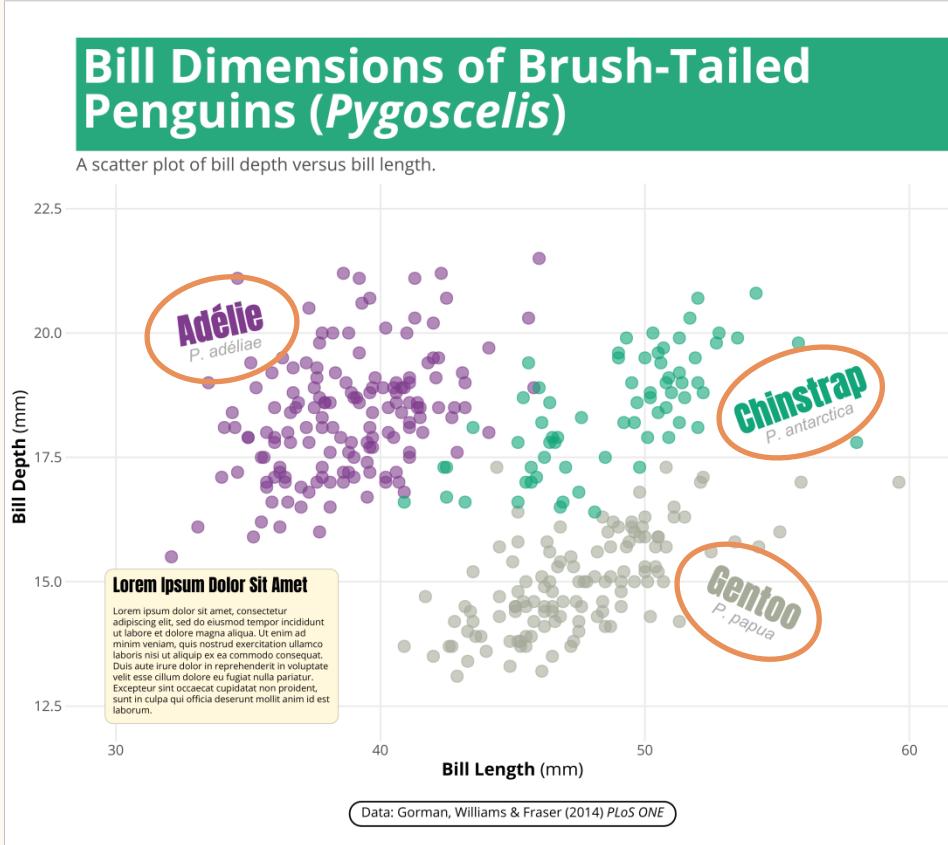
```
right_join(df_friends, by = "key") %>%  
  mutate(partners = if_else(  
    key == partners,  
    glue::glue("<b style='color:{color};'>  
               {partners}</b>"),  
    str_replace(partners, key,  
               glue::glue("<b style='color:{color};'>  
               {key}</b>"))  
)
```

Ross & Carol
Ross & Julie
Ross & Bonnie
Ross & Emily
Ross & Elizabeth
Ross & Mona
Ross & Charlie
Ross & Rachel
Rachel & Barry
Rachel & Paolo
Rachel & Tag
Rachel & Joshua
Rachel & Paul
Rachel & Joey
Joey & Kathy
Joey & Janine
Joey & Charlie
Monica & Richard
Monica & Pete
Monica & Chandler
Chandler & Janice
Chandler & Kathy
Phoebe & David
Phoebe & Gary
Phoebe & Mike

Font Color
Font Face

Visualization by Cédric Scherer • Data by Emil Hvitfeldt via the (friends) R package

{ggtext} Improved Text Rendering Support



`element_markdown()`

- formatted text elements,
e.g. titles, caption, axis text, striptext

`geom_richtext()`

- formatted text labels with 360° rotation

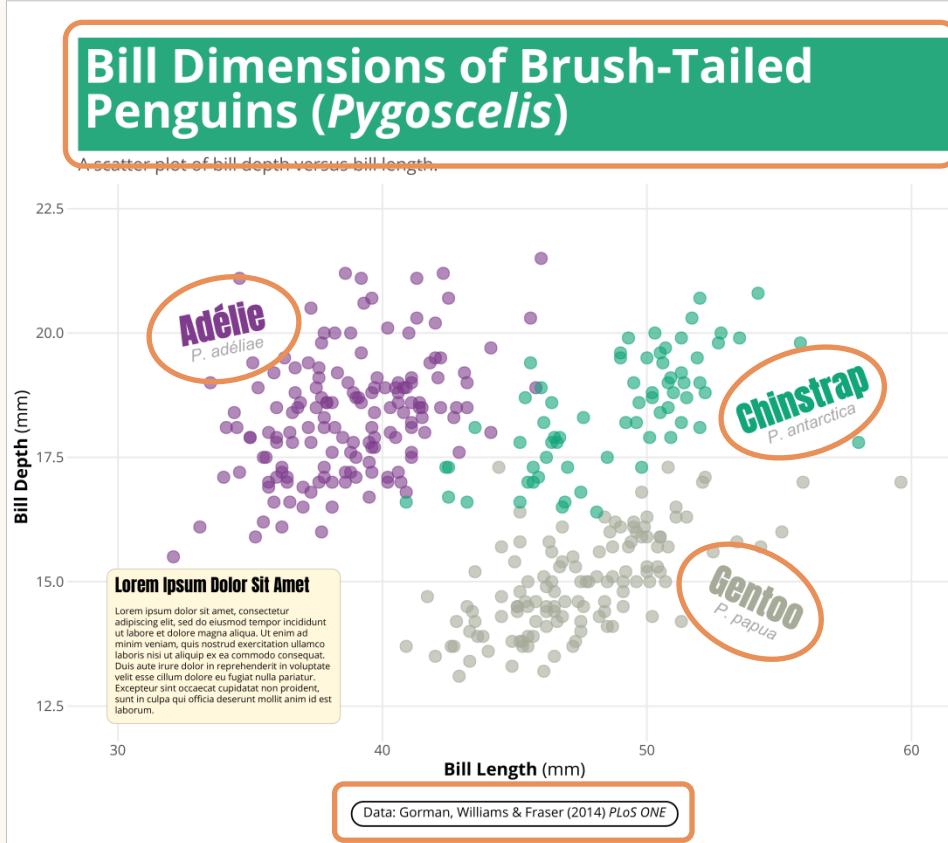
`element_textbox()` and
`element_textbox_simple()`

- formatted text boxes with word wrapping

`geom_textbox()`

- formatted text boxes with word wrapping

{ggtext} Improved Text Rendering Support



`element_markdown()`

- formatted text elements,
e.g. titles, caption, axis text, striptext

`geom_richtext()`

- formatted text labels with 360° rotation

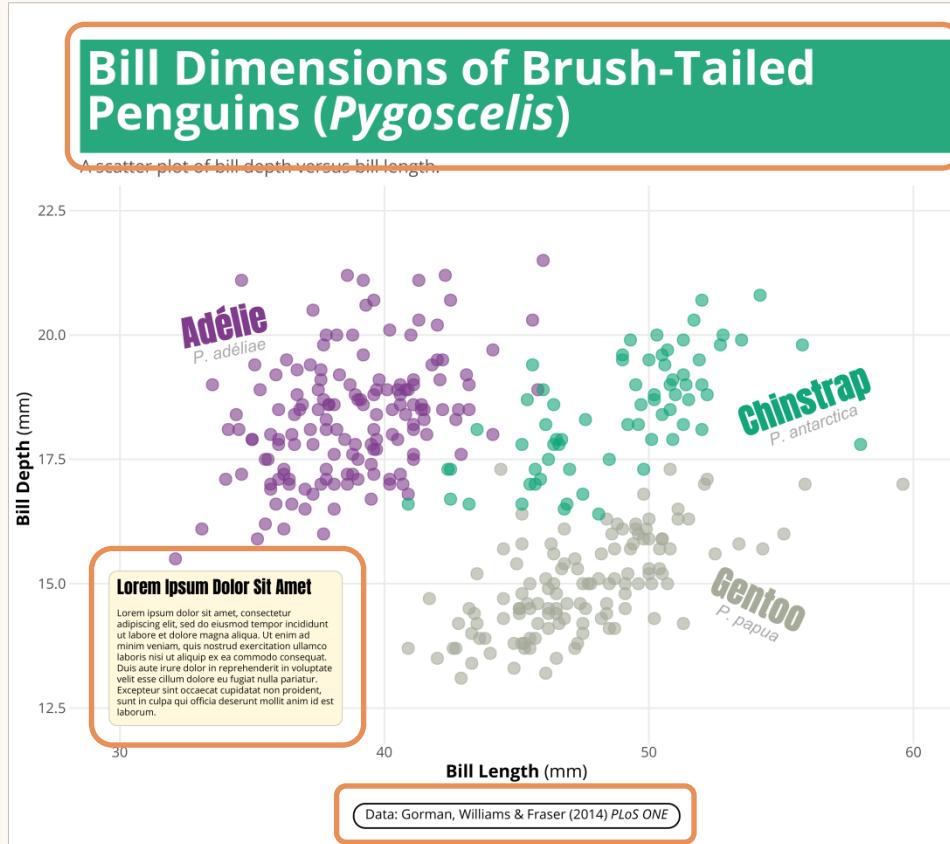
`element_textbox()` and
`element_textbox_simple()`

- formatted text boxes with word wrapping

`geom_textbox()`

- formatted text boxes with word wrapping

{ggttext} Improved Text Rendering Support



element_markdown()

- formatted text elements,
e.g. titles, caption, axis text, striptext

geom_richtext()

- formatted text labels with 360° rotation

`element_textbox()` and
`element_textbox_simple()`

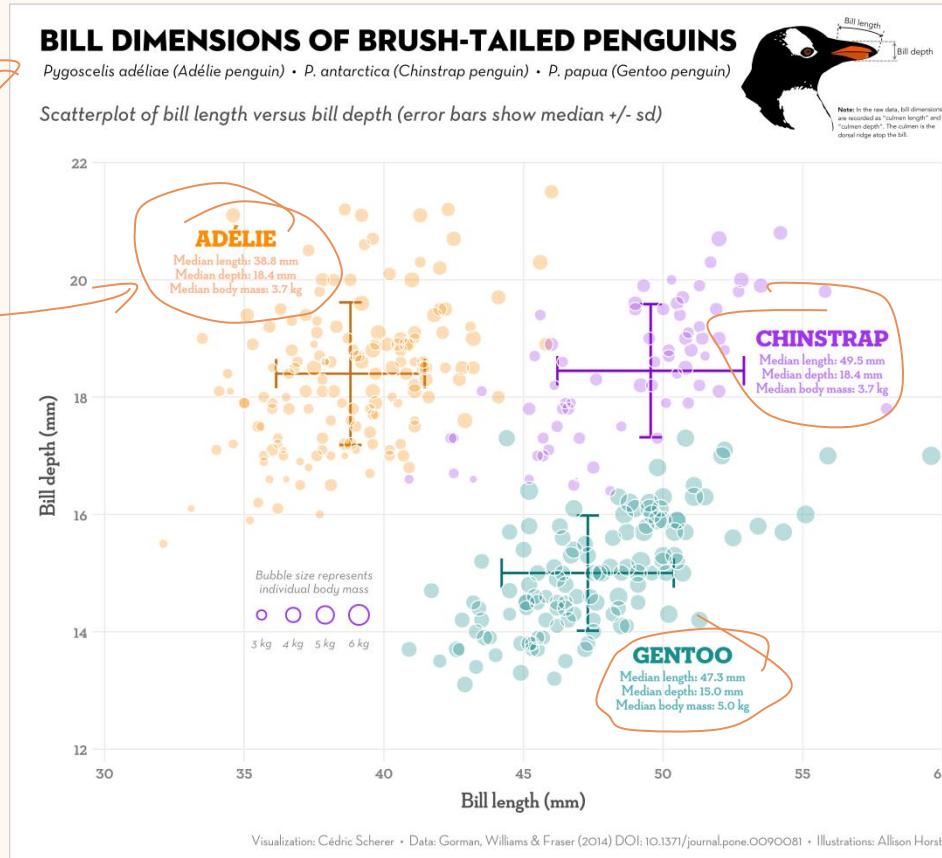
- formatted text boxes with word wrapping

geom_textbox()

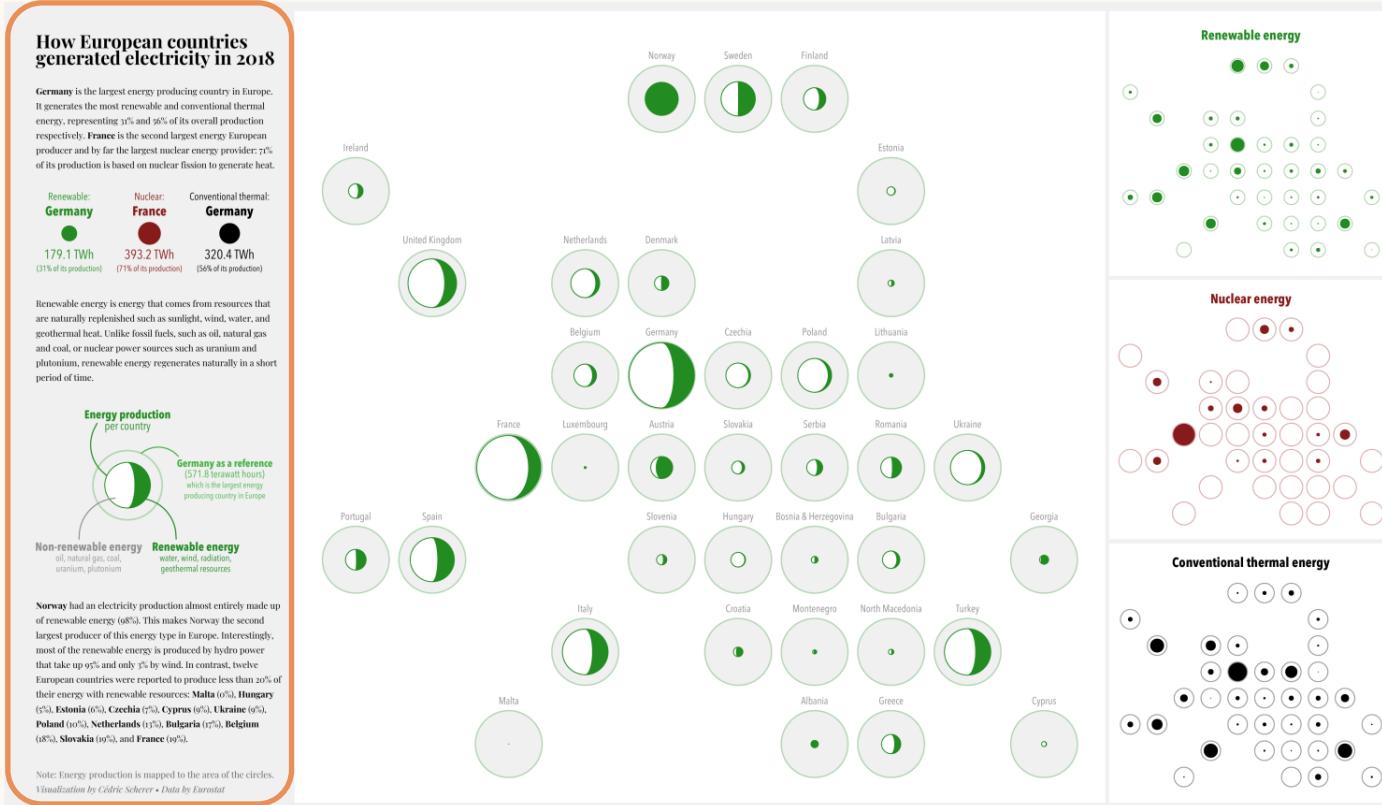
- formatted text boxes with word wrapping

{ggtext} Improved Text Rendering Support

Font Family
Font Size
Font Face
Lineheight

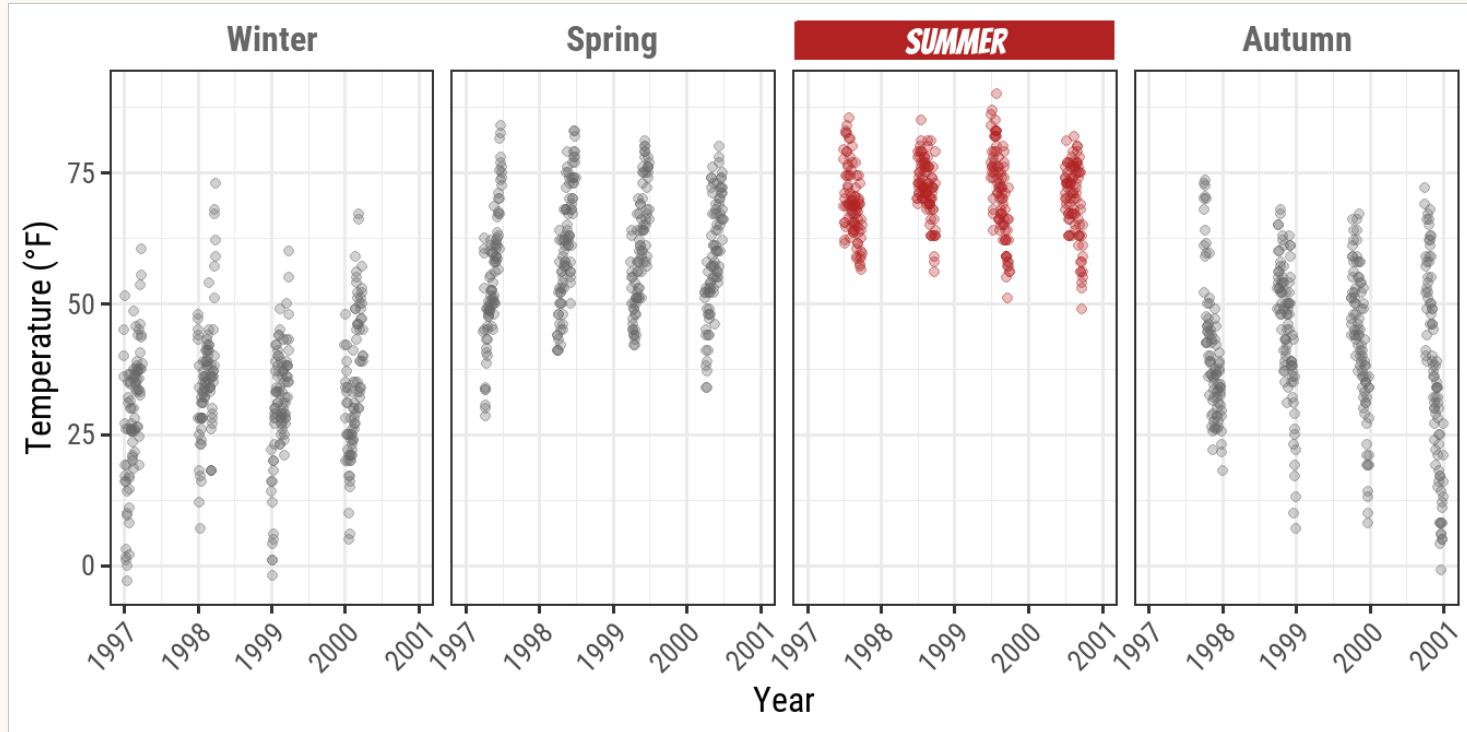


{ggtext} Improved Text Rendering Support



`geom_textbox() +
geom_richtext()`

{ggtext} Improved Text Rendering Support



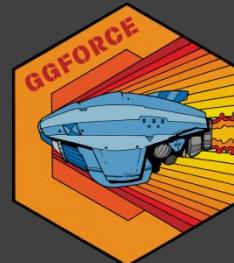
→ stackoverflow.com/questions/60332202/conditionally-fill-ggtext-text-boxes-in-facet-wrap

→ cedricscherer.com/2019/08/05/a-ggplot2-tutorial-for-beautiful-plotting-in-r/#panels

custom_element_textbox_highlight()

