How to Choose a Chart

A Statistically Motivated Guide

Andy Grogan-Kaylor

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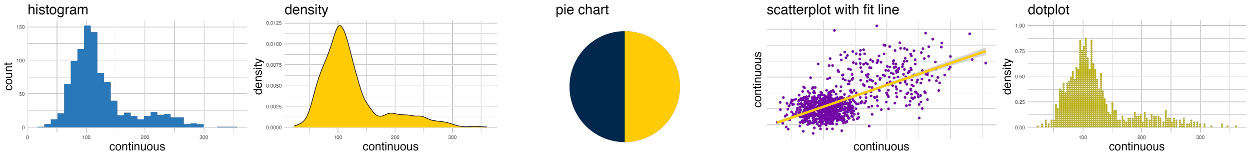
```r
library(ggplot2) # beautiful graphs

library(ggthemes) # nice themes for ggplot2

library(ggbeeswarm) # helpful 'beeswarm' geometry

library(ggdist) # 'distribution' geometries

library(cowplot) # arrange graphs
```

```

Attaching package: 'cowplot'

The following object is masked from 'package:ggthemes':

    theme_map
```

```r
library(pander) # nice tables
```



1 How to Choose a Chart

Choosing the right chart to represent your data can be a daunting process. I believe that a *starting point* for this thinking is some basic statistical thinking about the *type* of variables that you have. At the broadest level, variables may be conceptualized as *categorical* variables, or *continuous* variables.

- *categorical variables* represent unordered categories like *gender*, or *religious affiliation*.
- *continuous variables* represent a continuous scale like a *mental health scale*, or a *measure of neighborhood quality*.

Once we have discerned the type of variable that have, there are two followup questions we may ask before deciding upon a chart strategy:

- Is our graph about **one thing at a time**?
  - How much of *x* is there?
  - What is the distribution of *x*?
- Is our graph about **two things at a time**?
  - What is the relationship of *x* and *y*?
  - How are *x* and *y* associated?

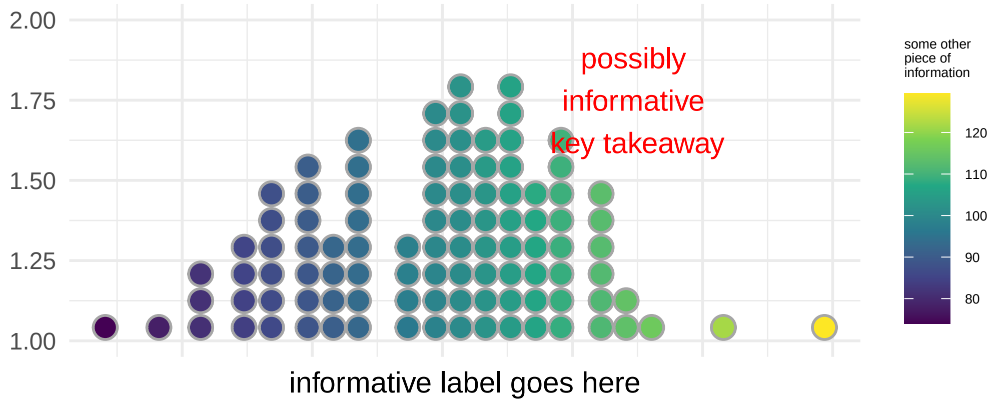
2 A Few Notes

2.1 A Note About Graph Labels

Graphs should have clear titles and labels.

Informative Title

Maybe The Title Is Even Your Main Takeaway



Words should be spelled out.
Every extra 'dimension' (axes, color, shape) should convey information.

2.2 A Note About Software

The principles of graphing discussed in this document transcend any particular software package, and could be implemented in many different software packages, such as SPSS, SAS, Stata, or R.

The graphs in these particular examples use ggplot2, a graphing library in R. `ggplot2` graph syntax can be formidably complex, with a steep learning curve. More information about ggplot can be found here.

2.3 A Note About The Code In This Document

Note that ggplot2 can be MUCH simpler than these examples make it look.

For example,

`ggplot(mydata, aes(x = x)) + geom_histogram()`

will produce a perfectly serviceable histogram.

Much of the complication of the code in this document is simply the result of formatting tweaks to get the graphs *EXACTLY* the way I wanted them.

Observe also, that for layout purposes, I am reading each ggplot call into an object, e.g.

`p1 <- ggplot(mydata, aes(x = x)) + geom_histogram()`

so that I can later use `plot_grid` to lay out the graphs.

In your own work, you do not need to do this, and it may be simpler to simply say:

`ggplot(...) + ...`

2.4 A Note About Graph Colors

This document uses colors based upon official University of Michigan colors. Using colors that match the design scheme of your organization may be helpful.

```
# michigan colors

michigan_colors=c("#00274c", # blue
                  "#ffcb05", # maize
                  "#a4270b", # tappan red
                  "#e96300", # ross school orange
                  "#beb300", # wave field green
                  "#21c1bc", # taubman teal
                  "#2878ba", # arboretum blue
                  "#7207a5") # ann arbor amethyst

# name individual colors
```

```r
michigan_blue <- "#00274c"

michigan_maize <- "#ffcb05"

tappan_red <- "#a4270b"

ross_school_orange <- "#e96300"

wave_field_green <- "#beb300"

taubman_teal <- "#21c1bc"

arboretum_blue <- "#2878ba"

ann_arbor_amethyst <- "#7207a5"
```

3 A Simulated Data File of Continuous and Categorical Data

A few randomly selected observations…

	x	y	z	u	v	w	s	q
45	71.39	94.67	120.2	Group A	Group A	Group A	Group 2	91.39
369	123.9	101.5	130.5	Group A	Group B	Group A	Group 2	143.9
284	64.98	101.4	114.3	Group B	Group B	Group A	Group 2	84.98
934	94.54	96.35	117.8	Group B	Group B	Group A	Group 2	114.5
686	127.1	133.3	88.67	Group A	Group A	Group A	Group 2	147.1
514	202.7	172.4	81.52	Group A	Group A	Group B	Group 4	242.7
847	236.1	149.3	109.4	Group B	Group B	Group B	Group 2	256.1
874	103.9	126.6	37.44	Group B	Group B	Group A	Group 1	113.9
606	99.87	104.1	128.4	Group A	Group A	Group A	Group 3	129.9
902	81.91	100.2	95.96	Group B	Group B	Group A	Group 4	121.9