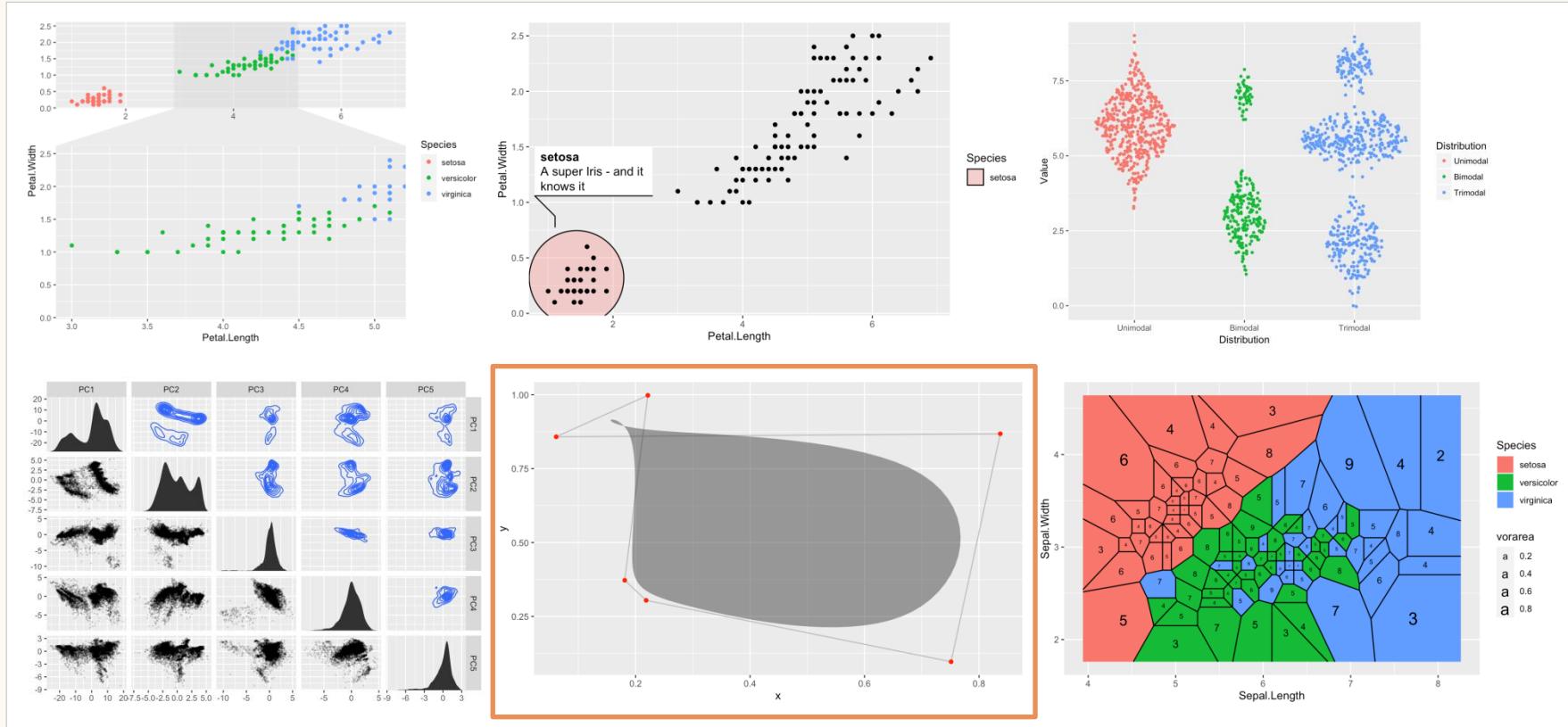
{ggforce}

Providing Missing Functionality to `ggplot2`



ggforce.data-imaginist.com

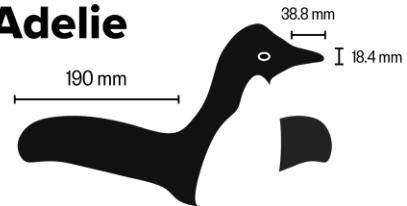
{ggforce} Providing Missing Functionality



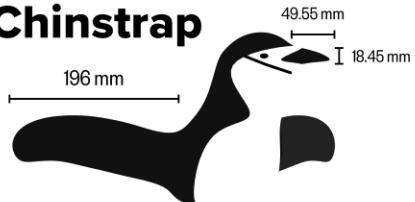
Palmer Penguins

Median length of flipper, length and depth of bill,
of 342 penguins recorded between 2007 and 2009

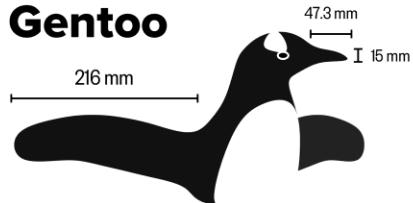
Adelie



Chinstrap

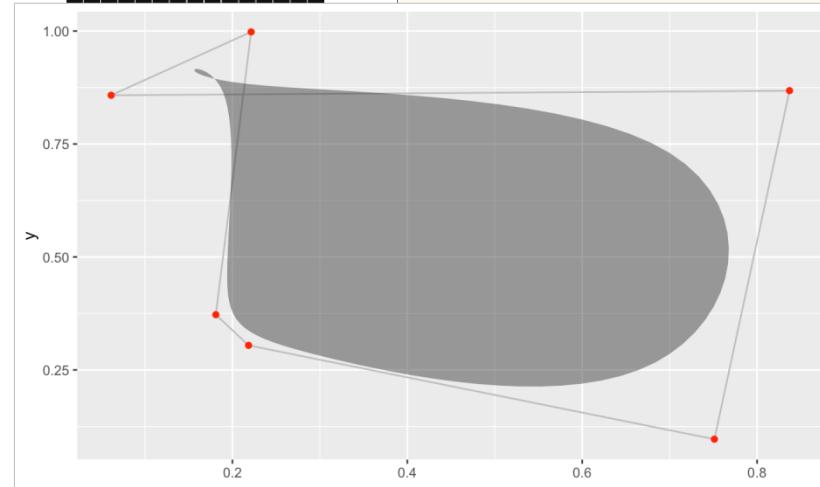


Gentoo



Recorded penguins by species

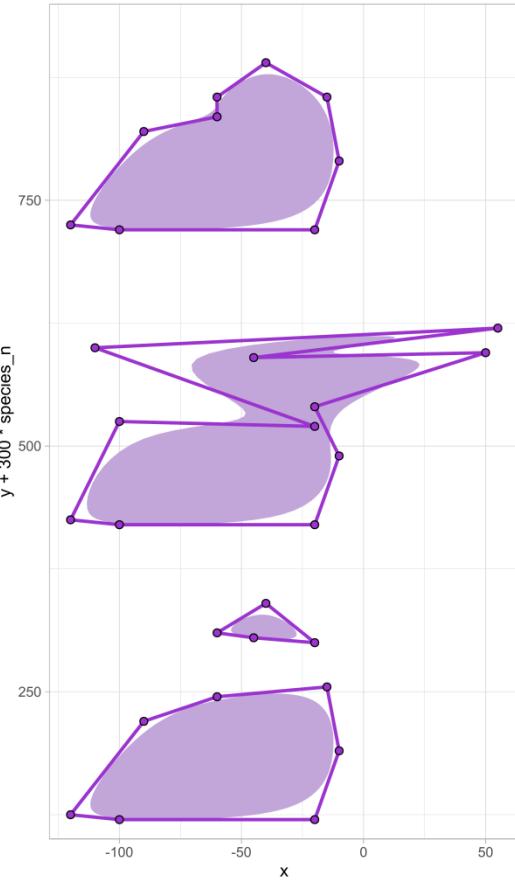
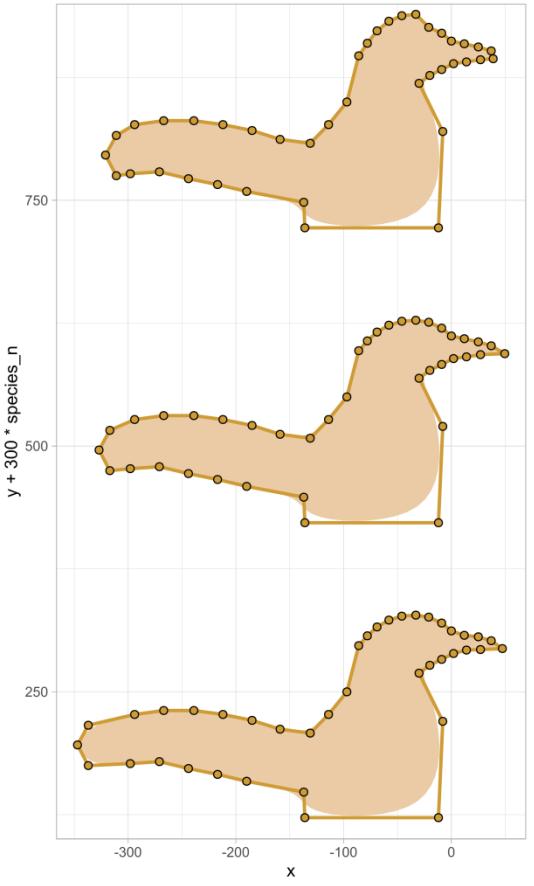
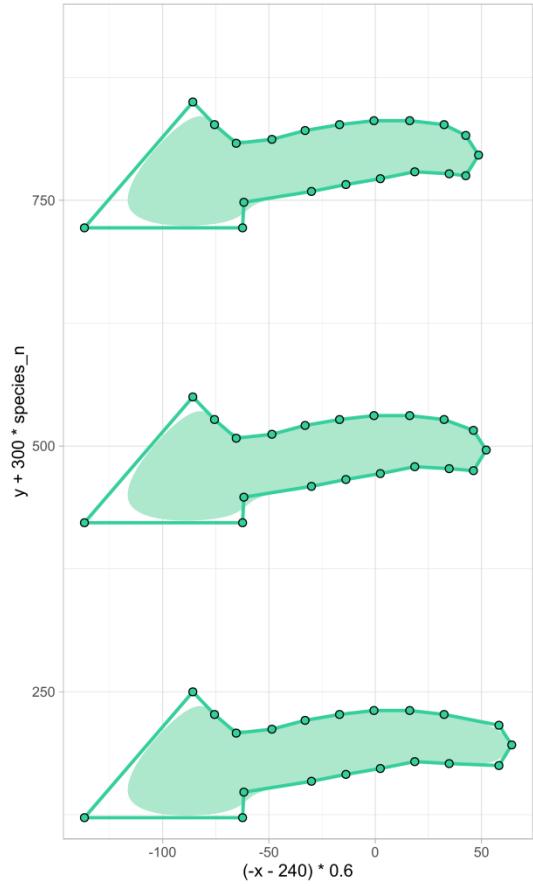
151



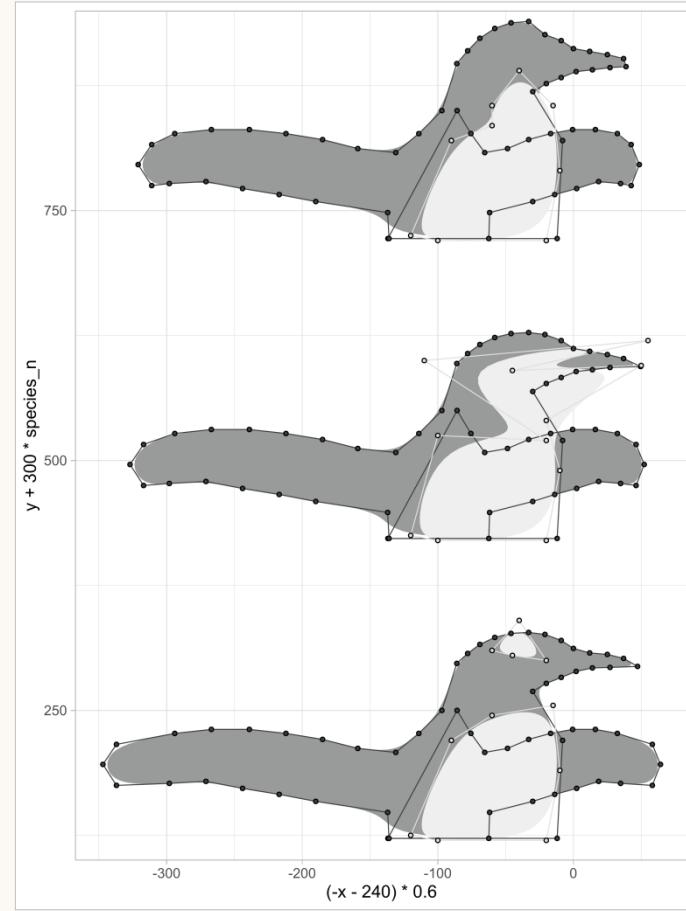
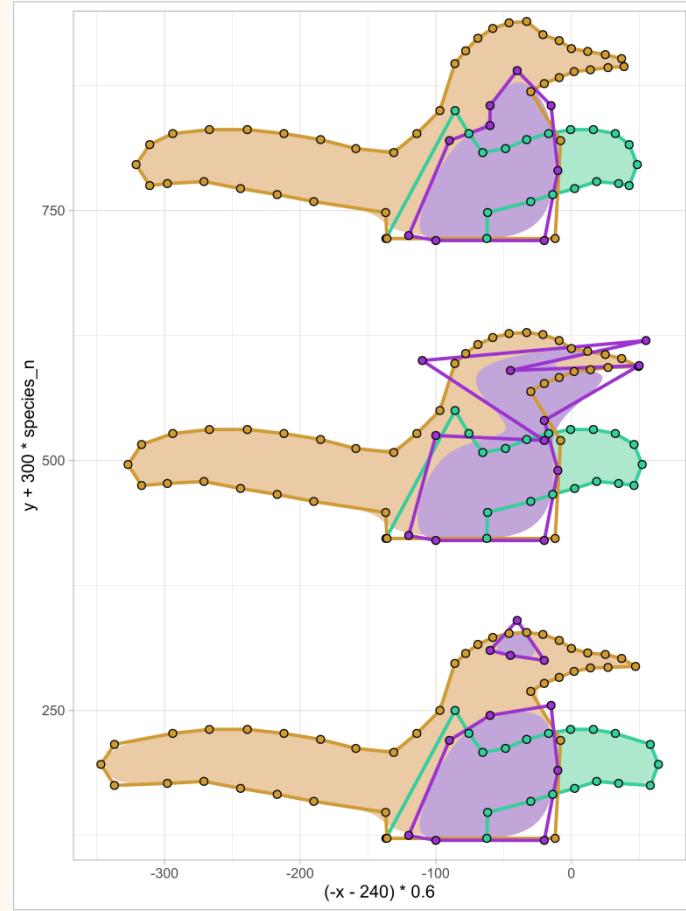
geom_bspline_closed()

Source: Dr. Kristen Gorman and the Palmer Station, Antarctica LTER | Graphic: Georgios Karamanis

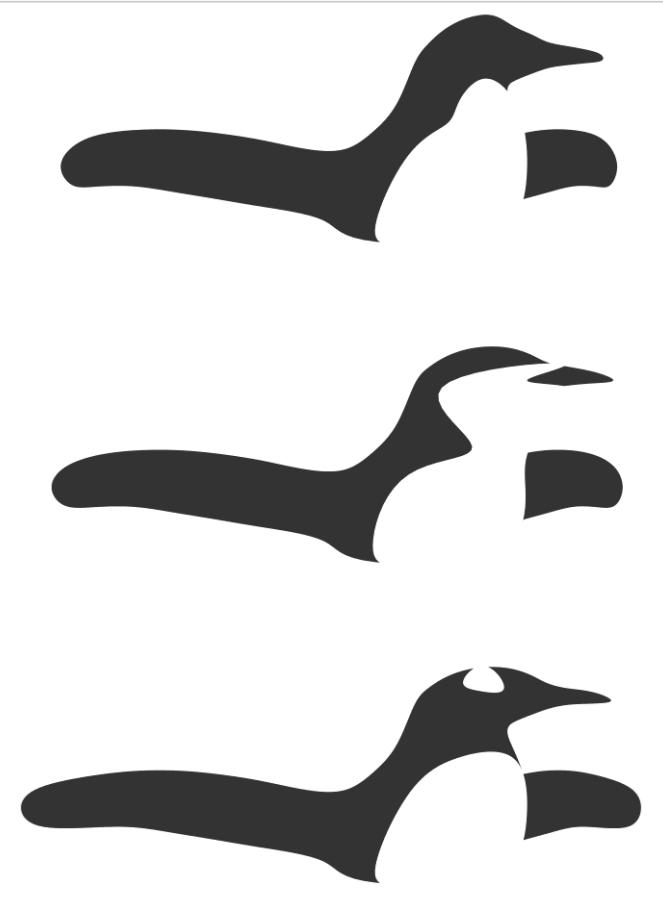
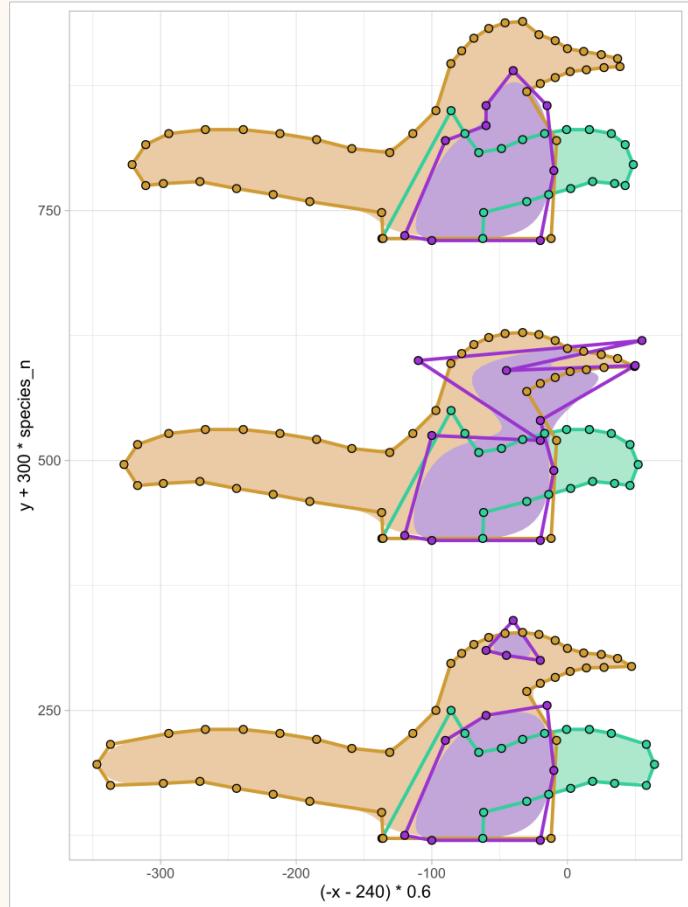
Georgios Karamanis, Contribution to #TidyTuesday 2020/31