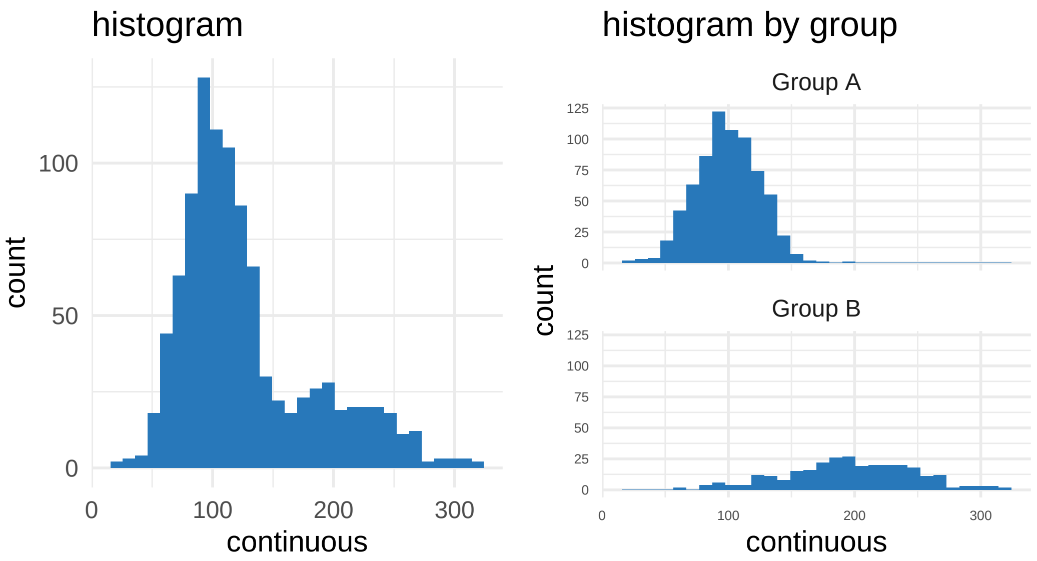
4 One Thing At A Time

Two Things At A Time

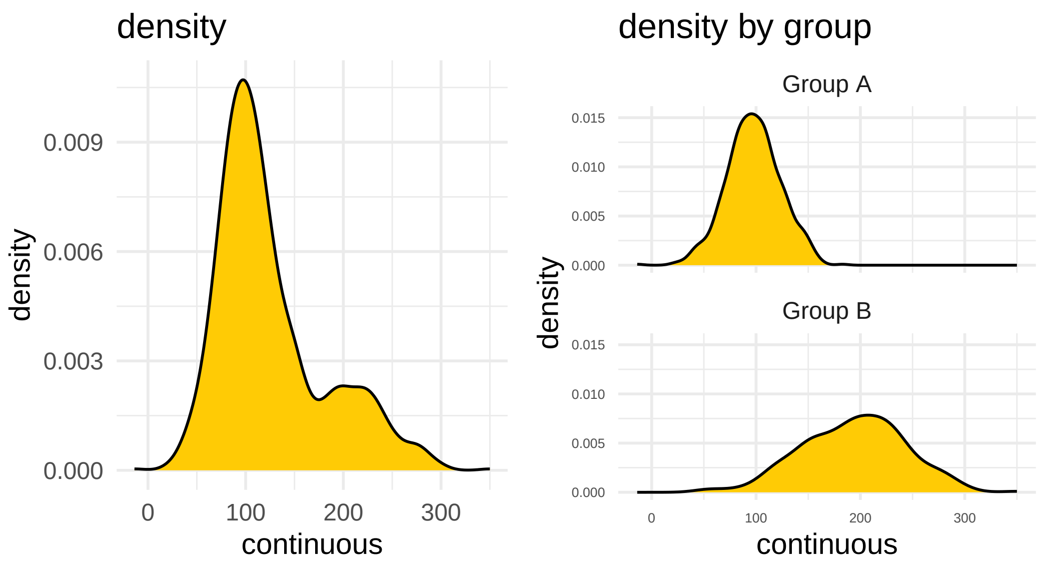
5 Continuous

Continuous By Categorical

```r
my_histogram <- ggplot(mydata, aes(x = x)) +
  geom_histogram(fill = arboretum_blue) +
  ggtitle("histogram") +
  xlab("continuous") + ylab("count") +
  theme_minimal()

my_facet_histogram <- ggplot(mydata, aes(x = x)) +
  geom_histogram(fill = arboretum_blue) +
  facet_wrap(~w, nrow = 2) +
  ggtitle("histogram by group") +
  xlab("continuous") + ylab("count") +
  theme_minimal() +
  theme(axis.text = element_text(size = 5)) # small font size for axis

plot_grid(my_histogram, my_facet_histogram, ncol=2)
```



```
my_density <- ggplot(mydata, aes(x = y)) +
  geom_density(fill = michigan_maize) +
  ggtitle("density") +
  xlab("continuous") + ylab("density") +
  theme_minimal()

my_facet_density <- ggplot(mydata, aes(x = y)) +
  geom_density(fill = michigan_maize) +
  facet_wrap(~w, nrow = 2) +
  ggtitle("density by group") +
  xlab("continuous") + ylab("density") +
  theme_minimal() +
  theme(axis.text = element_text(size = 5)) # small font size for axis

plot_grid(my_density, my_facet_density, ncol = 2)
```

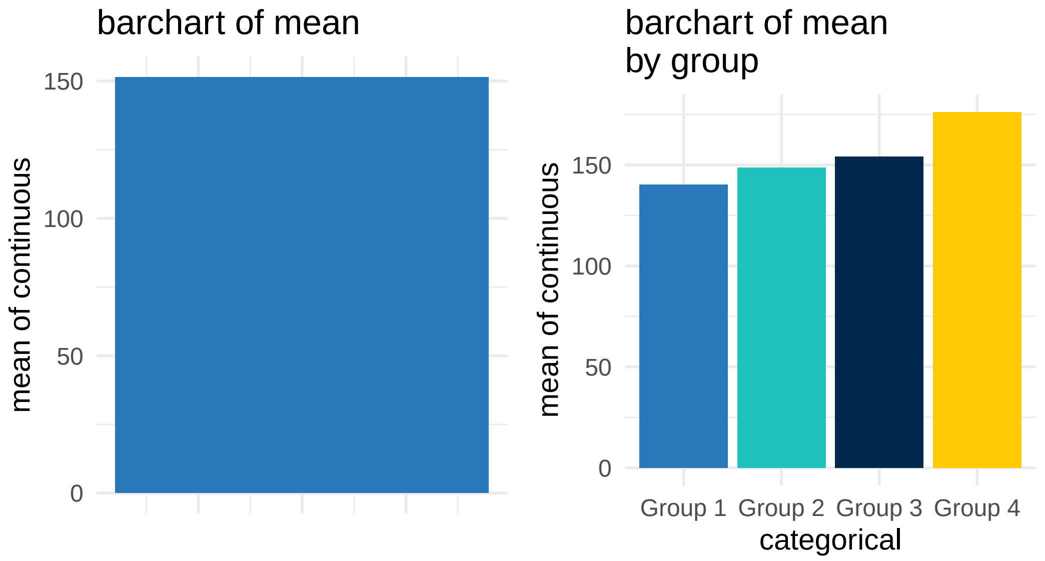


```
my_m_barchart <- ggplot(mydata,
                        aes(x = 1,
                            y = q,
                            fill = factor(1))) +
  stat_summary(fun = mean, geom = "bar") +
  scale_fill_manual(values = c(arboretum_blue)) +
  ggtitle("barchart of mean") +
  guides(fill=FALSE) +
  xlab(" ") +
  ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.ticks.x = element_blank())
```