Modified from Georgios Karamanis' Contribution to #TidyTuesday 2020/31

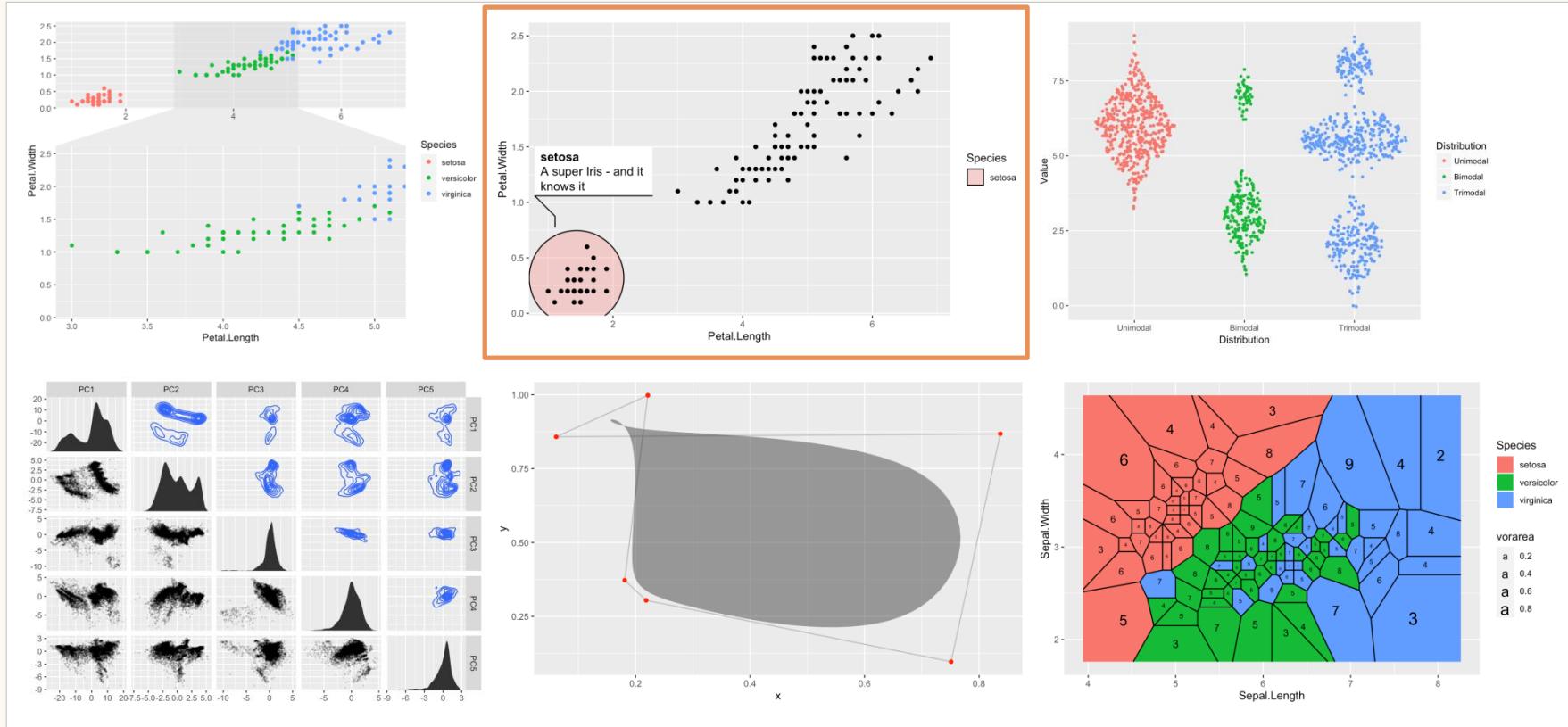


Modified from Georgios Karamanis' Contribution to #TidyTuesday 2020/31



Modified from Georgios Karamanis' Contribution to #TidyTuesday 2020/31

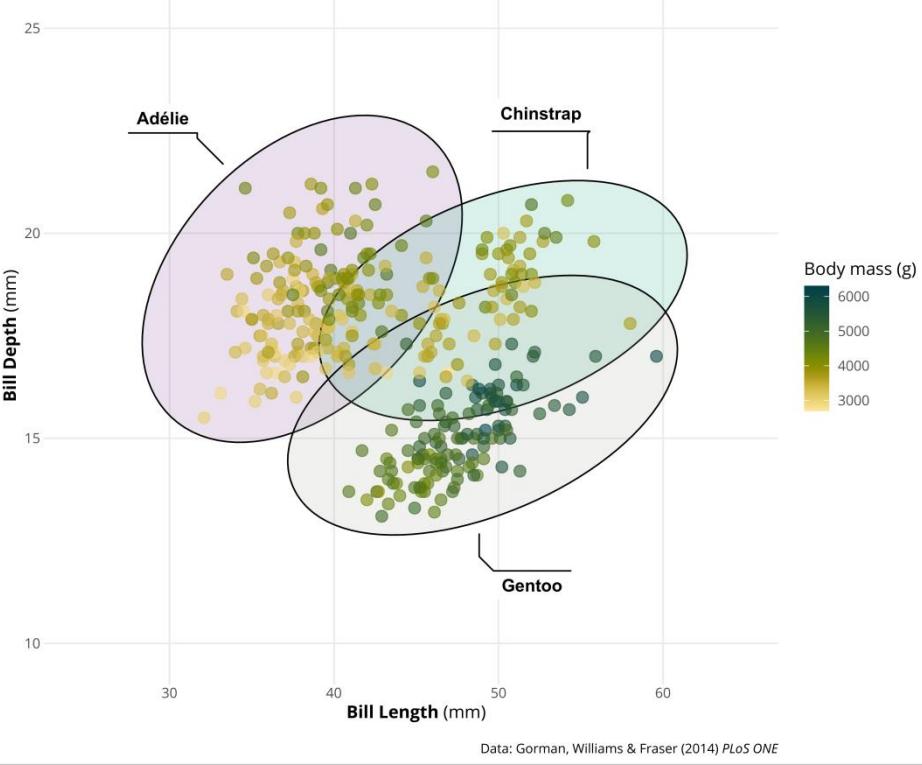
{ggforce} Providing Missing Functionality



{ggforce} Fancy Annotations

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



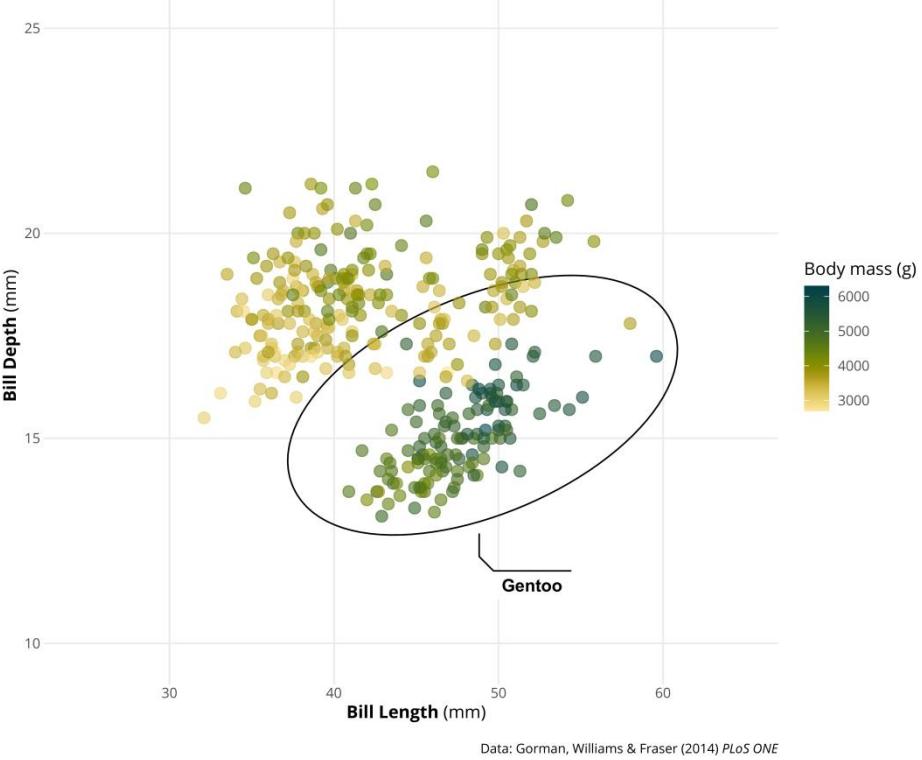
geom_mark_*

→ advanced labels for single or multiple points

{ggforce} Fancy Annotations

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



```
geom_mark_ellipsoid(aes(fill = species, label = species,  
filter = species == 'Gentoo'))
```

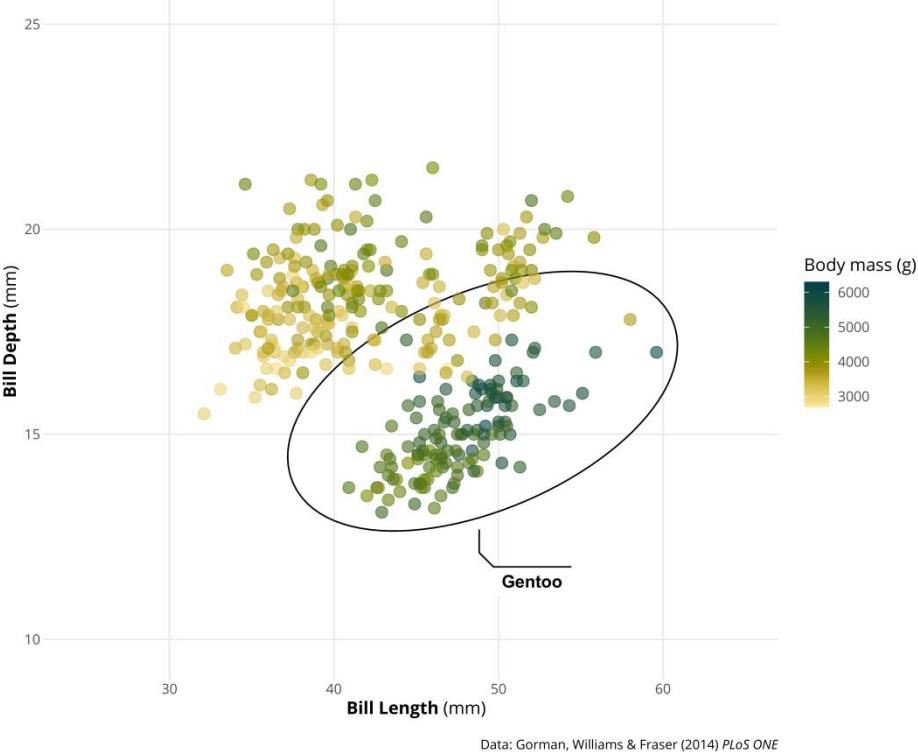
geom_mark_*

- advanced labels for single or multiple points
- show all groups or highlight interesting parts

{ggforce} Fancy Annotations

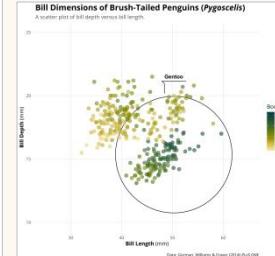
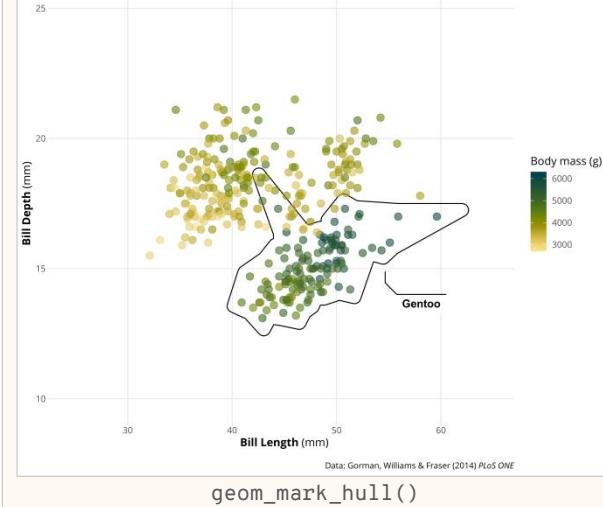
Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.

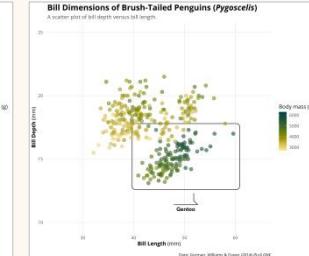


Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



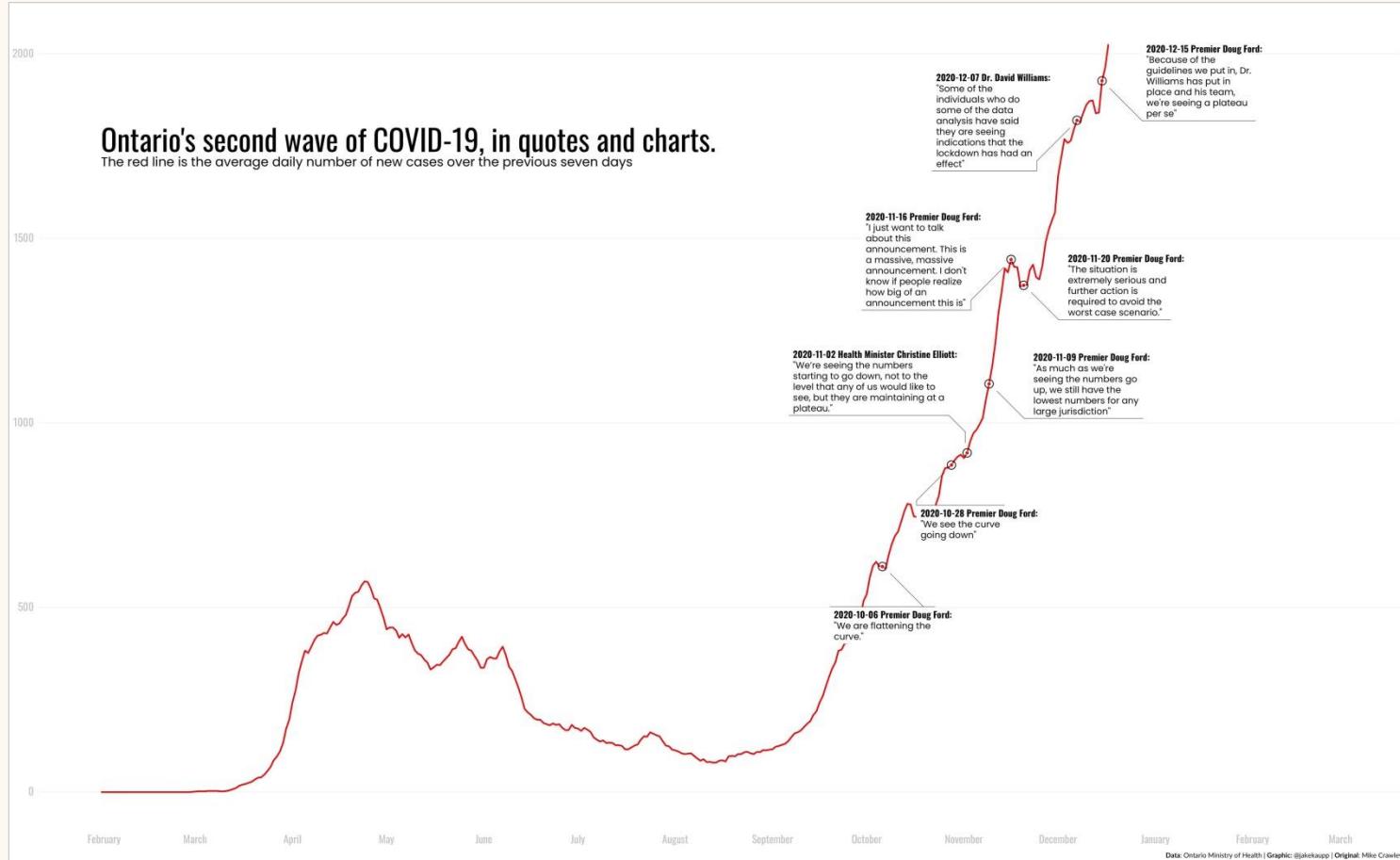
`geom_mark_circle()`



`geom_mark_rect()`

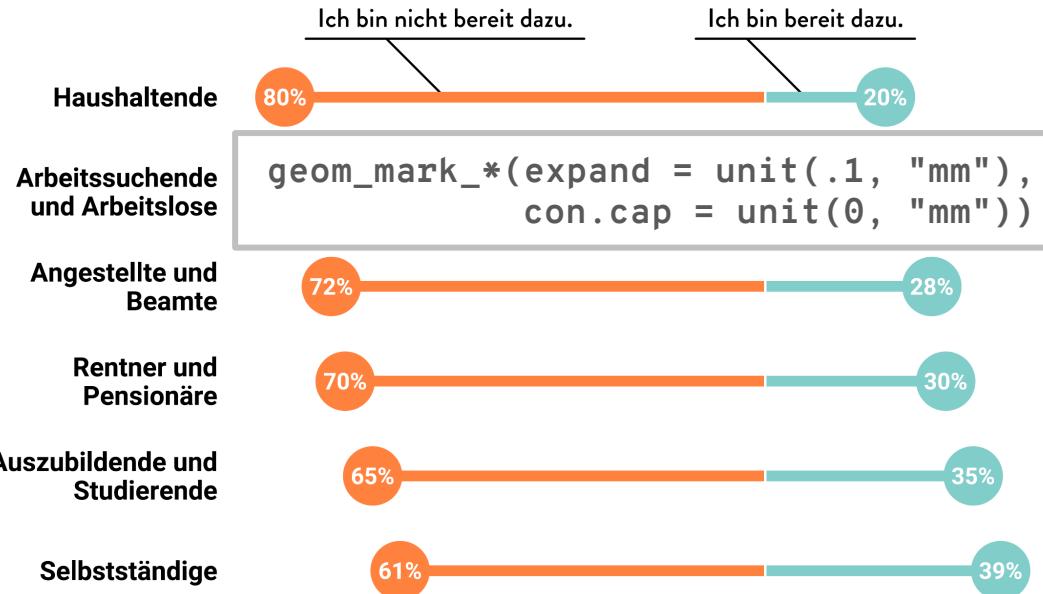
the points
ing parts

`geom_mark_ellipsoid()`



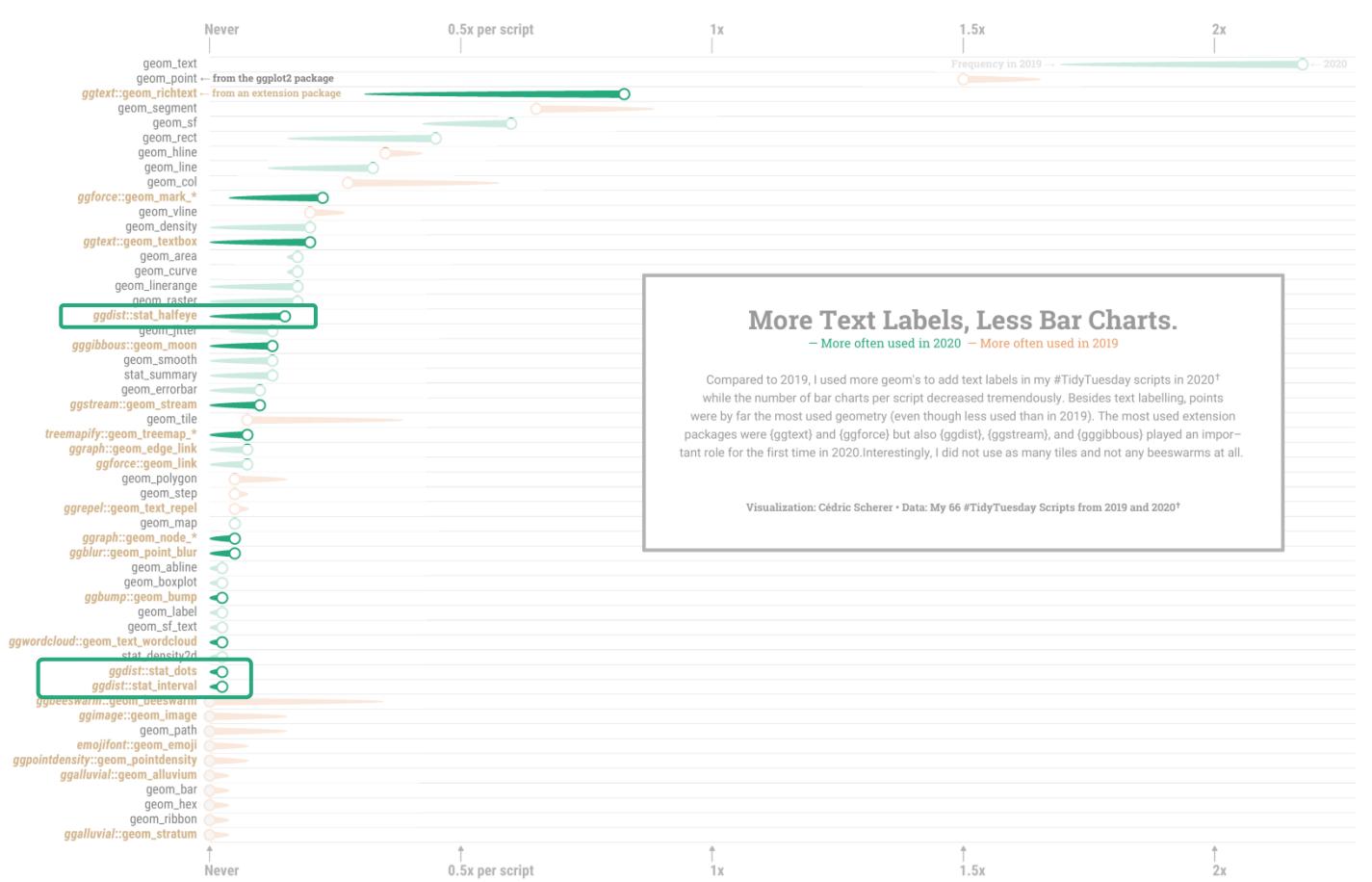
Jake Kaupp

Die Präsidentin der EU Ursula von der Leyen bittet "finanziell nicht notleidende Kunden" ihr Recht auf Rückerstattung aus Solidarität nicht in Anspruch zu nehmen.