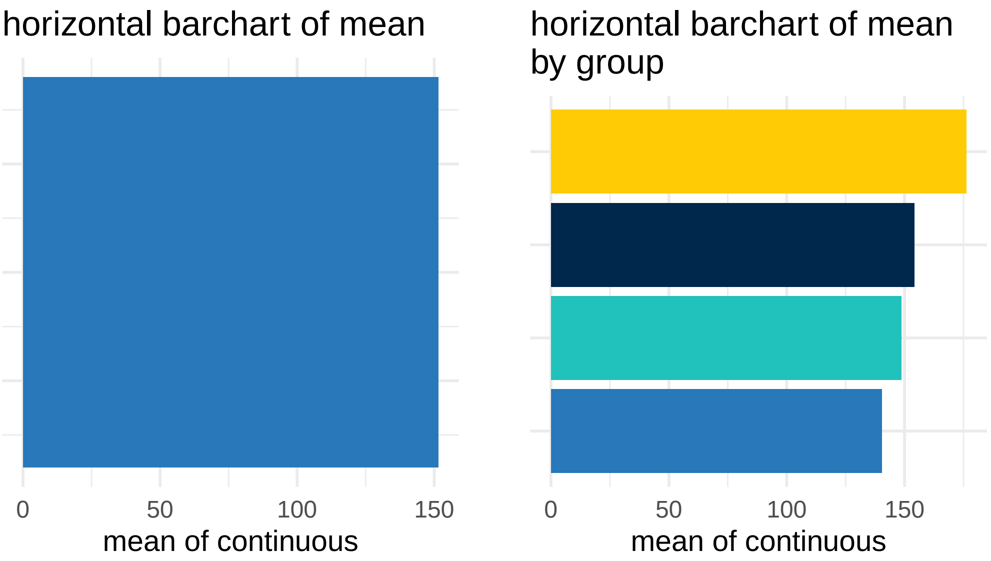
```
Warning: The `<scale>` argument of `guides()` cannot be `FALSE`. Use "none" instead as
of ggplot2 3.3.4.
```

```
my_facet_m_barchart <- ggplot(mydata,
                              aes(x = factor(s),
                                  y = q,
                                  fill = s)) +
  stat_summary(fun = mean, geom = "bar") +
  scale_fill_manual(values = c(arboretum_blue,
                               taubman_teal,
                               michigan_blue,
                               michigan_maize)) +
  ggtitle("barchart of mean \nby group") +
  guides(fill=FALSE) +
  xlab("categorical") + ylab("mean of continuous") +
  theme_minimal()
```

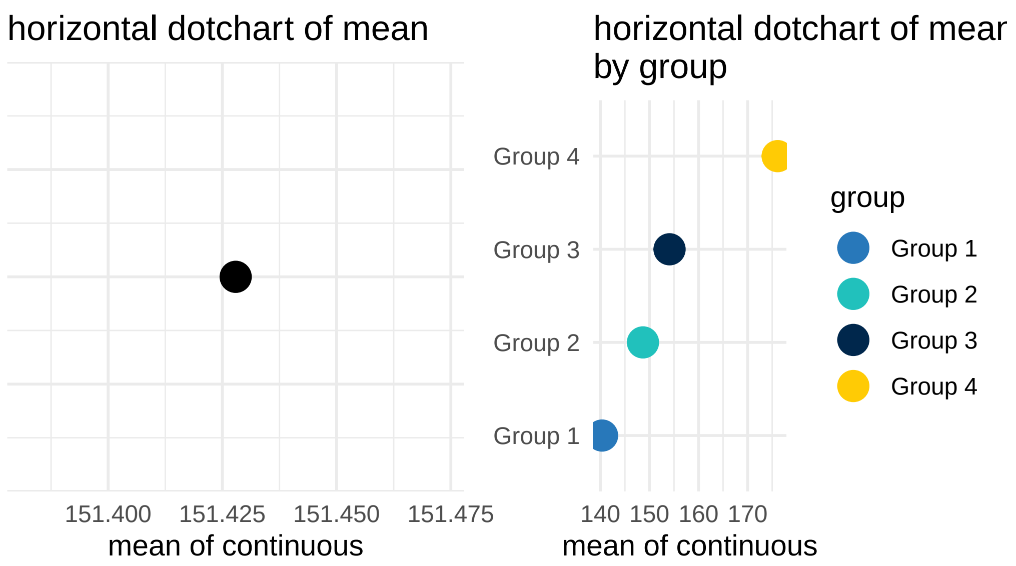
```
plot_grid(my_m_barchart,
          my_facet_m_barchart,
          ncol = 2)
```



```
my_horiz_m_barchart <- ggplot(mydata,
                              aes(x = 1,
                                  y = q,
                                  fill = factor(1))) +
  stat_summary(fun = mean,
               geom = "bar") +
  coord_flip() +
  scale_fill_manual(values = c(arboretum_blue)) +
  ggtitle("horizontal barchart of mean") +
  guides(fill=FALSE) +
  xlab(" ") +
  ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.text.y = element_blank()) +
  theme(axis.ticks.y = element_blank())

my_facet_horiz_m_barchart <- ggplot(mydata,
                                    aes(x = factor(s),
                                        y = q,
                                        fill = s)) +
  stat_summary(fun = mean,
               geom = "bar") +
  coord_flip() +
  scale_fill_manual(values = c(arboretum_blue,
                               taubman_teal,
                               michigan_blue,
                               michigan_maize)) +
  ggtitle("horizontal barchart of mean \nby group") +
  guides(fill=FALSE) +
  xlab(" ") + ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.text.y = element_blank()) +
  theme(axis.ticks.y = element_blank())

plot_grid(my_horiz_m_barchart,
          my_facet_horiz_m_barchart)
```