Basierend auf 1057 Antworten auf eine Umfrage von KUENDIGUNG.ORG

Customer survey Kuendigung.org
(kuendigung.org/studien/verbraucherumfrage-zur-zukunft-nach-der-krise)



More Text Labels, Less Bar Charts.

— More often used in 2020 — More often used in 2019

Compared to 2019, I used more geom's to add text labels in my #TidyTuesday scripts in 2020[†] while the number of bar charts per script decreased tremendously. Besides text labelling, points were by far the most used geometry (even though less used than in 2019). The most used extension packages were (ggtext) and (ggforce) but also (ggdist), (ggstream), and (ggbibous) played an important role for the first time in 2020. Interestingly, I did not use as many tiles and not any beeswarms at all.

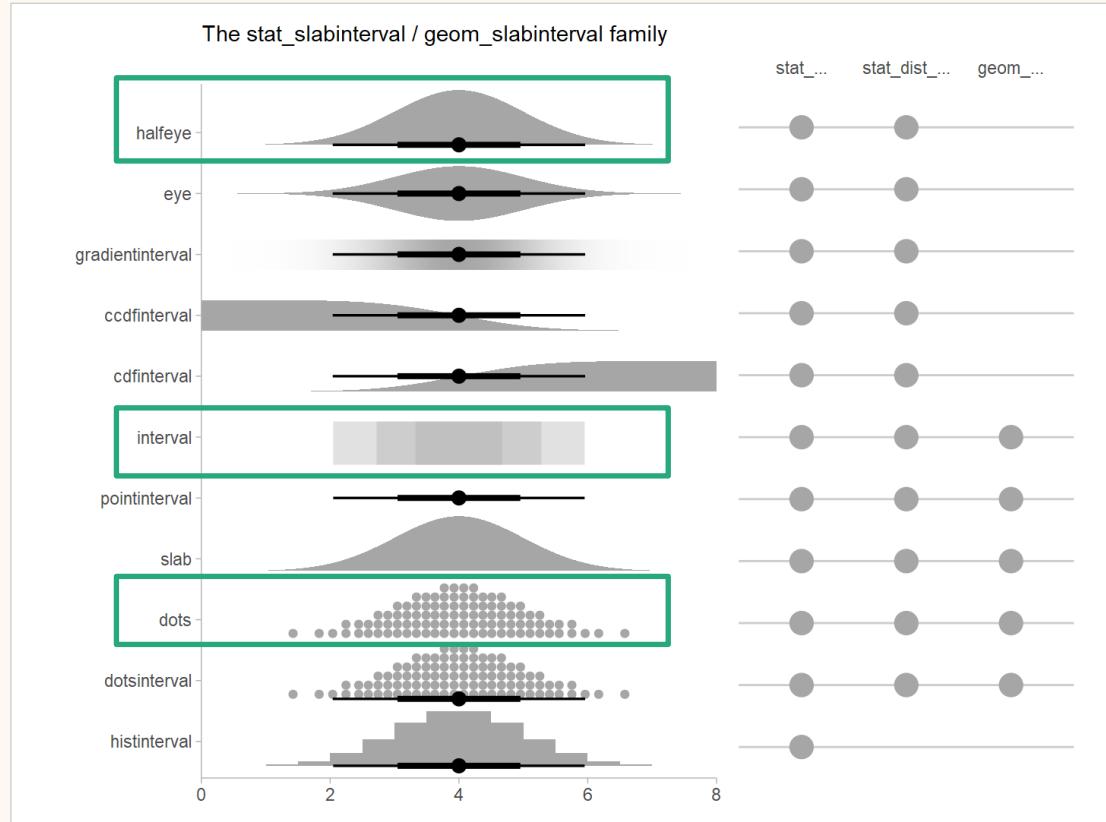
Visualization: Cédric Scherer • Data: My 66 #TidyTuesday Scripts from 2019 and 2020[†]

[†] I extracted all functions starting with `geom` or `stat` from my Rmd files containing the code for all my #TidyTuesday contributions (thanks Georgios for the idea and script). For the contributions from 2019 ($n = 26$) and 2020 ($n = 40$) I calculated the frequency of usage per year for each geom/stat as times used divided by the number of contributions. Note that some geom's which usually appear together (e.g. `treemapify::geom_treemap` functions) or behave very similarly (e.g. `ggforce::geommark` functions) were grouped together.

{ggdist}

Visualizations of Distributions and Uncertainty

{ggdist} Visualizations of Distributions and Uncertainty



Not my cup of coffee...

Each dot depicts one coffee bean rated by Coffee Quality Institute's trained reviewers. In addition, the multiple interval stripes show where 25%, 50%, 95%, and 100% of the beans fall along the rating gradient from 0 to 100 points. The rated coffee beans range from 59.8 points (Guatemala) to 89.9 (Ethiopia). Only countries of origin with 25 or more tested beans are shown. The red empty triangle marks the minimum rating, the black filled triangle indicates each country's median score.

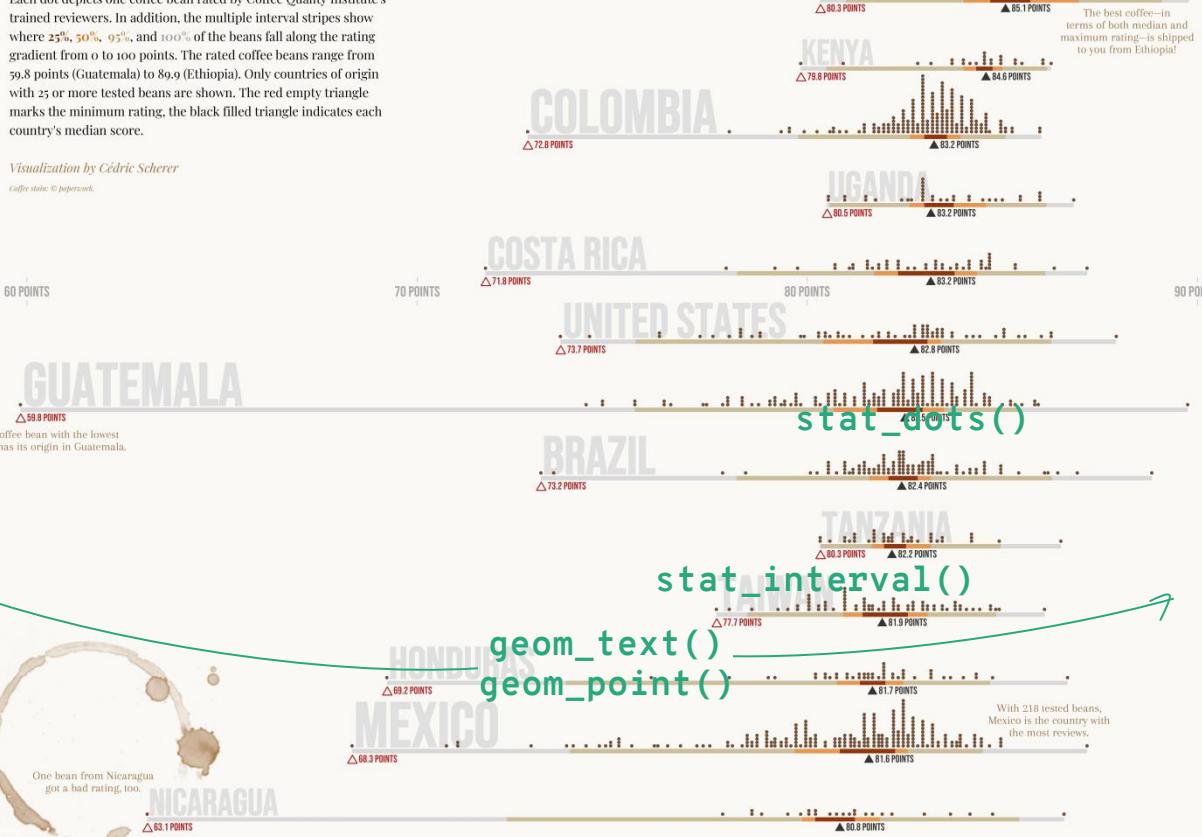
Visualization by Cédric Scherer

Coffee stain: © paperwerk.



The coffee bean with the lowest rating has its origin in Guatemala.

△ 59.8 POINTS



Contribution to #TidyTuesday 2020/28

COLOMBIA

△ 72.8 POINTS

KENYA

△ 79.8 POINTS

stat_dots()

stat_interval()

▲ 84.6 POINTS

geom_text()
geom_point()

△ 80.5 POINTS

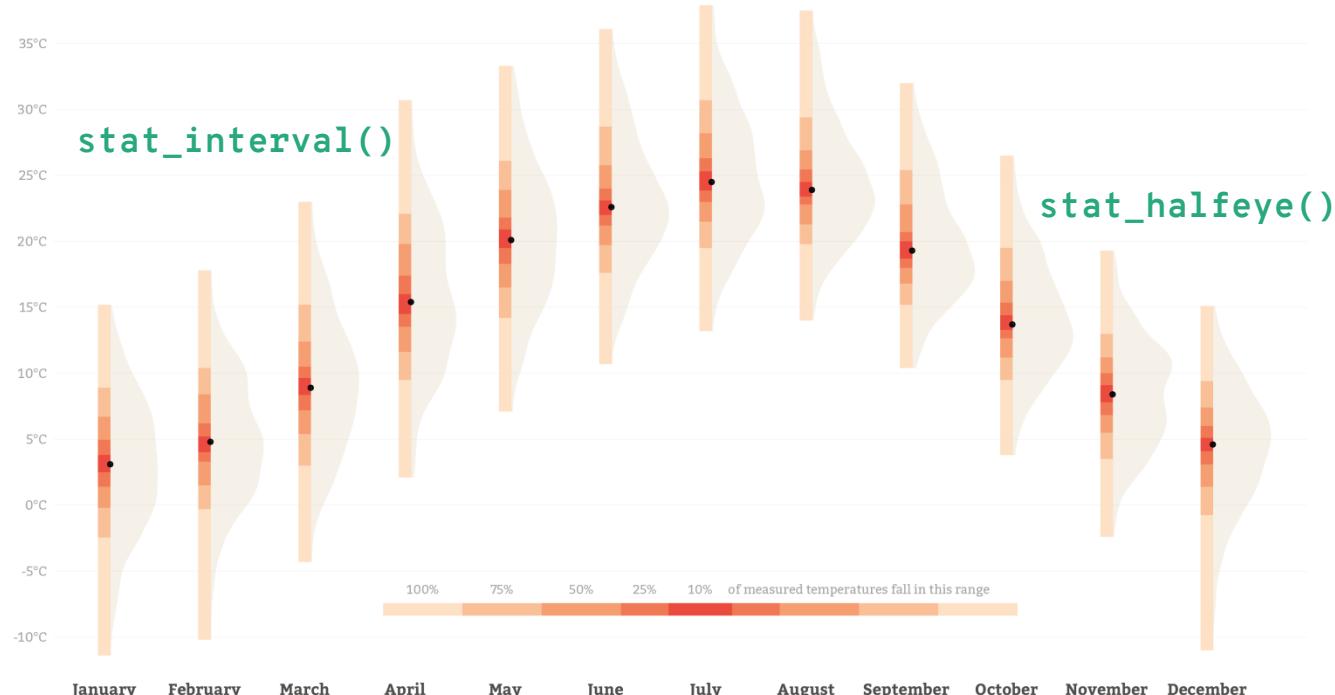
UGANDA

▲ 83.2 POINTS

Contribution to #TidyTuesday 2020/28

Daily Temperatures in Berlin, Germany

Range and distribution of maximum daily temperatures in Celsius per month from 2000 to 2018 measured in Berlin-Dahlem, Germany



Contribution to the SWD Challenge September 2019



More Text Labels, Less Bar Charts.

— More often used in 2020 — More often used in 2019

Compared to 2019, I used more geom's to add text labels in my #TidyTuesday scripts in 2020[†] while the number of bar charts per script decreased tremendously. Besides text labelling, points were by far the most used geometry (even though less used than in 2019). The most used extension packages were (`ggtext`) and (`ggforce`) but also (`ggdist`), (`ggstream`), and (`gggibbous`) played an important role for the first time in 2020. Interestingly, I did not use as many tiles and not any beeswarms at all.

Visualization: Cédric Scherer • Data: My 66 #TidyTuesday Scripts from 2019 and 2020[†]

[†] I extracted all functions starting with `geom` or `stat` from my Rmd files containing the code for all my #TidyTuesday contributions (thanks Georgios for the idea and script). For the contributions from 2019 (n = 26) and 2020 (n = 40) I calculated the frequency of usage per year for each geomist as times used divided by the number of contributions. Note that some geom's which usually appear together (e.g. `treemapify::geom_treemap` functions) or behave very similarly (e.g. `ggforce::geommark` functions) were grouped together.

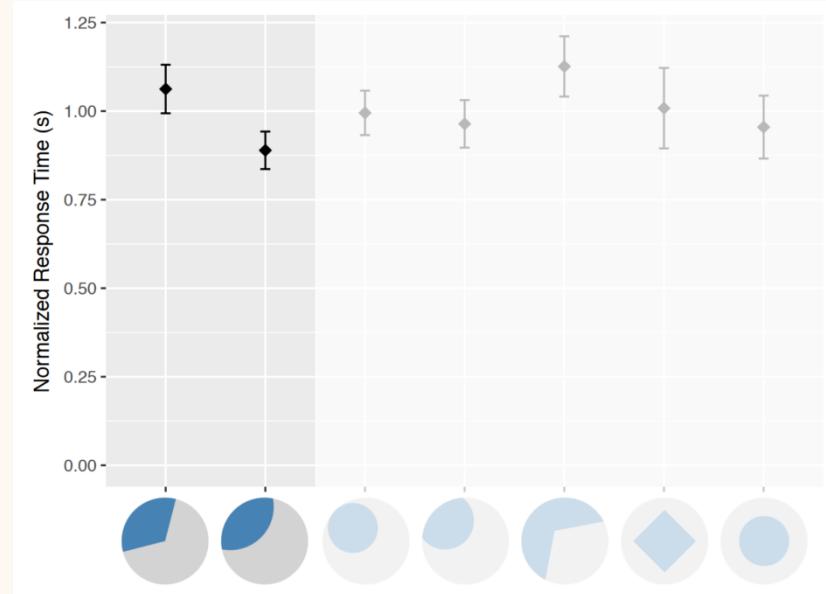
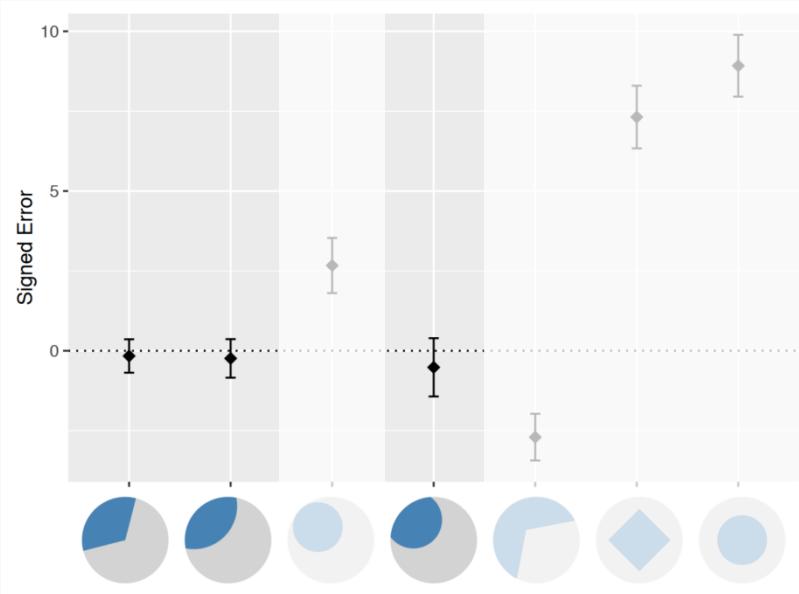
{gggibbous}

Moon charts for ggplot2



Circular Part-to-Whole Charts Using the Area Visual Cue

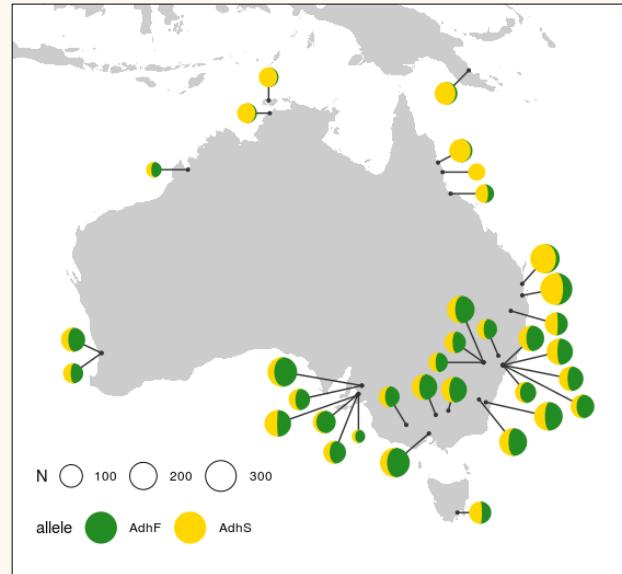
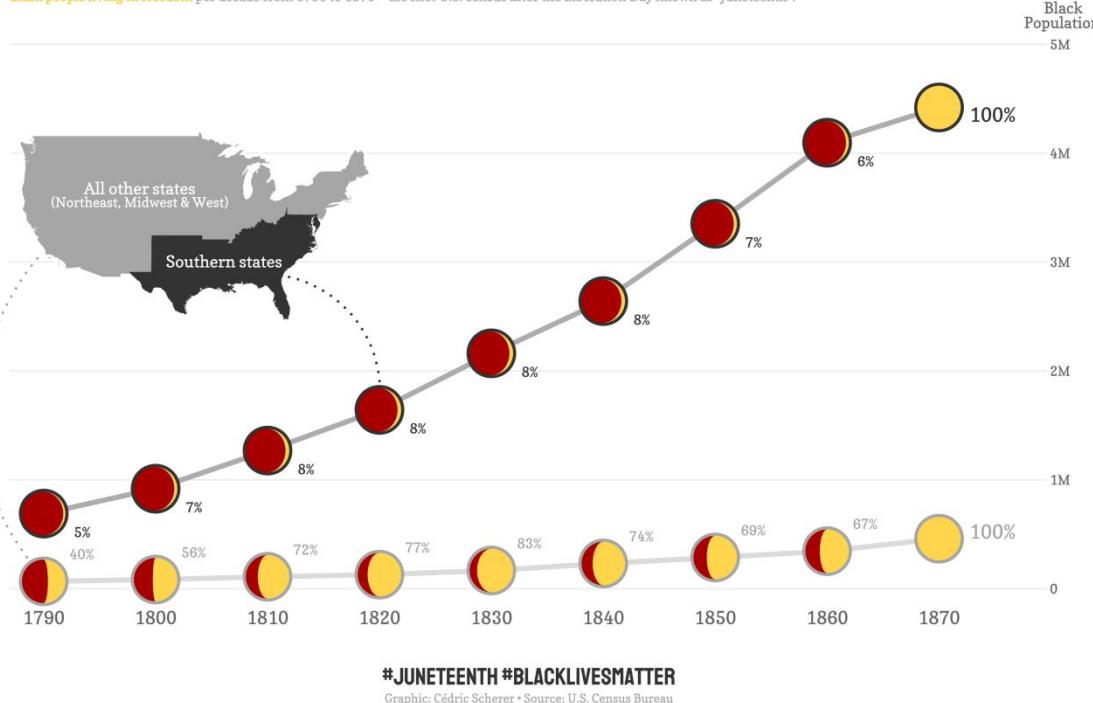
Robert Kosara
Tableau Research