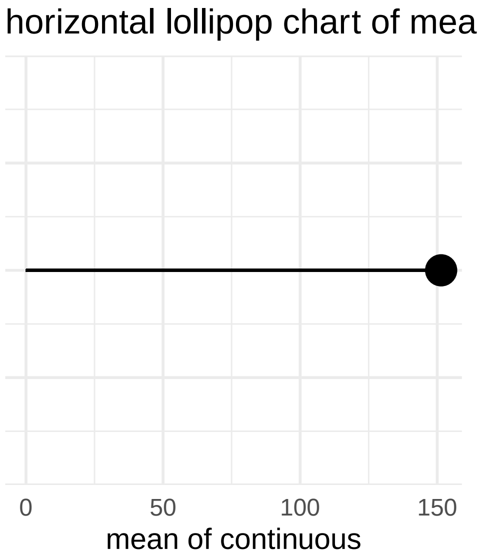


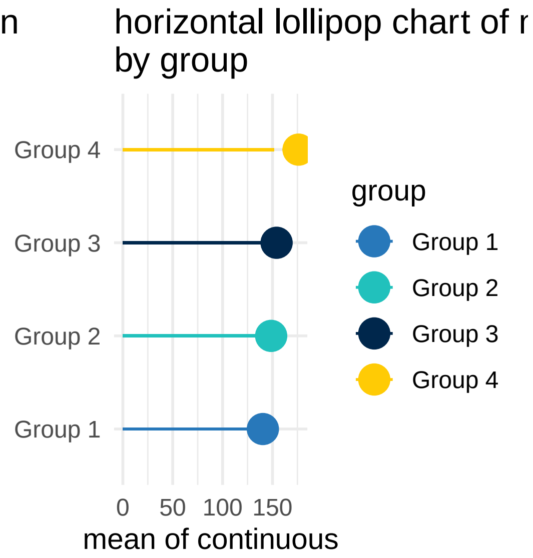
```
my_horiz_m_dotchart <- ggplot(mydata,
                              aes(x = 1,
                                  y = q,
                                  fill = factor(1))) +
  stat_summary(fun = mean,
               geom = "point", size = 5) +
  coord_flip() +
  scale_color_manual(values = c(arboretum_blue)) +
  ggtitle("horizontal dotchart of mean") +
  guides(fill = FALSE) +
  xlab(" ") +
  ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.text.y = element_blank(),
        axis.ticks.y = element_blank())

my_facet_horiz_m_dotchart <- ggplot(mydata,
                                    aes(x = factor(s),
                                        y = q,
                                        color = s)) +
  stat_summary(fun = mean,
               geom = "point",
               size = 5) +
  coord_flip() +
  scale_color_manual(name = "group",
                     values = c(arboretum_blue,
                                taubman_teal,
                                michigan_blue,
                                michigan_maize)) +
  ggtitle("horizontal dotchart of mean \nby group") +
  guides(fill=FALSE) +
  xlab(" ") +
  ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.title.y = element_blank(),
        axis.ticks = element_blank())

plot_grid(my_horiz_m_dotchart,
          my_facet_horiz_m_dotchart)
```



```
my_horiz_m_lollipop_chart <- ggplot(mydata,
                                    aes(x = 1,
                                        y = q,
                                        fill = factor(1))) +
  stat_summary(fun = mean,
               geom = "point",
               size = 5) +
  geom_segment(aes(x = 1,
                   xend = 1,
                   y = 0,
                   yend = mean(q))) +
  coord_flip() +
  scale_color_manual(values = c(arboretum_blue)) +
  ggtitle("horizontal lollipop chart of mean") +
  guides(fill = FALSE) +
  xlab(" ") + ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.text.y = element_blank(),
        axis.ticks.y = element_blank())

my_facet_horiz_m_lollipop_chart <- ggplot(mydata,
                                    aes(x = factor(s),
                                        y = q,
                                        color = s)) +
  stat_summary(fun = mean,
               geom = "point",
               size = 5) +
  geom_segment(aes(x = factor(s),
                   xend = factor(s),
                   y = 0,
                   yend = mean(q))) +
  coord_flip() +
  scale_color_manual(name = "group",
                     values = c(arboretum_blue,
                                taubman_teal,
                                michigan_blue,
                                michigan_maize)) +
  ggtitle("horizontal lollipop chart of mean \nby group") +
  guides(fill=FALSE) +
  xlab(" ") +
  ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.title.y = element_blank(),
        axis.ticks = element_blank())

plot_grid(my_horiz_m_lollipop_chart,
          my_facet_horiz_m_lollipop_chart)
```

```
Warning in geom_segment(aes(x = 1, xend = 1, y = 0, yend = mean(q))): All aesthetics have leng
i Please consider using `annotate()` or provide this layer with data containing
  a single row.
```

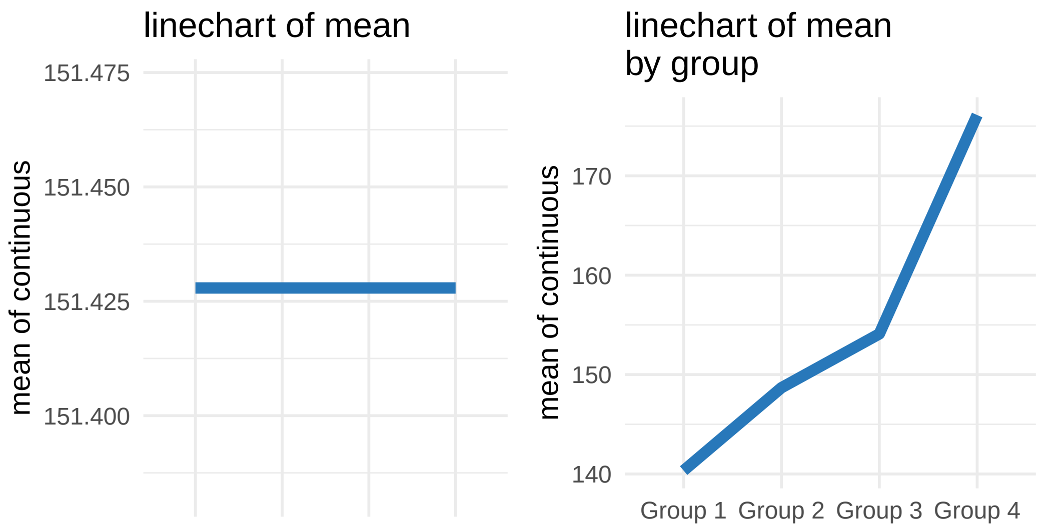




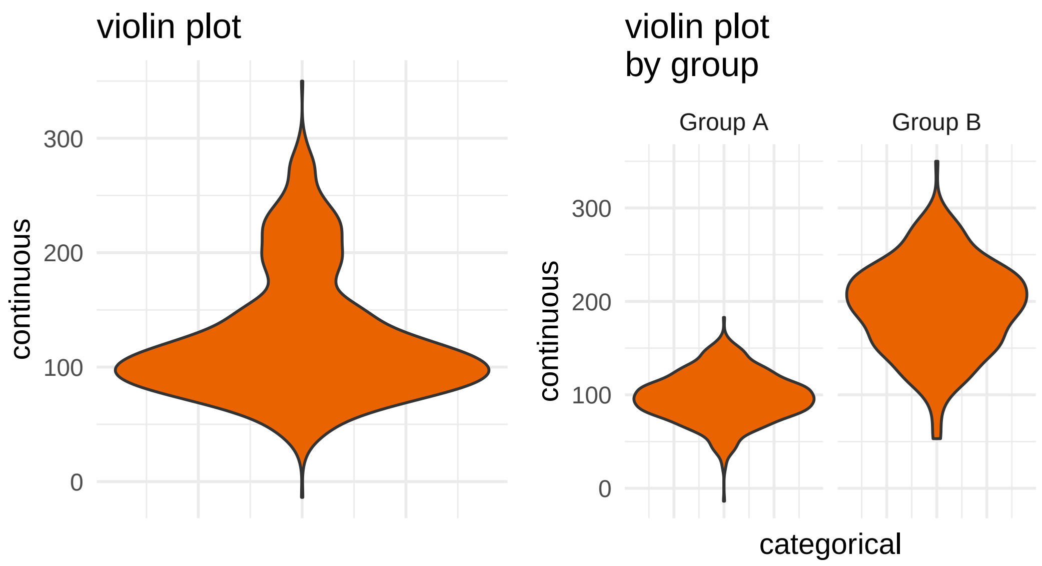
```
my_m_linechart <- ggplot(mydata,
                         aes(x = factor(s),
                             y = mean(q),
                             group = 1)) +
  stat_summary(fun = mean,
               geom = "line",
               size = 2,
               color = arboretum_blue) +
  geom_blank() +
  ggtitle("linechart of mean") +
  xlab(" ") +
  ylab("mean of continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.ticks.x = element_blank())
```

```
Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
i Please use `linewidth` instead.
```

```
my_facet_m_linechart <- ggplot(mydata,
                               aes(x = factor(s),
                                   y = q,
                                   group = 1)) +
  stat_summary(fun = mean,
               geom = "line",
               size = 2,
               color = arboretum_blue) +
  ggtitle("linechart of mean \nby group") +
  xlab(" ") +
  ylab("mean of continuous") +
  theme_minimal()

plot_grid(my_m_linechart, my_facet_m_linechart)
```