doi.org/10.2312/evs.20191163

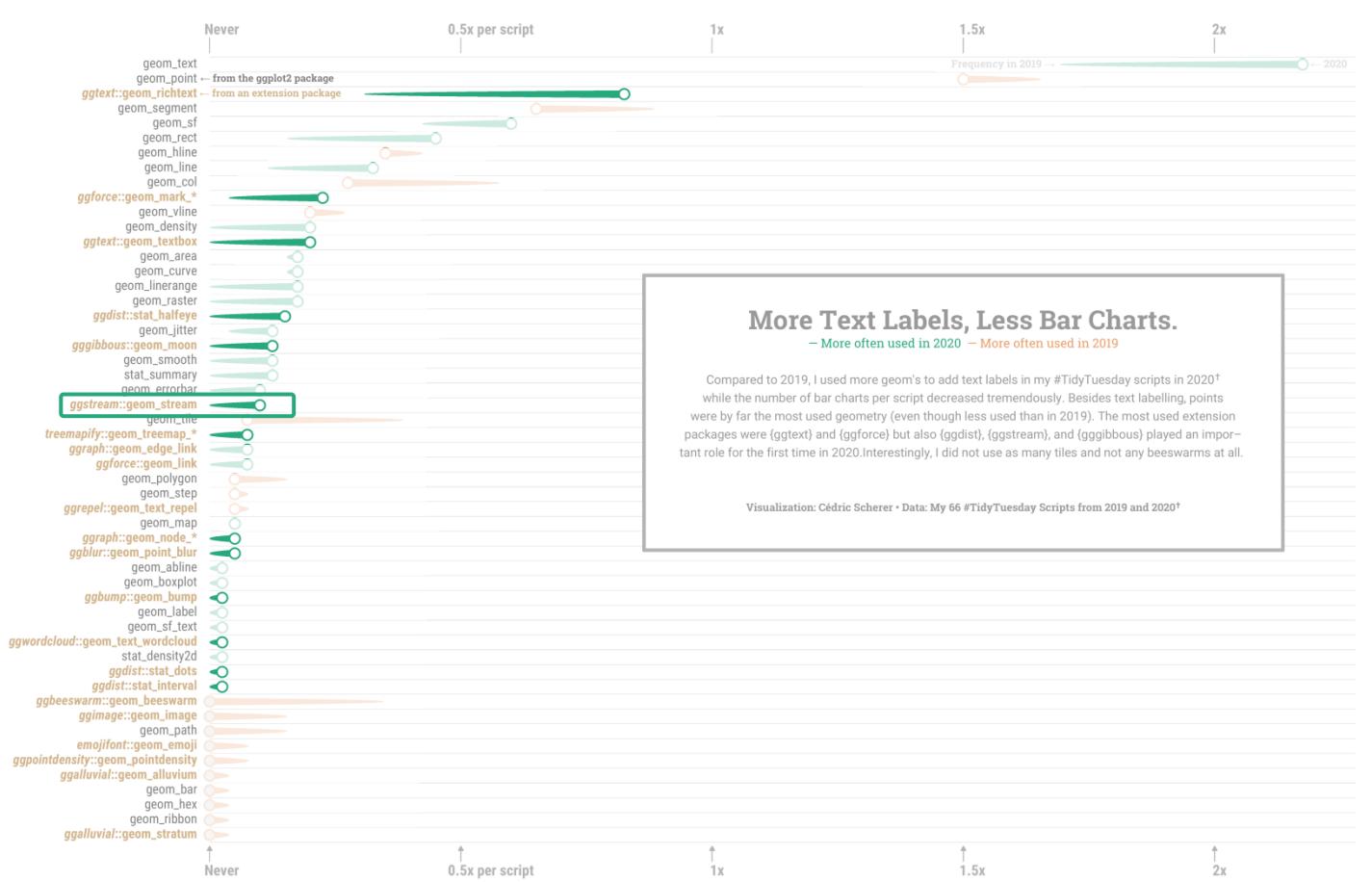
{gg gibbous} Moon charts

By 1860, property owners in the south of North America began establishing plantation farms for cash crops like tobacco, cotton, and sugar cane—enterprises that required increasing amounts of labor. To meet the need, wealthy planters became slave traders and imported ever more individuals to the colonies, the vast majority from West Africa. While the “Emancipation Proclamation” was made law as of 1863, slave owners in the South, namely Texas, still maintained slavery until June 19th 1865 when Union soldiers were able to enforce the law abolishing slavery in the region. The graphic below shows the share of **black people in slavery**, **most of them enslaved in the Southern states**, and **black people living in freedom** per decade from 1790 to 1870—the first U.S. census after the Liberation Day known as “Juneteenth”.



Package example
(github.com/mnbram/gggibbous)

Contribution to #TidyTuesday 2020/25



More Text Labels, Less Bar Charts.

— More often used in 2020 — More often used in 2019

Compared to 2019, I used more geom's to add text labels in my #TidyTuesday scripts in 2020[†] while the number of bar charts per script decreased tremendously. Besides text labelling, points were by far the most used geometry (even though less used than in 2019). The most used extension packages were (ggtext) and (ggforce) but also (ggdist), (ggstream), and (gggibbous) played an important role for the first time in 2020. Interestingly, I did not use as many tiles and not any beeswarms at all.

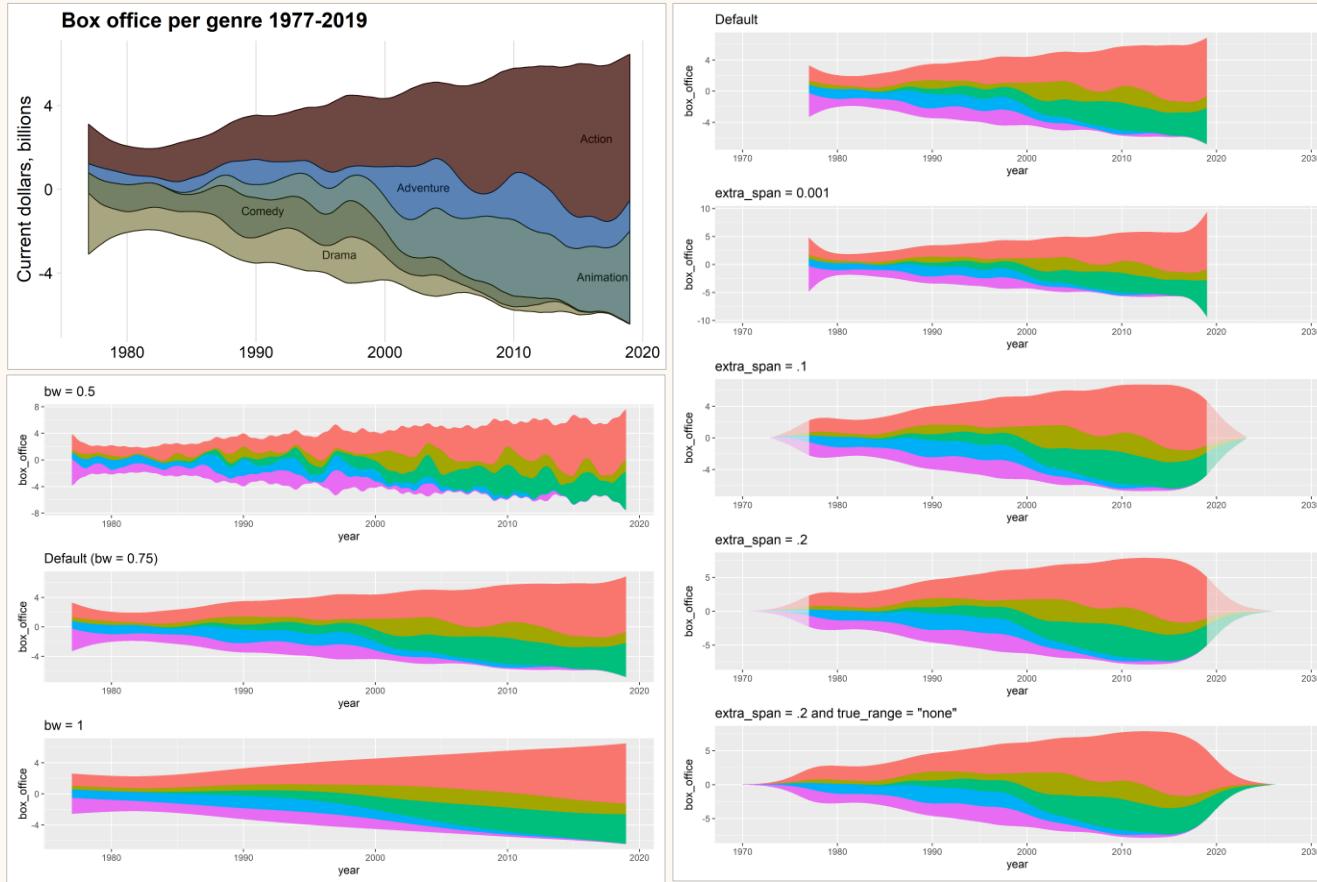
Visualization: Cédric Scherer • Data: My 66 #TidyTuesday Scripts from 2019 and 2020[†]

[†] I extracted all functions starting with `geom` or `stat` from my Rmd files containing the code for all my #TidyTuesday contributions (thanks Georgios for the idea and script). For the contributions from 2019 ($n = 26$) and 2020 ($n = 40$) I calculated the frequency of usage per year for each geom/stat as times used divided by the number of contributions. Note that some geom's which usually appear together (e.g. `treemapify::geom_treemap` functions) or behave very similarly (e.g. `ggforce::geommark` functions) were grouped together.

{ggstream}

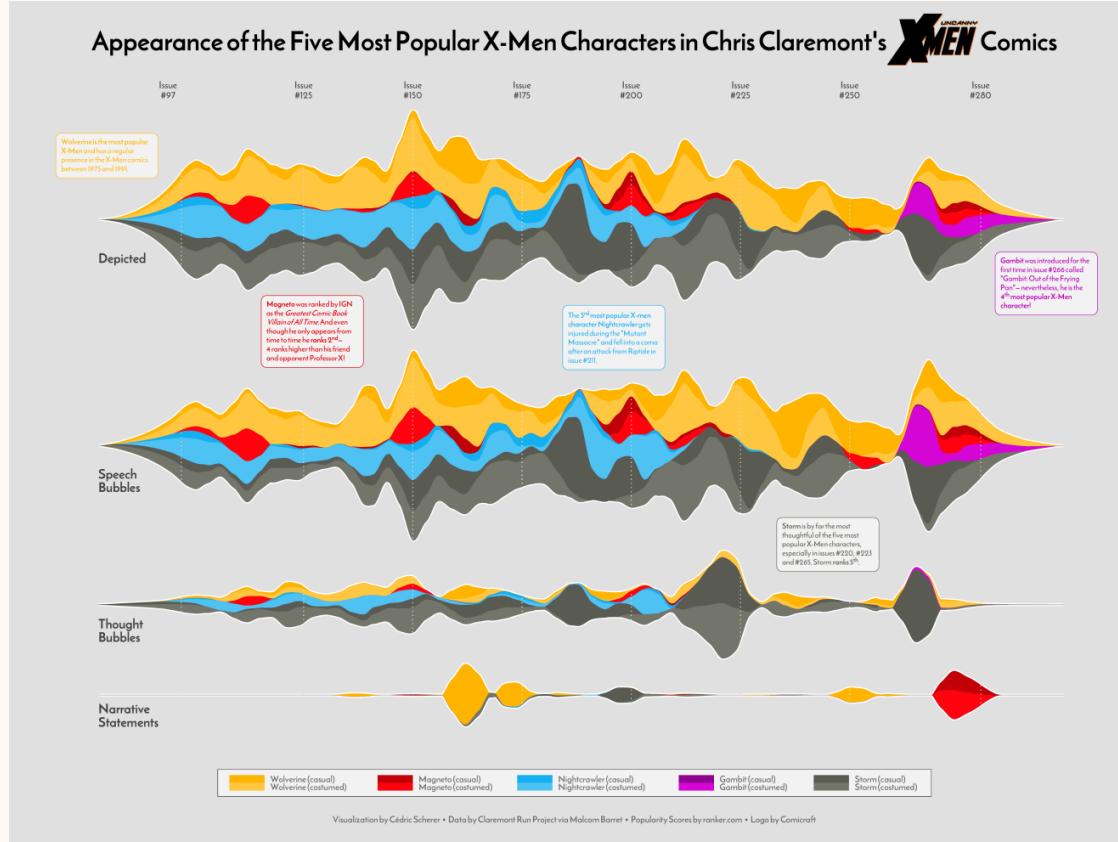
Make streamplots with ggplot2

{ggstream} Streamgraphs



Package examples
(github.com/davidsjoberg/ggstream)

{ggstream} Streamgraphs



My Contribution to #TidyTuesday 2020/27

{ggplot2}

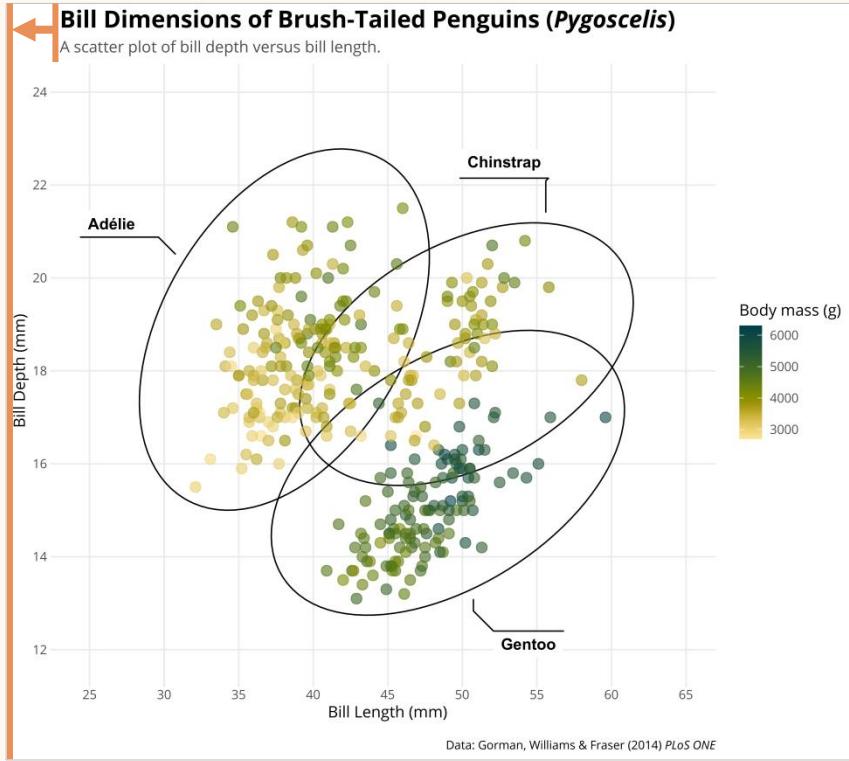
Details You May Not Know Yet
(or have never thought about)



ggplot2.tidyverse.org

Left-Aligned Title?

```
theme(plot.title = element_text(hjust = 0))
```



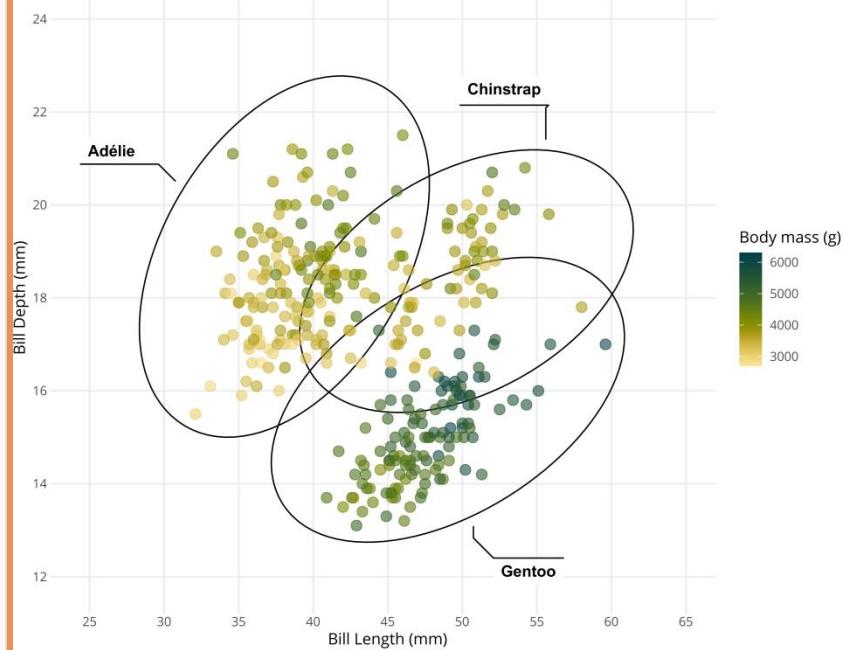
Left-Aligned Title

```
theme(plot.title.position = 'panel')
```

Default

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.