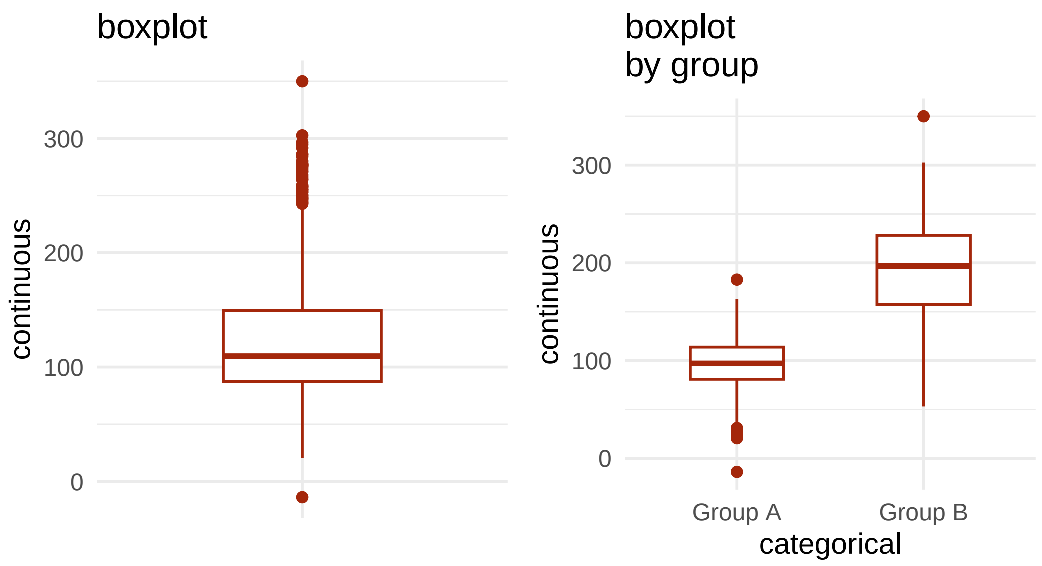
```
my_violin <- ggplot(mydata,
                    aes(x = 1,
                        y = y)) +
  geom_violin(fill = ross_school_orange) +
  ggtitle("violin plot") +
  xlab(" ") +
  ylab("continuous") +
  theme_minimal()  +
  theme(axis.text.x = element_blank()) +
  theme(axis.ticks.x = element_blank())

my_facet_violin <- ggplot(mydata,
                          aes(x = 1,
                              y = y)) +
  geom_violin(fill = ross_school_orange) +
  facet_wrap(~w,
             ncol = 2) +
  ggtitle("violin plot \nby group") +
  xlab("categorical") +
  ylab("continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.ticks.x = element_blank())

plot_grid(my_violin, my_facet_violin, ncol = 2)
```



```
my_boxplot <- ggplot(mydata,
                     aes(x = 2,
                         y = y)) +
  geom_boxplot(colour=tappan_red) +
  scale_x_discrete(limit = c(0,1,2)) +
  ggtitle("boxplot") +
  xlab(" ") +
  ylab("continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.ticks.x = element_blank())
```

```
Warning in scale_x_discrete(limit = c(0, 1, 2)): Continuous limits supplied to discrete scale.
i Did you mean `limits = factor(...)` or `scale_*_continuous()`?
```

```
my_conditional_boxplot <- ggplot(mydata,
                                 aes(x = w,
                                     y = y)) +
  geom_boxplot(colour=tappan_red, width = .5) +
  ggtitle("boxplot \nby group") +
  xlab("categorical") +
  ylab("continuous") +
  theme_minimal()

plot_grid(my_boxplot, my_conditional_boxplot, ncol = 2)
```

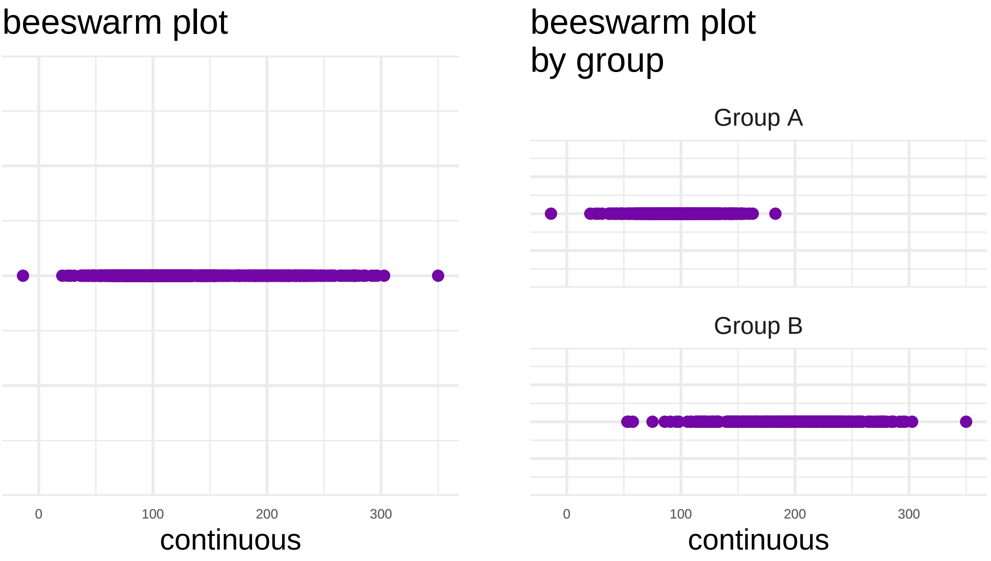


```
library(ggbeeswarm) # beeswarm geometry

my_beeswarm <- ggplot(mydata,
                      aes(x = y,
                          y = 1)) +
  geom_beeswarm(colour = ann_arbor_amethyst,
                groupOnX = FALSE) +
  ggtitle("beeswarm plot") +
  xlab("continuous") +
  ylab("") +
  theme_minimal() +
  theme(axis.text=element_text(size = 5),
        axis.text.y = element_blank())
```

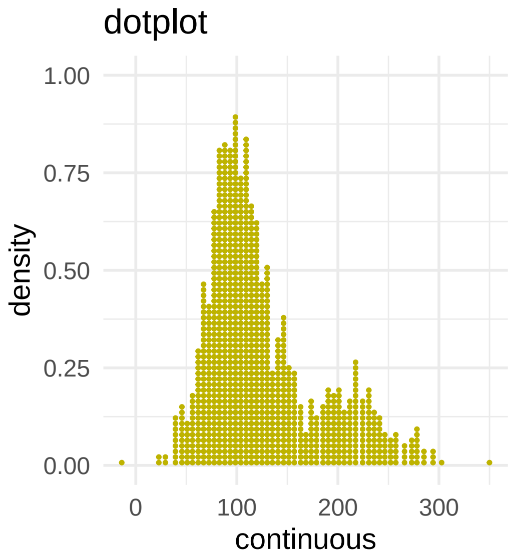
```
Warning: The `groupOnX` argument of `geom_beeswarm()` is deprecated as of ggbeeswarm
0.7.1.
i ggplot2 now handles this case automatically.
```

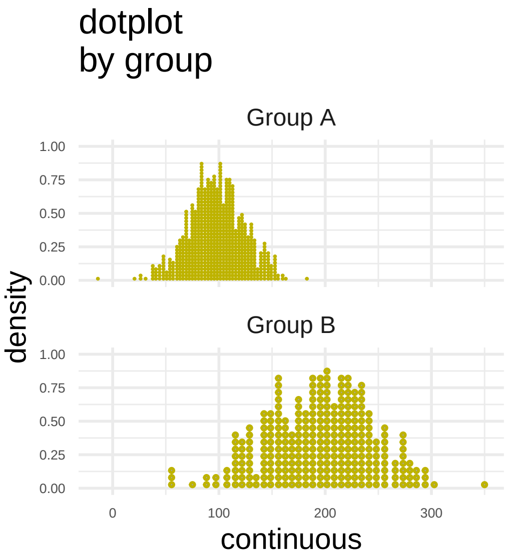
```
my_facet_beeswarm <- ggplot(mydata,
                            aes(x = y,
                                y = 1)) +
  geom_beeswarm(colour = ann_arbor_amethyst,
                groupOnX = FALSE) +
  facet_wrap(~w, nrow = 2) +
  ggtitle("beeswarm plot \nby group") +
  xlab("continuous") +
  ylab("") +
  theme_minimal() +
  theme(axis.text.x = element_text(size = 5),
        axis.text.y = element_blank())
```

```
plot_grid(my_beeswarm, my_facet_beeswarm)
```



```
library(ggdist) # 'distribution' geometries

my_dotplot <- ggplot(mydata,
                     aes(x = y)) +
  stat_dots(colour=wave_field_green) +
  ggtitle("dotplot") +
  xlab("continuous") +
  ylab("density") +
  theme_minimal()

my_facet_dotplot <- ggplot(mydata,
                           aes(x = y)) +
  stat_dots(colour=wave_field_green) +
  facet_wrap(~w, nrow = 2) +
  ggtitle("dotplot \nby group") +
  xlab("continuous") +
  ylab("density") +
  theme_minimal() +
  theme(axis.text = element_text(size = 5)) # small font size for axis

plot_grid(my_dotplot, my_facet_dotplot, ncol = 2)
```