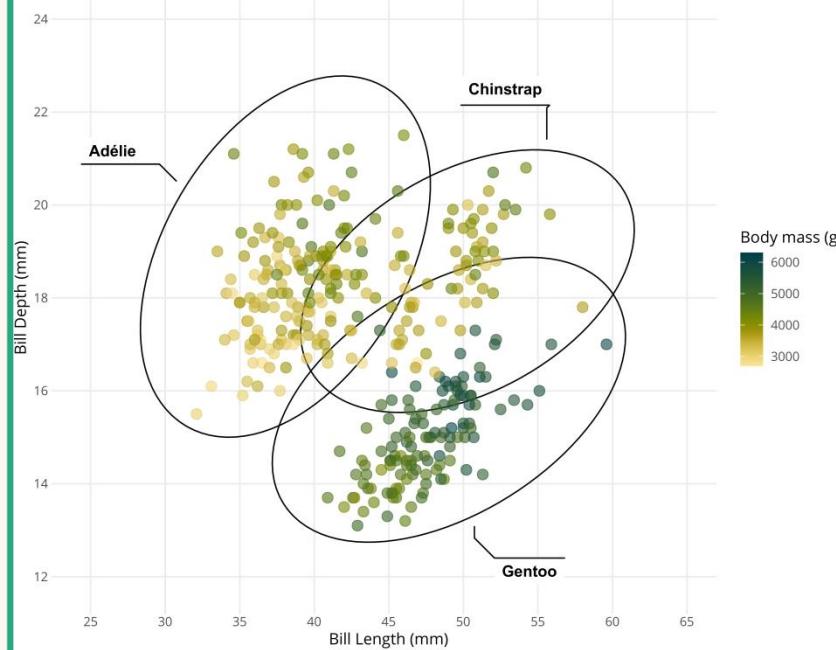


```
theme(plot.title.position = 'plot')
```

Better

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



Data: Gorman, Williams & Fraser (2014) *PLoS ONE*

Data: Gorman, Williams & Fraser (2014) *PLoS ONE*

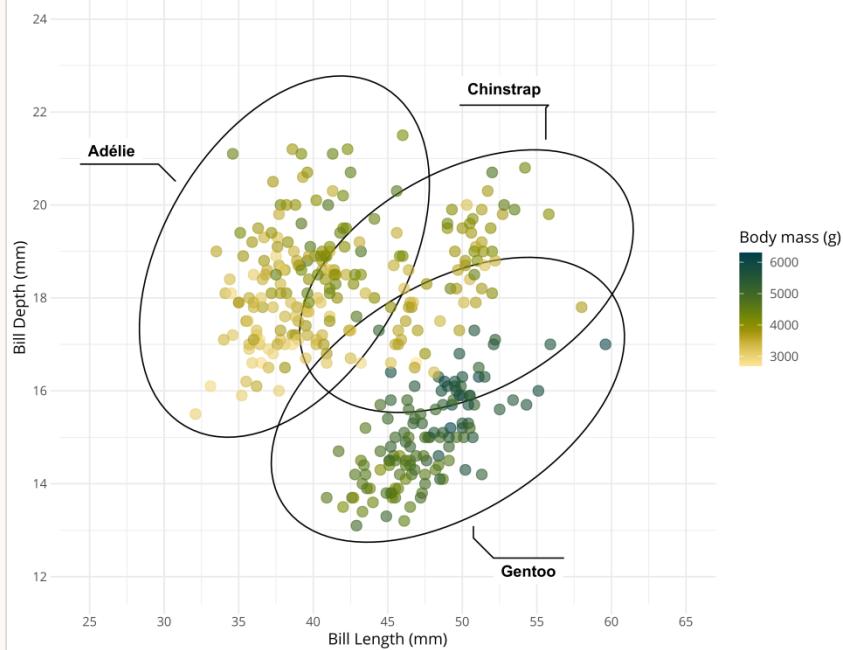
Right-Aligned Caption

```
theme(plot.caption.position = 'panel')
```

Default

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



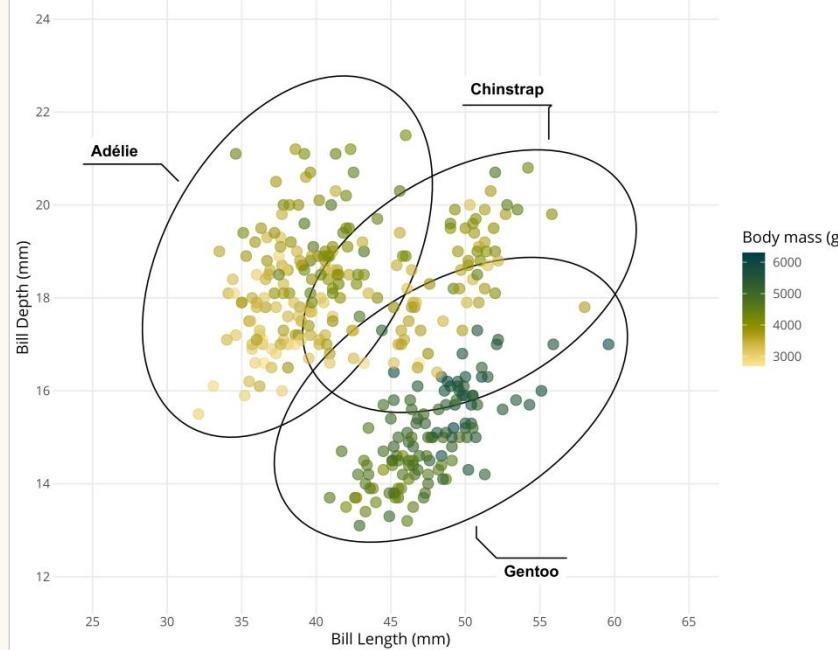
Data: Gorman, Williams & Fraser (2014) *PLoS ONE*

Better (?)

```
theme(plot.caption.position = 'plot')
```

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



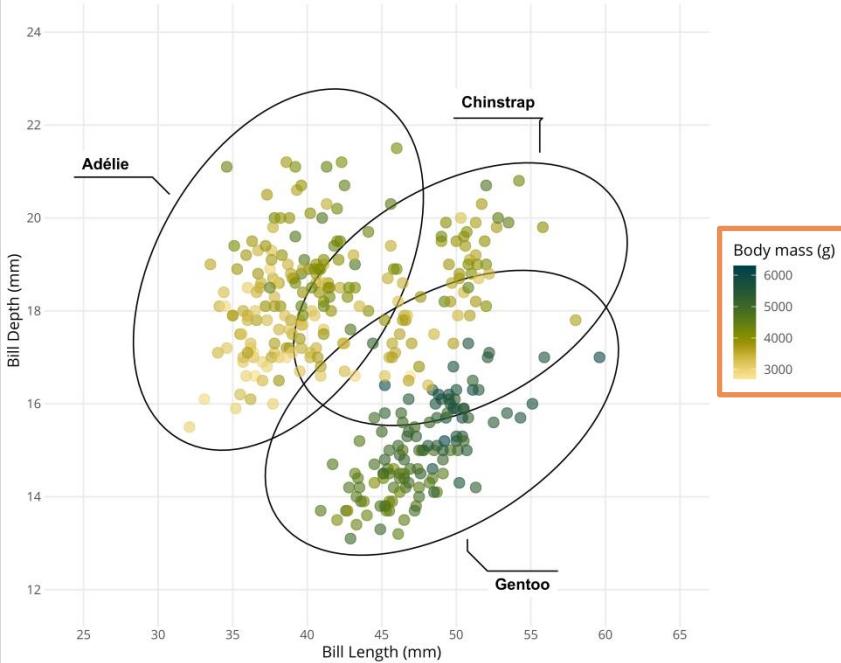
Data: Gorman, Williams & Fraser (2014) *PLoS ONE*

Legend Design

theme(legend.position = 'right') *Default*

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

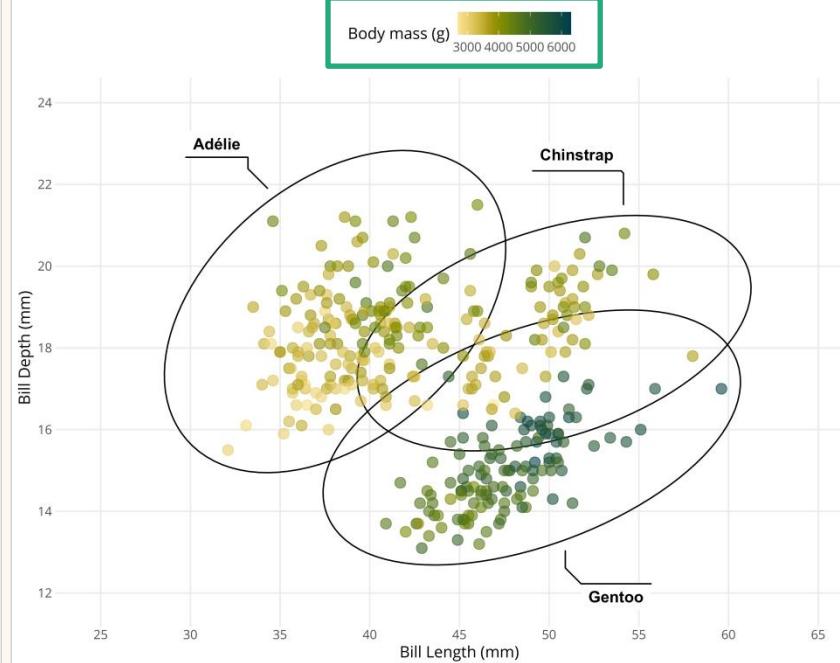
A scatter plot of bill depth versus bill length.



Well...
theme(legend.position = 'plot')

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



Legend Design

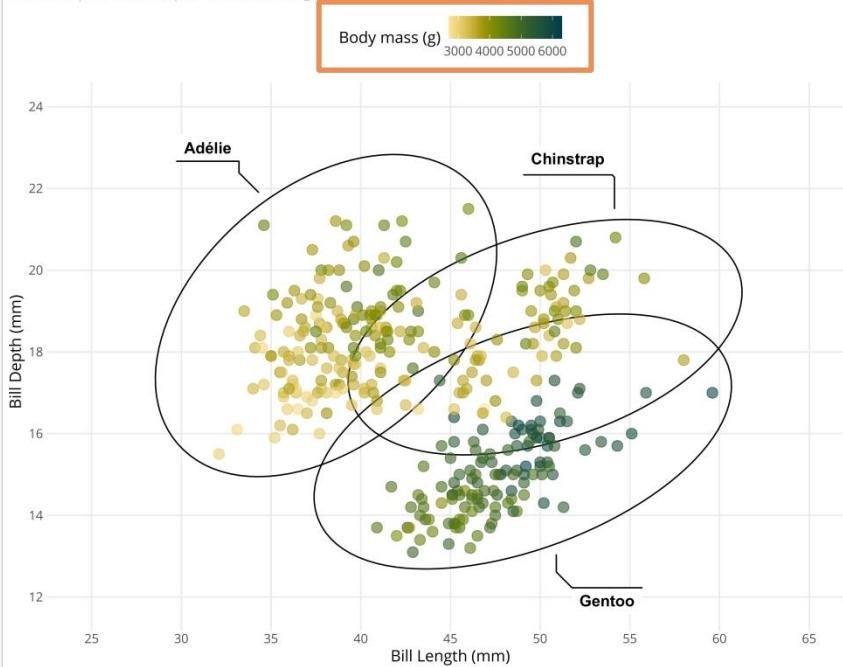
Default

```
guides(color = guide_colorbar(title.position = 'top', title.hjust = .5,
                                barwidth = unit(20, 'lines'), barheight = unit(.5, 'lines')))
```

Better!

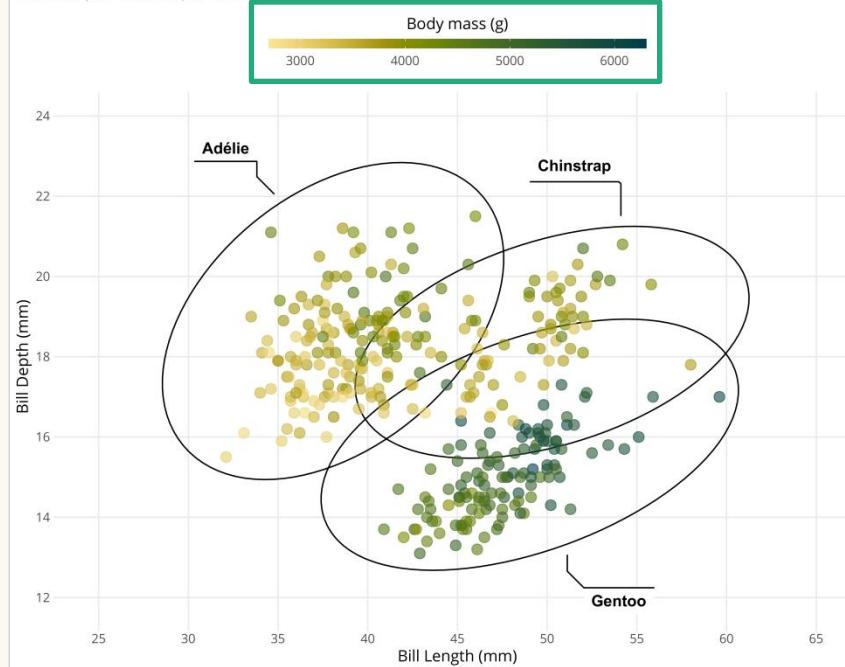
Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



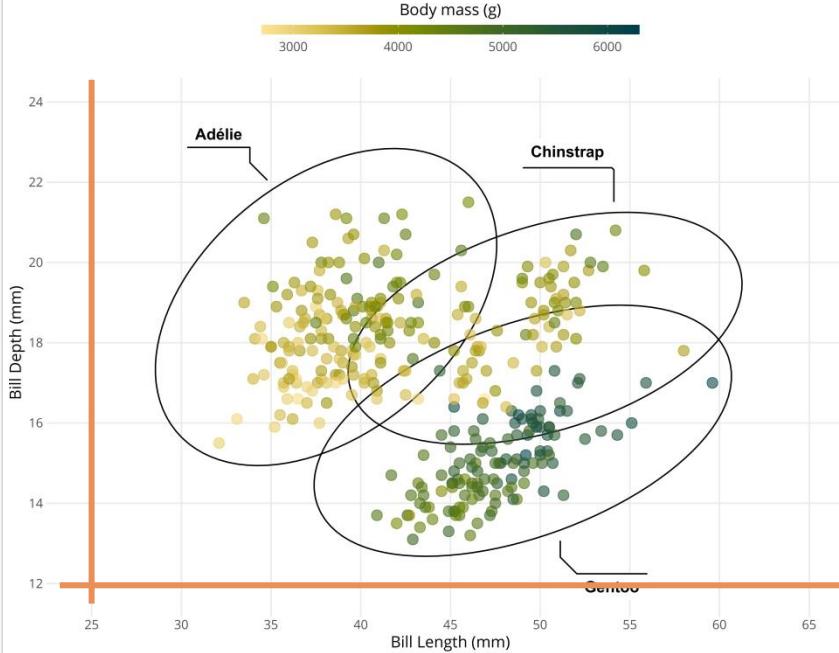
Limit Expansion

`coord_cartesian(expand = TRUE)`

Default

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.

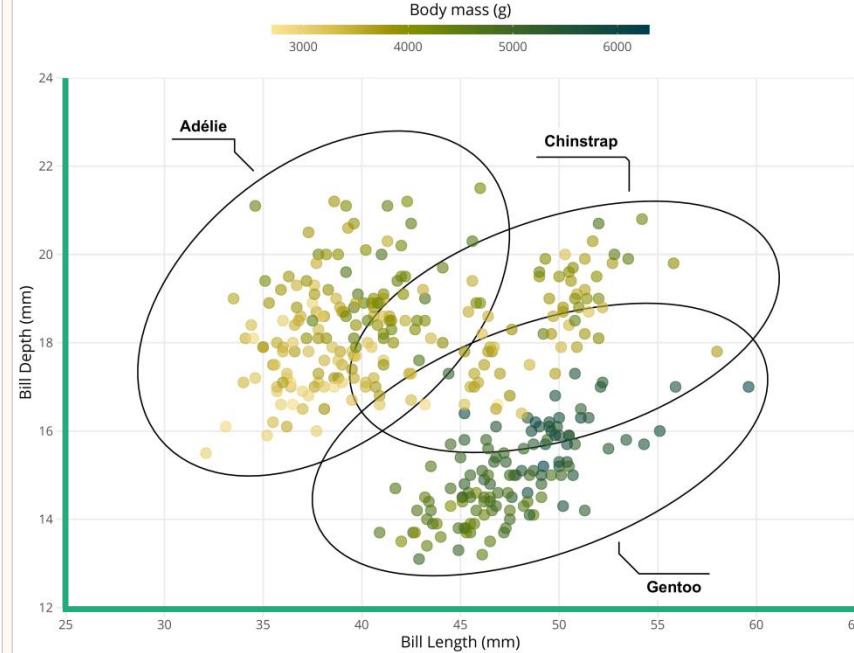


`coord_cartesian(expand = FALSE)`

Without

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



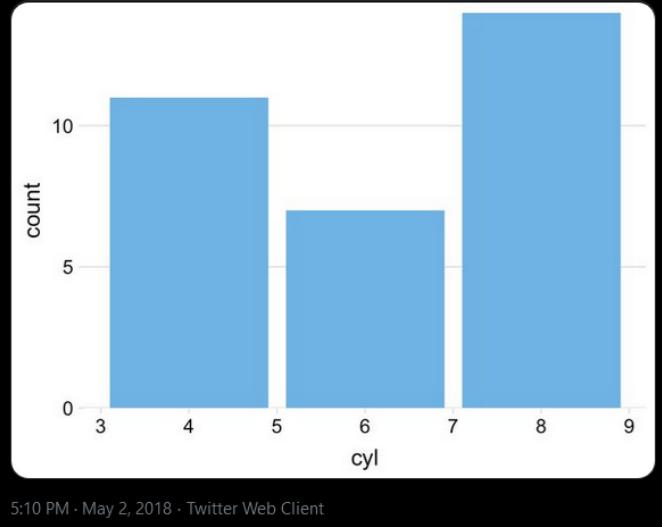
Geeky Details



Claus Wilke
@ClausWilke

Replies to @thomas85 and @hrbrmstr

This kind of stuff just really gets me. One of the main reasons I was motivated to add clip = "off" is plots like the attached, which look terrible in my opinion.



5:10 PM · May 2, 2018 · Twitter Web Client



gvdr @ipnosimmia · May 2, 2018

Replies to @ClausWilke @thomas85 and @hrbrmstr

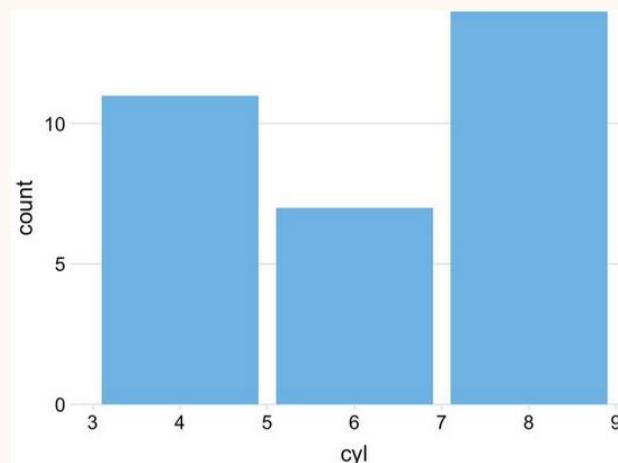
I must admit my limits. I can't see any difference between incorrect and correct. May I ask you to spell it out? (here to learn!)



1



2



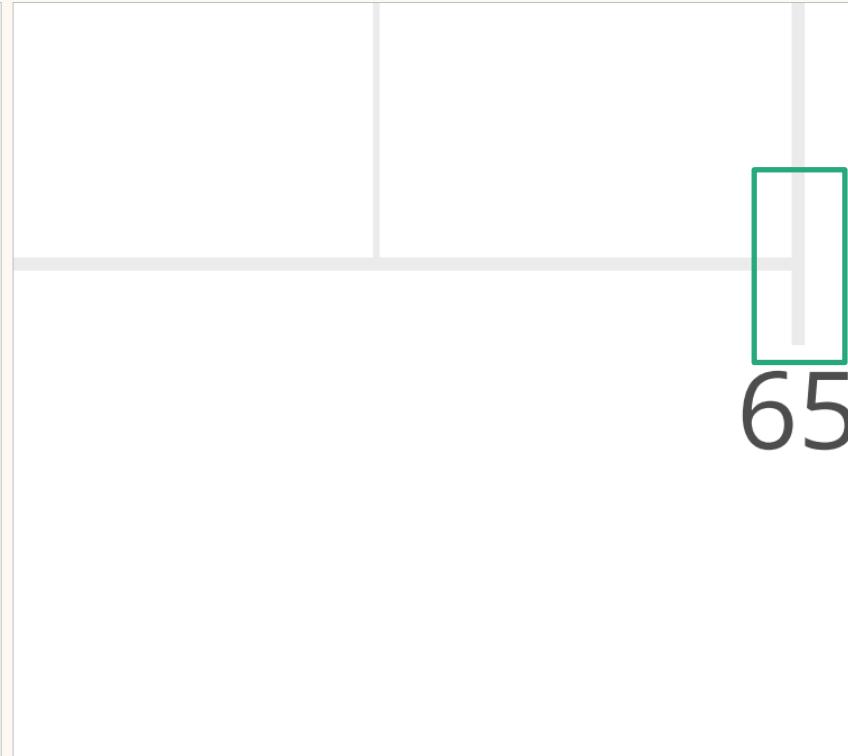
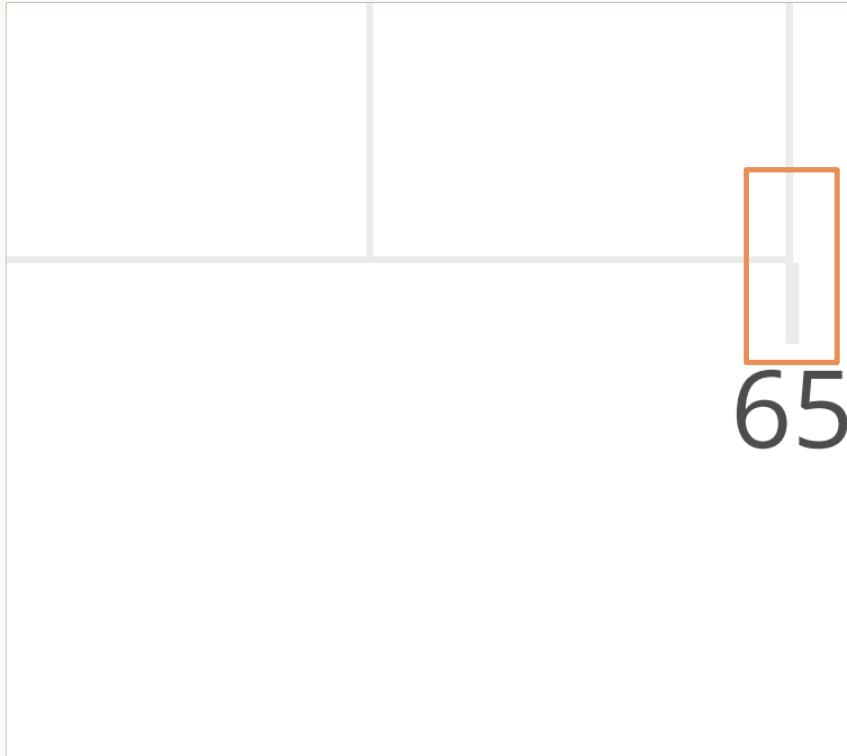
Geeky Details