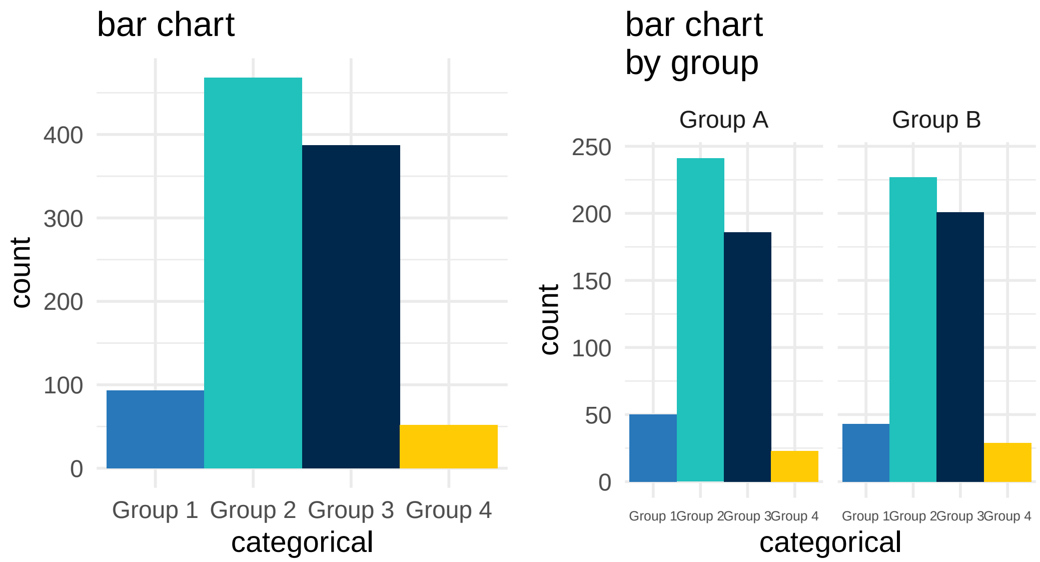
6 One Thing At A Time

Two Things At A Time

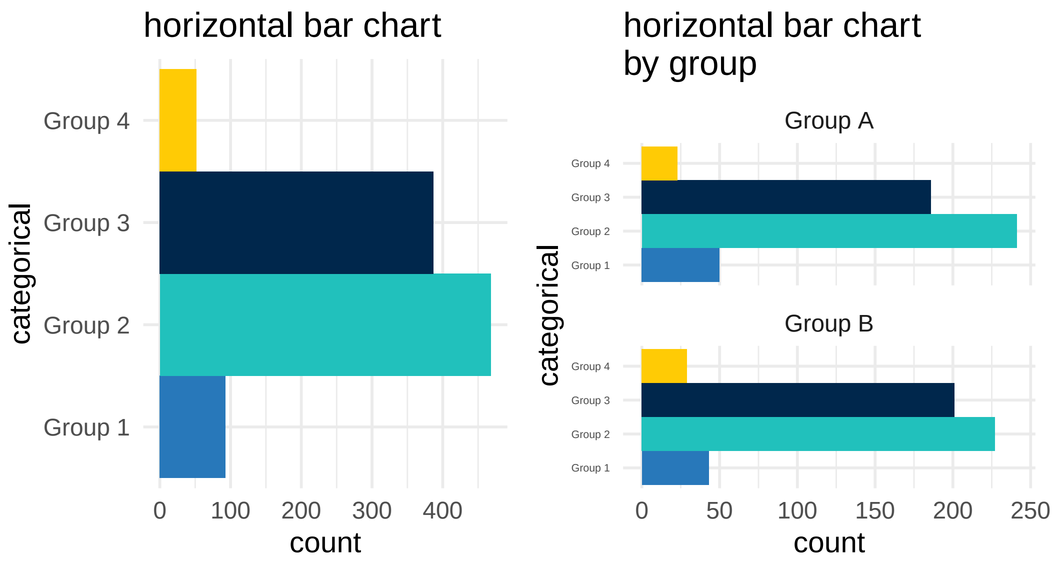
7 Categorical

Categorical By Categorical

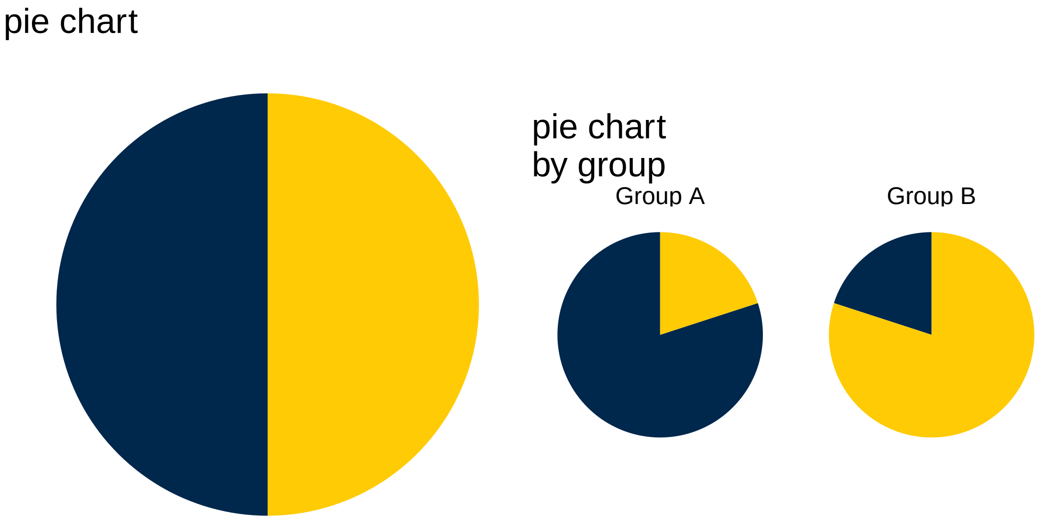
```
my_barchart <- ggplot(mydata,
                      aes(s,
                          fill = s)) +
  geom_bar(width = 1.0) +
  scale_fill_manual(values = c(arboretum_blue,
                               taubman_teal,
                               michigan_blue,
                               michigan_maize)) +
  ggtitle("bar chart") +
  guides(fill=FALSE) +
  xlab("categorical") +
  ylab("count") +
  theme_minimal()

my_facet_barchart <- ggplot(mydata,
                            aes(s,
                                fill = s)) +
  geom_bar(width = 1.0) +
  facet_wrap(~u, ncol = 2) +
  scale_fill_manual(values = c(arboretum_blue,
                               taubman_teal,
                               michigan_blue,
                               michigan_maize)) +
  ggtitle("bar chart \nby group") +
  guides(fill=FALSE) +
  xlab("categorical") + ylab("count") +
  theme_minimal() +
  theme(axis.text.x = element_text(size = rel(.6)))

plot_grid(my_barchart, my_facet_barchart, ncol = 2)
```



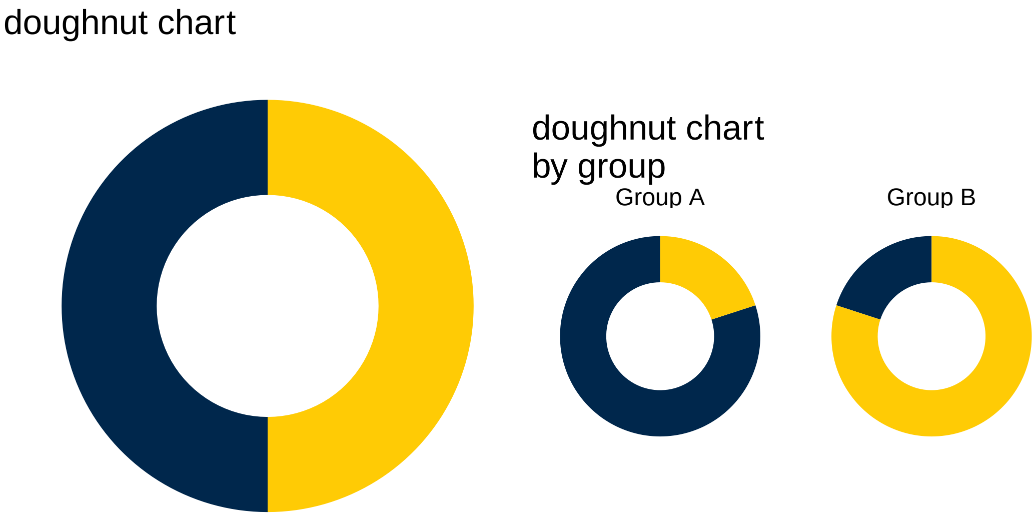
```
my_horiz_barchat <- ggplot(mydata, aes(s, fill = s)) +
  geom_bar(width = 1.0) +
  coord_flip() +
  scale_fill_manual(values = c(arboretum_blue,
                               taubman_teal,
                               michigan_blue,
                               michigan_maize)) +
  ggtitle("horizontal bar chart") +
  guides(fill=FALSE) +
  xlab("categorical") +
  ylab("count") +
  theme_minimal()

my_horiz_facet_barchart <- ggplot(mydata, aes(s, fill = s)) +
  geom_bar(width = 1.0) +
  facet_wrap(~u, ncol = 1) +
  coord_flip() +
  scale_fill_manual(values = c(arboretum_blue,
                               taubman_teal,
                               michigan_blue,
                               michigan_maize)) +
  ggtitle("horizontal bar chart \nby group") +
  guides(fill=FALSE) +
  xlab("categorical") +
  ylab("count") +
  theme_minimal() +
  theme(axis.text.y = element_text(size = rel(.5)))

plot_grid(my_horiz_barchat, my_horiz_facet_barchart, ncol = 2)
```



```
my_pie <- ggplot(mydata, aes(x = 1, fill = v)) +
  geom_bar(width = 1) +
  coord_polar(theta="y") +
  scale_fill_manual(values = michigan_colors) +
  ggtitle("pie chart") + guides(fill=FALSE) +
  xlab(" ") +
  ylab("categorical") +
  theme_void() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank()) +
  theme(axis.ticks = element_blank())

my_facet_pie <- ggplot(mydata, aes(x = 1, fill = v)) +
  geom_bar(width = 1, position = "fill") +
  coord_polar(theta="y") +
  facet_wrap(~u, ncol = 2) +
  scale_fill_manual(values = michigan_colors) +
  ggtitle("pie chart \nby group") +
  guides(fill=FALSE) +
  xlab(" ") +
  ylab("categorical") +
  theme_void() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank())

plot_grid(my_pie, my_facet_pie, ncol = 2)
```