`coord_cartesian(clip = 'on')`

Default

Without

`coord_cartesian(clip = 'off')`



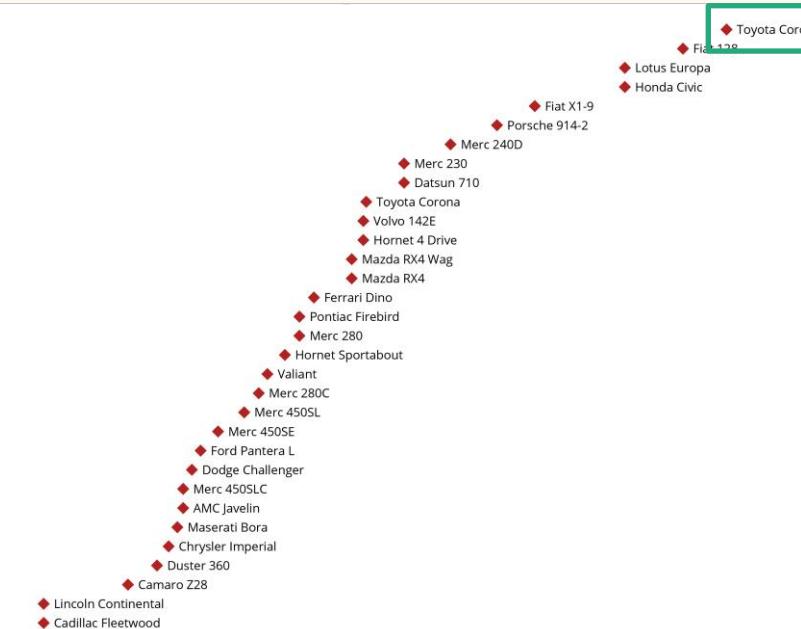
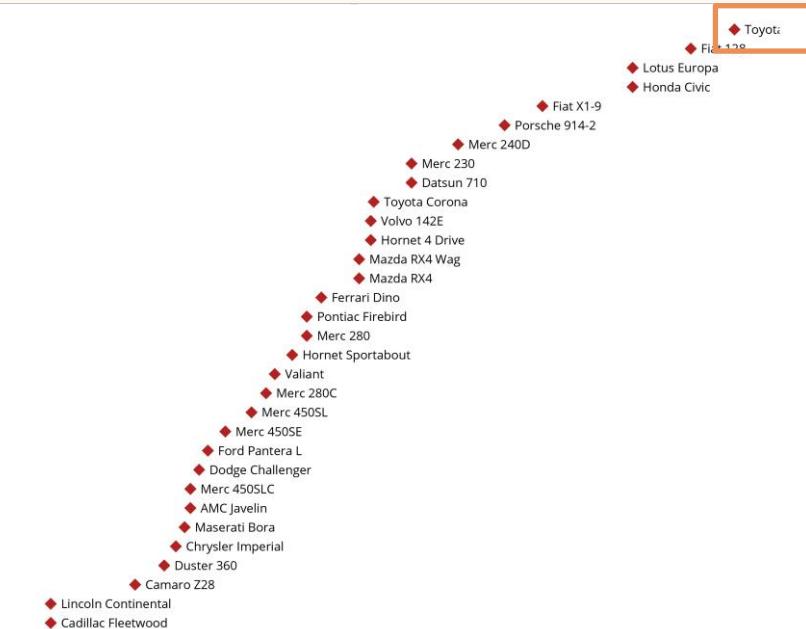
Geeky Details

```
coord_cartesian(clip = 'on')
```

Default

Without

```
coord_cartesian(clip = 'off')
```



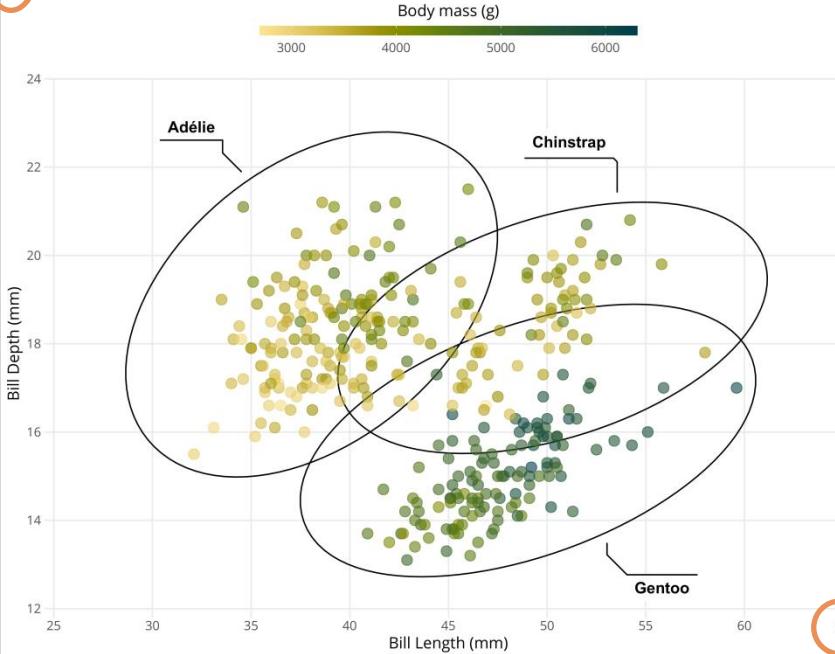
White Space

```
theme(plot.margin = margin(rep(base_size/2, 4)))
```

Default

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.

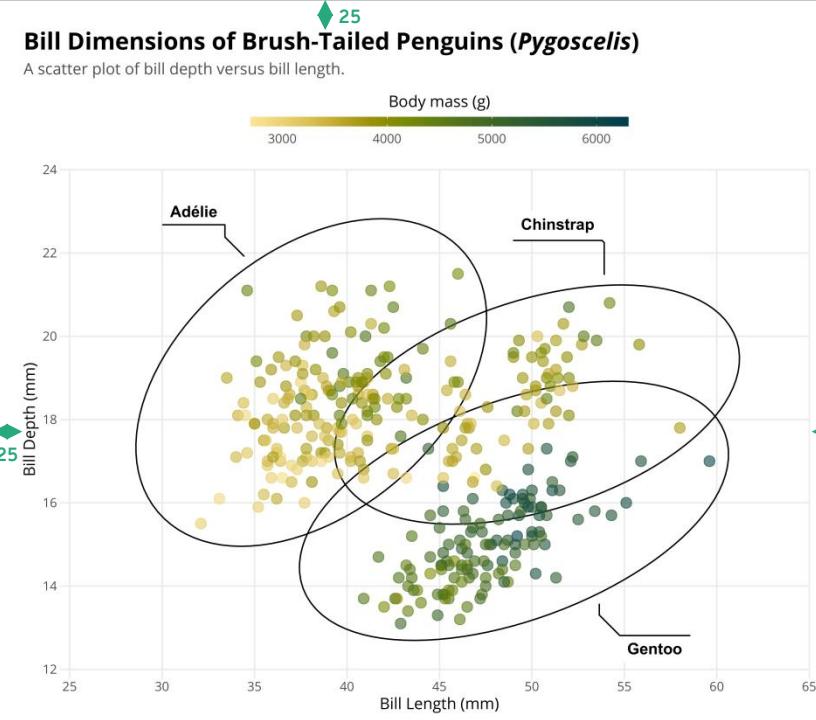


```
theme(plot.margin = margin(25, 25, 10, 25))
```

Better

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.

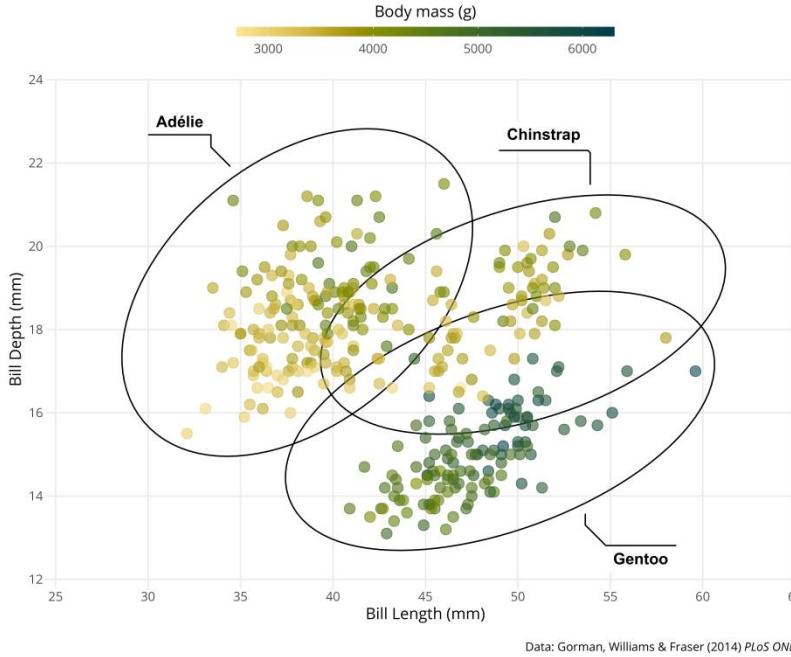


Adding Images

```
png <- magick::image_read("https://raw.githubusercontent.com/allisonhorst/.../culmen_depth.png")
img <- grid::rasterGrob(png, interpolate = TRUE)
annotation_custom(img, ymin = 22, ymax = 31, xmin = 55, xmax = 65.5)
```

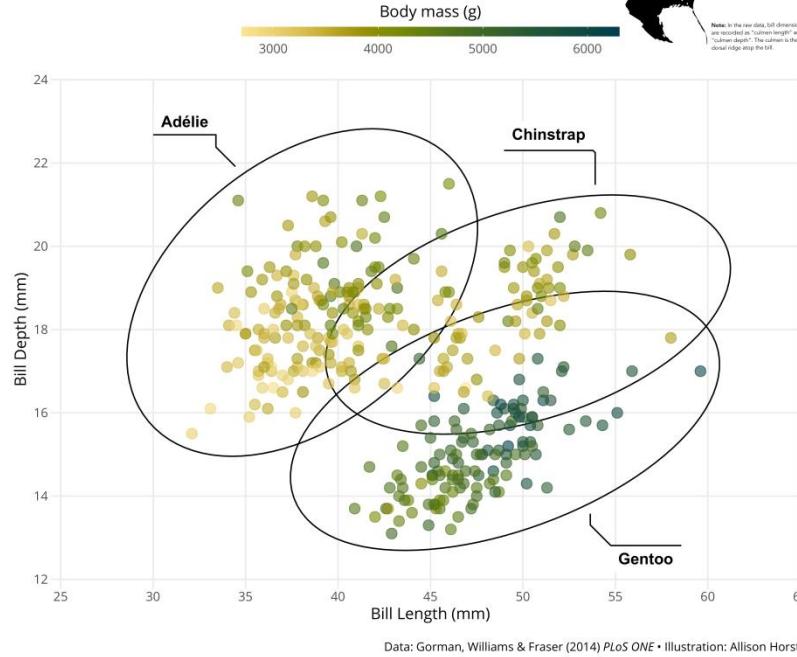
Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



{patchwork}

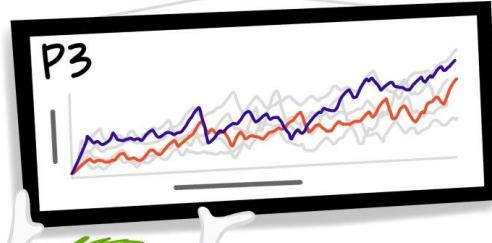
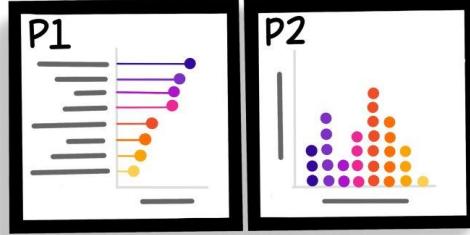
The Composer of ggplots



patchwork.data-imaginist.com

patchwork

Combine + arrange
your ggplots!

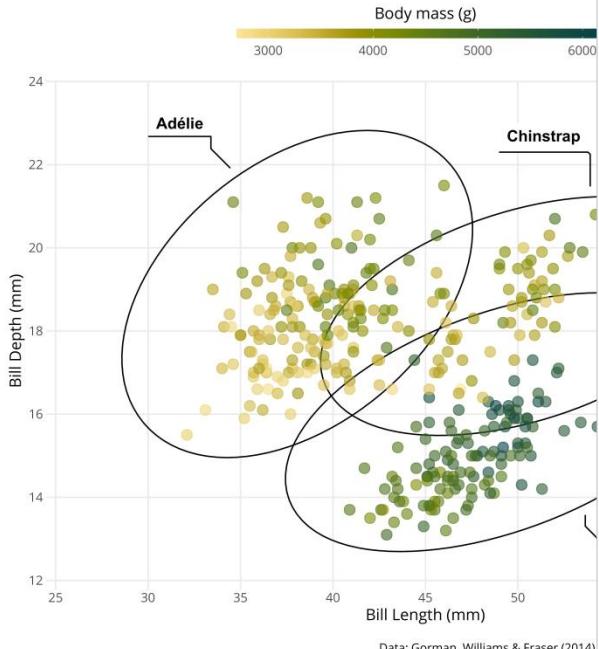


Artwork by Allison Horst

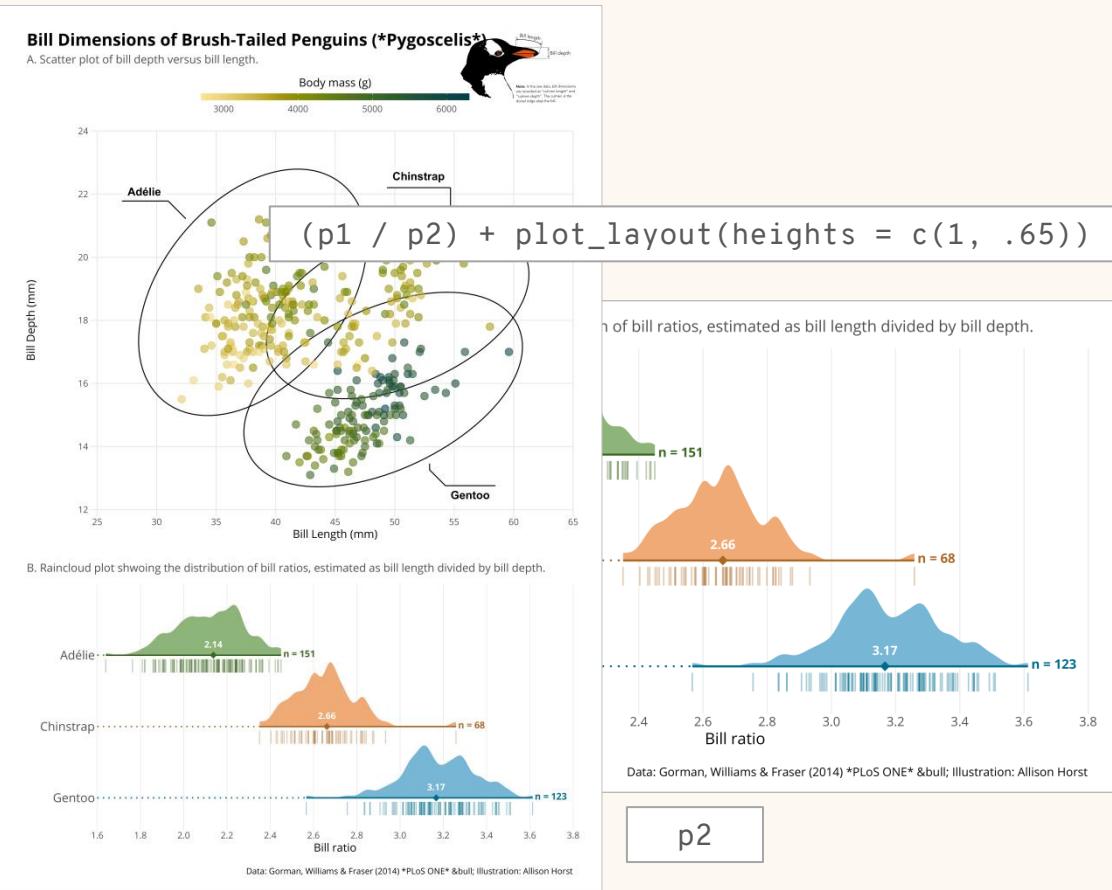
{patchwork} The Composer of ggplots

Bill Dimensions of Brush-Tailed Penguins (*Pygoscelis*)

A scatter plot of bill depth versus bill length.



p1



```
ggtitle('*Pygoscelis*') + theme(plot.title = element_markdown())
```



```
theme(plot.position = 'plot')
```

```
theme(legend.position = 'top') +  
  guide(color = guide_colorbar())
```

```
theme(plot.margin = margin(t, r, b, 1))
```

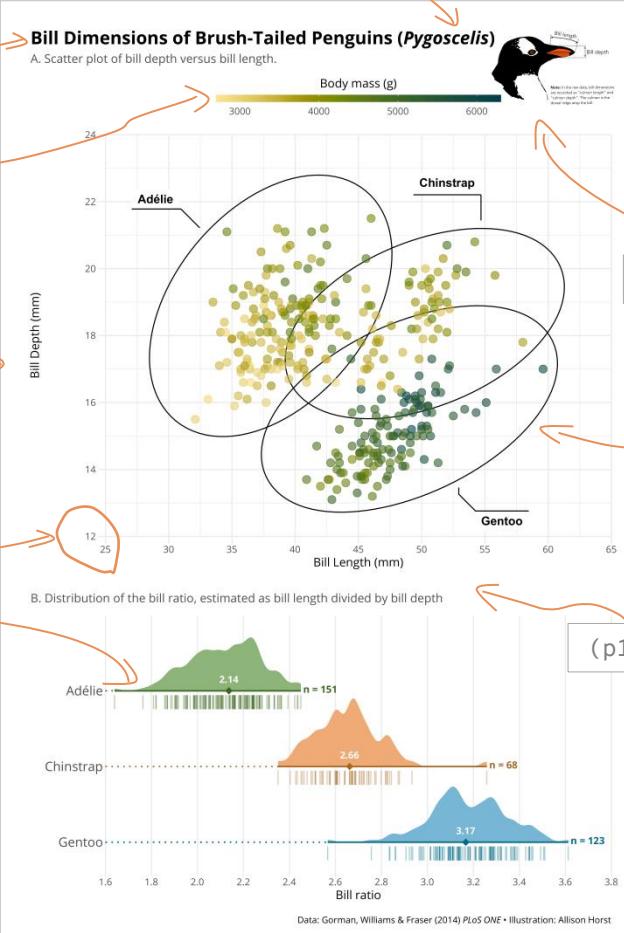
```
coord_cartesian(expand = c(0, 0),  
  clip = 'off')
```

```
ggdist::stat_halfeye()
```



Palmer Penguins

github.com/allisonhorst/palmerpenguins



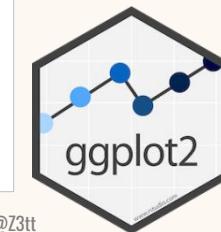
```
annotation_custom(grid::rasterGrob(img))
```



```
ggforce::geom_mark_*
```



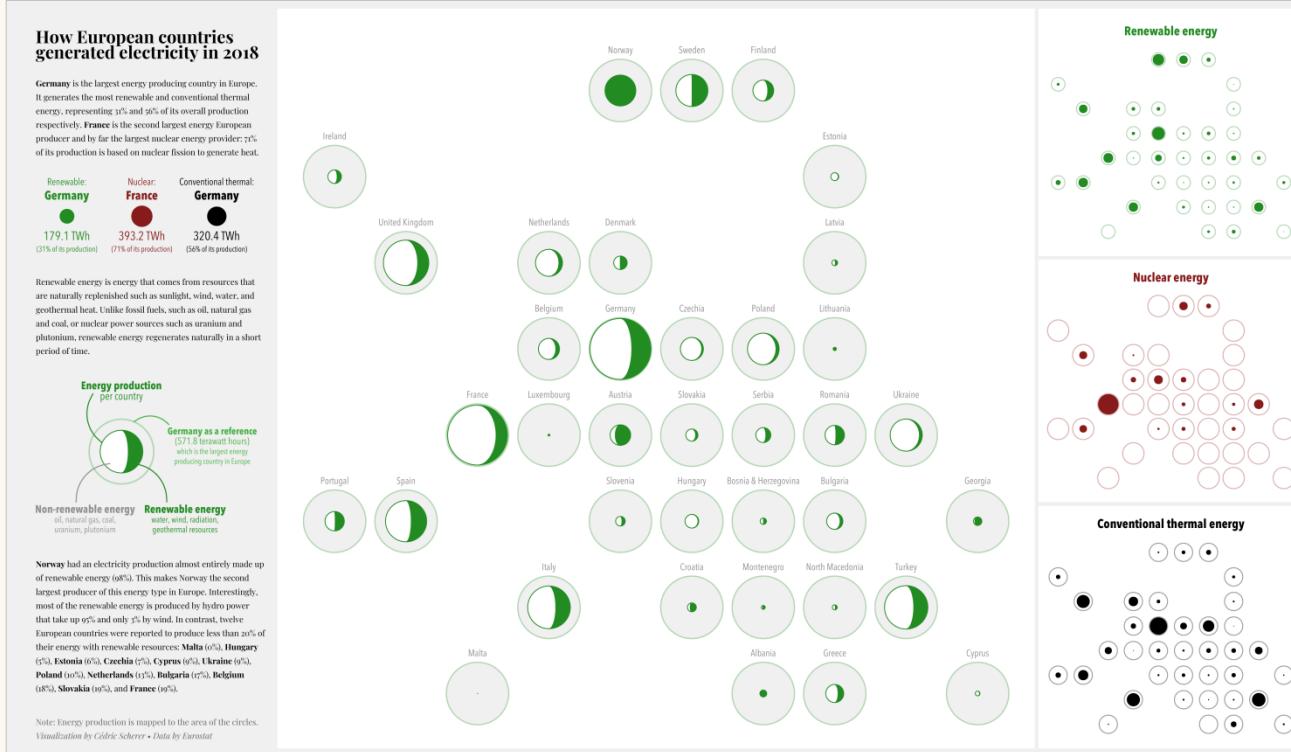
```
(p1 / p2) + plot_layout(heights = c(1, .65))
```



ggplot2

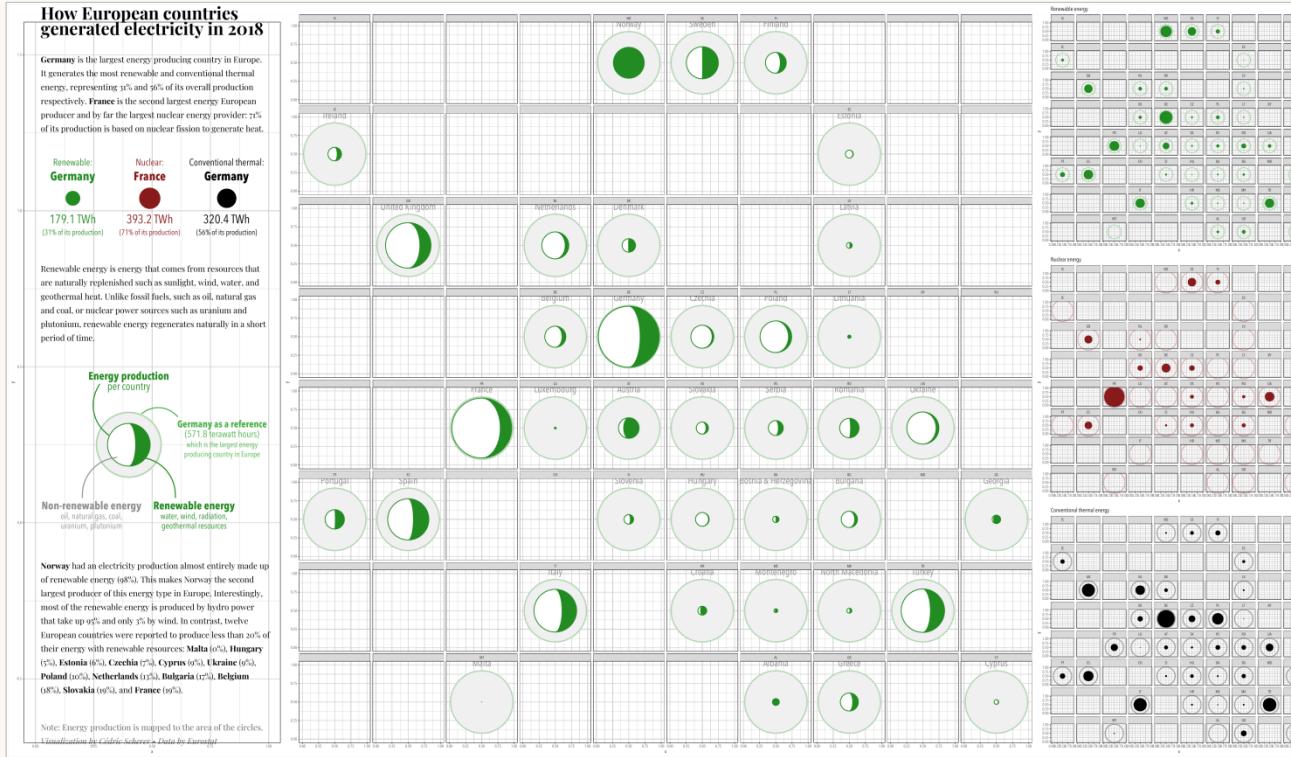
ggplot2.tidyverse.org

{patchwork} The Composer of ggplots



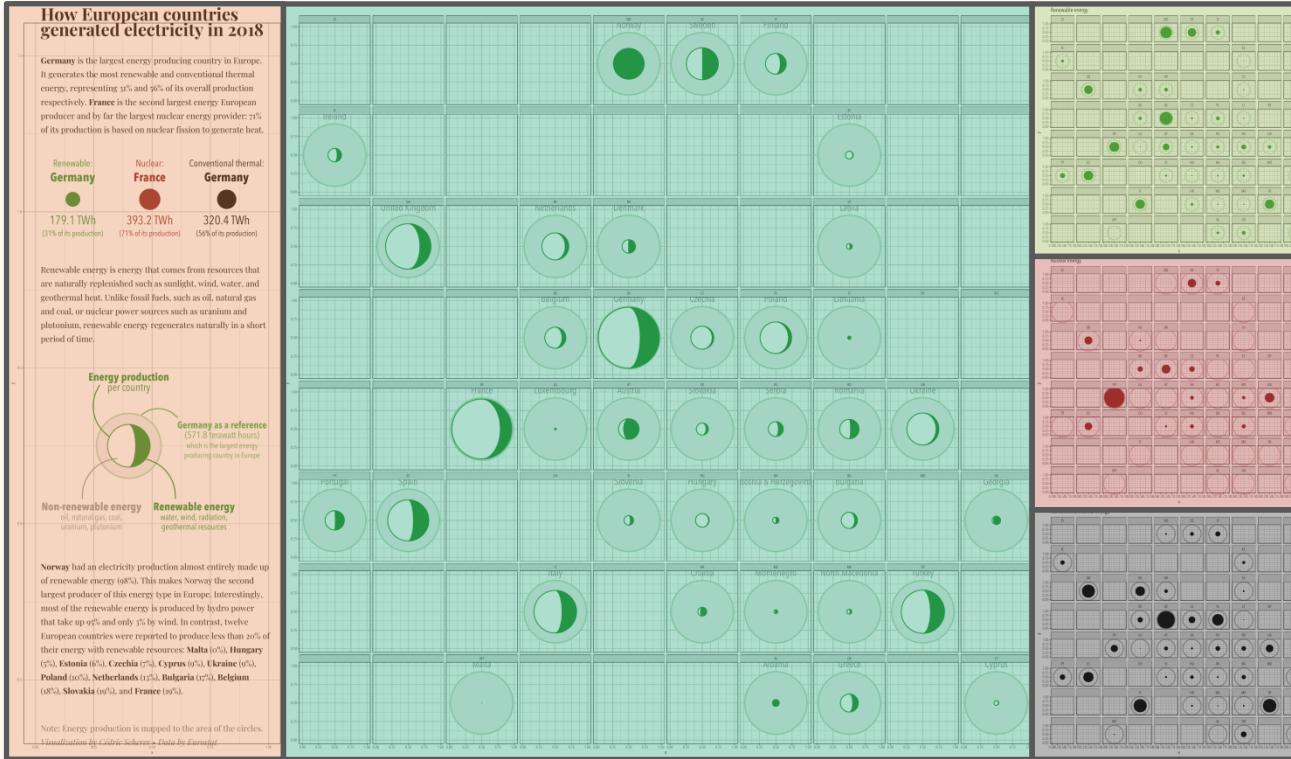
{patchwork} The Composer of ggplots

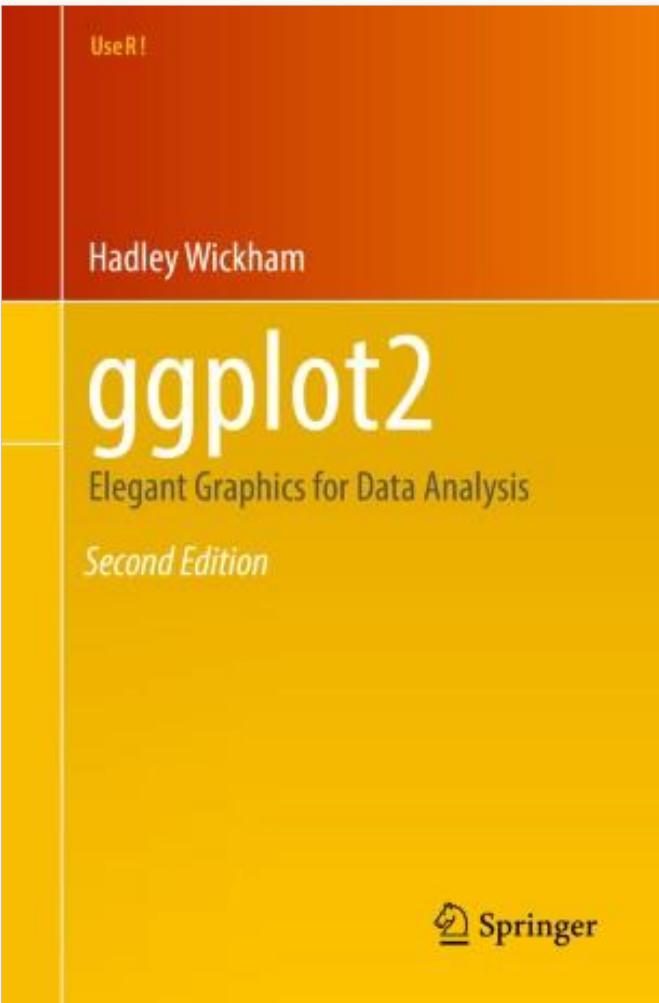
legend | main | (renewable / nuclear / thermal) + plot_layout(widths = c(.35, 1, .35))



{patchwork} The Composer of ggplots

legend | main | (renewable / nuclear / thermal) + plot_layout(widths = c(.35, 1, .35))





The image is a screenshot of the R Graph Gallery website. At the top, there is a navigation bar with links for "CHART TYPES", "QUICK", "TOOLS", "ALL", "D3.JS", "PYTHON", "DATA TO VIZ", and "ABOUT". Below the navigation bar, the text "The R Graph Gallery" is centered, followed by social media sharing icons for Twitter, GitHub, LinkedIn, and others. A welcome message from the site's creator is present, encouraging users to explore the gallery and provide feedback. The main content area is organized into several sections, each featuring a grid of circular thumbnails representing different types of charts. The sections include "Distribution", "Correlation", "Ranking", and "Part of a whole". Each section contains five thumbnails, each showing a different type of chart such as a violin plot, density plot, histogram, boxplot, or word cloud.

CHART TYPES QUICK TOOLS ALL D3.JS PYTHON DATA TO VIZ ABOUT

The R Graph Gallery

Welcome to the R graph gallery, a collection of charts made with the [R programming language](#). Hundreds of charts are displayed in several sections, always with their reproducible code available. The gallery makes a focus on the tidyverse and [ggplot2](#). Feel free to suggest a chart or report a bug; any feedback is highly welcome. Stay in touch with the gallery by following it on [Twitter](#) or [Github](#). If you're new to R, consider following this [course](#).

Distribution

Violin Density Histogram Boxplot Ridgeline

Correlation

Scatter Heatmap Correlogram Bubble Connected scatter Density 2d

Ranking

Barplot Spider / Radar Wordcloud Parallel Lollipop Circular Barplot

Part of a whole

CÉDRIC SCHERER

Data Visualization & Computational Ecology

MY PERSONAL DATA VISUALIZATION YEAR 2020

Even though it was a crazy and exhausting year, there was also some good and exiting things happening. Therefore I've decided to take a short break on New Year's Day and look back at some of the positive moments of my personal data visualization journey during 2020.

POSTED BY CÉDRIC FRIDAY, JANUARY 1, 2020

WHAT DO I BINGE NEXT? A DETAILED OVERVIEW OF THE TOP 250 TV SHOWS

My contribution to the RStudio table contests visualizing relevant details of the top 250 TV shows as rated by IMDB users. I focused on displaying all the details I and my friends care about including in-line visualizations of rating trends and average runtime.

POSTED BY CÉDRIC SUNDAY, NOVEMBER 1, 2020

THE WORST DAYS OF THE CORONAVIRUS PANDEMIC SO FAR

Coronavirus SARS-CoV-2, COVID-19 or simply Corona—what started as an epidemic in China has become a global pandemic. I created an animated timeseries of daily deaths relative to each country's worst day so far to visualize the first wave of COVID-19.

POSTED BY CÉDRIC TUESDAY, MARCH 31, 2020

COMPARING THE EXTENT OF THE AUSTRALIAN BUSHFIRES 2019/20

The massive bushfires in Australia are in the news worldwide. The incredible extent of burnt land and plume of smoke is hard to imagine so I have compared the areas to countries in Europe and worldwide.

POSTED BY CÉDRIC THURSDAY, JANUARY 9, 2020

BEST TIDYTUESDAY 2019

Here are my favorite visualizations of the #TidyTuesday challenge in 2019 (from those I've seen and which I remember). I present my personal top 3 in terms of design and storytelling.

POSTED BY CÉDRIC MONDAY, DECEMBER 30, 2019

MERRY (WHITE?) CHRISTMAS!

At the end of the year, I explore the history of snow cover and white Christmas in Berlin. I wish you a merry Christmas and wonderful holidays 2019!

POSTED BY CÉDRIC TUESDAY, DECEMBER 24, 2019

OLDER POSTS →



ABOUT ME

Always coding. Passionate about design. Worried about nature. Proud dad.



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ggplot Wizardry: My Favorite Tricks and Secrets for Beautiful Plots in R

[Slides](#) [Handson](#) [Recording](#) [Beamer](#) [PDF](#) [HTML](#)

Slides and hands-on codes for my talk at the 1st OutlierConf, February 4-7 2021.



ggplot Wizardry

My Favorite Tricks and Secrets for Beautiful Plots in R

Dr. Cédric Scherer
@cedricscherrer, Data Scientist, LinkedIn



Outlier

Talk Resources:

- Slides
- Recording
- Hands-On Tutorial
- Codes

Bonus: Extended version

- Slides from the usR! Oslo meeting on March 24, 2021

About the talk:

In this talk, I present my favorite tips and tricks with regard to the `ggplot2` package, a library for plotting in the programming language R. I will cover functions that are helpful but many may not be aware of as well as a collection of interesting functions from a large range of extension packages.

The talk is intended for people who already know how to code in R and `ggplot2`. However, I am going to cover a diverse collection of tips so I hope everyone can pick something helpful independent from their level of expertise.

TUTORIAL

SLIDES FROM TODAY





Thank you!

[DATAVIS](#) [TUTORIAL](#) [TOYVERSE](#) [GGPLOT2](#)

A GGPLOT2 TUTORIAL FOR BEAUTIFUL PLOTTING IN R

POSTED BY CÉDRIC ON MONDAY, AUGUST 5, 2013

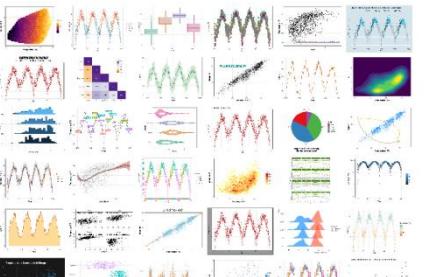
Last update: 2020-12-07

INTRODUCTORY WORDS

I don't care, just show me the content!

Back in 2016, I had to prepare my PhD introductory talk and I started using [\(ggplot2\)](#) to visualize my data. I never liked the syntax and style of base plots in R, so I was quickly in love with ggplot. Especially useful was its faceting utility. But because I was short on time, I plotted these figures by trial and error and with the help of lots of googling. The resource I came always back to was a blog entry called [Beautiful plotting in R: A ggplot2 cheatsheet](#) by Zev Ross, updated last in January 2016. After giving the talk which contained some decent plots thanks to the blog post, I decided to go through this tutorial step-by-step. I learned so much from it and directly started modifying the codes and over the time I added additional code snippets, chart types and resources.

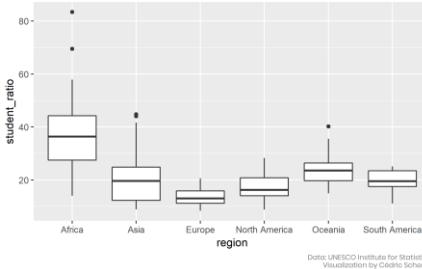
Since the blog entry by Zev Ross was not updated for some years and step by step this became a unique version of a tutorial, I decided to host the updated version on my GitHub. Now it finds its proper place on this homepage! (Plus I added a ton of other updates—just to name a few: The fantastic [\(patchwork\)](#), [\(ggttext\)](#) and [\(ggeforce\)](#) packages. How to deal with custom fonts and colors. A collection of R packages tailored to create interactive charts. And several other chart types including pie charts because everyone looooves pie charts!)


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THE EVOLUTION OF A GGPLOT (EP. I)

POSTED BY CÉDRIC ON FRIDAY, MAY 17, 2019

The Evolution of a ggplot



- Aim of this Tutorial
- Data Preparation
- The Default Boxplot
- Sort Your Data!
- Let Your Plot Shine—Get Rid of the Default Settings
- The Choice of the Chart Type
- More Geoms, More Fun, More Info!
- Add Text Boxes to Let The Plot Speak for Itself
- Bonus: Add a Tile Map as Legend
- The Final Evolved Visualization
- Complete Code for Final Plot
- Post Scriptum: Mean versus Median

AIM OF THIS TUTORIAL

In this series of blog posts, I aim to show you how to turn a default ggplot into a plot that visualizes information in an appealing and easily understandable way. The goal of each blog post is to provide a step-by-step tutorial explaining how my visualization have evolved from a typical basic ggplot. All plots are going to be created with 100% [\(ggplot2\)](#) and 0% Inkscape.

In the first episode, I transform a basic boxplot into a colorful and self-explanatory combination of a jittered dot strip plot and a lollipop plot. I am going to use [data](#) provided by the UNESCO on global student to teacher ratios that was selected as data for the #TidyTuesday challenge 19 of 2019.

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Thank you!