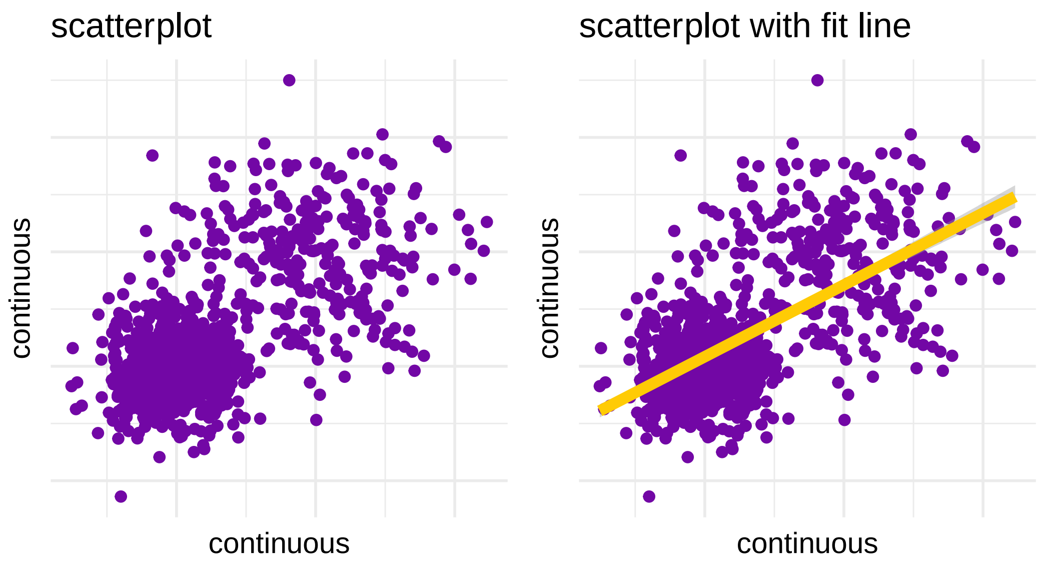
```
my_doughnut <- ggplot(mydata, aes(x = 2, fill = v)) +
  geom_bar() +
  coord_polar(theta="y") +
  scale_fill_manual(values = michigan_colors) +
  ggtitle("doughnut chart") +
  guides(fill=FALSE) +
  xlab(" ") +
  ylab("categorical") +
  xlim(.5, 2.5) +
  theme_void() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank()) +
  theme(axis.ticks = element_blank())

my_facet_doughnut <- ggplot(mydata, aes(x = 2, fill = v)) +
  geom_bar(position = "fill") +
  coord_polar(theta="y") +
  facet_wrap(~u, ncol = 2) +
  scale_fill_manual(values = michigan_colors) +
  ggtitle("doughnut chart \nby group") +
  guides(fill=FALSE) +
  xlab(" ") +
  ylab("categorical") +
  xlim(.5, 2.5) +
  theme_void() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank())

plot_grid(my_doughnut, my_facet_doughnut, ncol = 2)
```



8 Continuous by Continuous

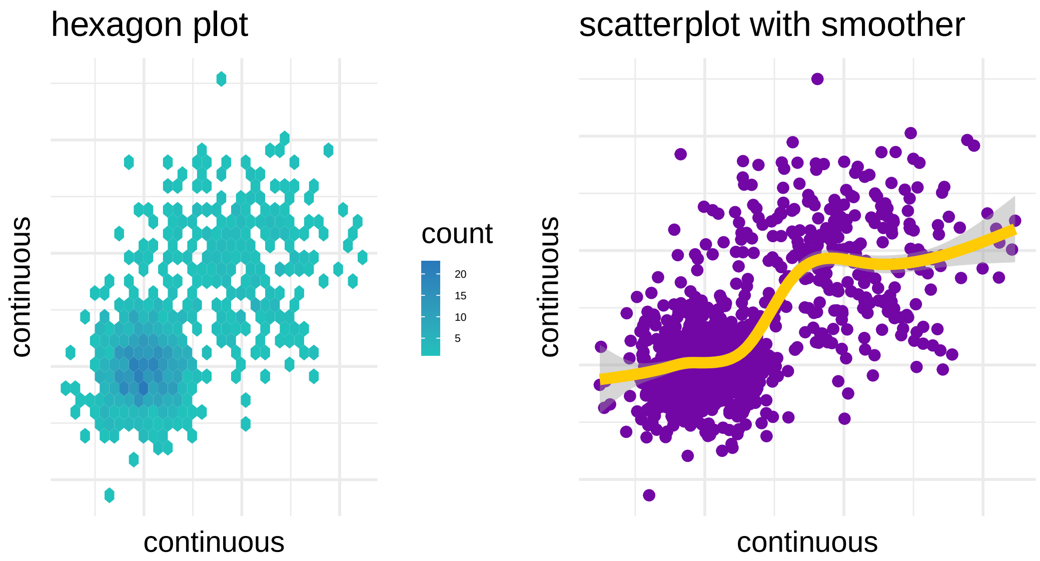
```
my_scatterplot <- ggplot(mydata, aes(x=x, y=y)) +
  geom_point(colour = ann_arbor_amethyst) +
  ggtitle("scatterplot") +
  xlab("continuous") +
  ylab("continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank())

my_scatterplot_smoother <- ggplot(mydata, aes(x=x, y=y)) +
  geom_point(colour = ann_arbor_amethyst) +
  geom_smooth(method = lm, color = michigan_maize, size = 2) +
  ggtitle("scatterplot with fit line") +
  xlab("continuous") +
  ylab("continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank())

plot_grid(my_scatterplot, my_scatterplot_smoother)
```

```
`geom_smooth()` using formula = 'y ~ x'
```



```
my_hexagon <- ggplot(mydata, aes(x=x, y=y)) +
  geom_hex() +
  ggtitle("hexagon plot") +
  xlab("continuous") +
  ylab("continuous") +
  theme_minimal() +
  theme(legend.text = element_text(size=4),
        legend.key.size = unit(.25, "cm")) +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank())  +
  scale_fill_gradient(low = taubman_teal,
                      high = arboretum_blue)

my_smoother <- ggplot(mydata, aes(x=x, y=y)) +
  geom_point(colour = ann_arbor_amethyst) +
  geom_smooth(se=TRUE, color=michigan_maize, size=2) +
  ggtitle("scatterplot with smoother") +
  xlab("continuous") +
  ylab("continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank())

plot_grid(my_hexagon, my_smoother)
```

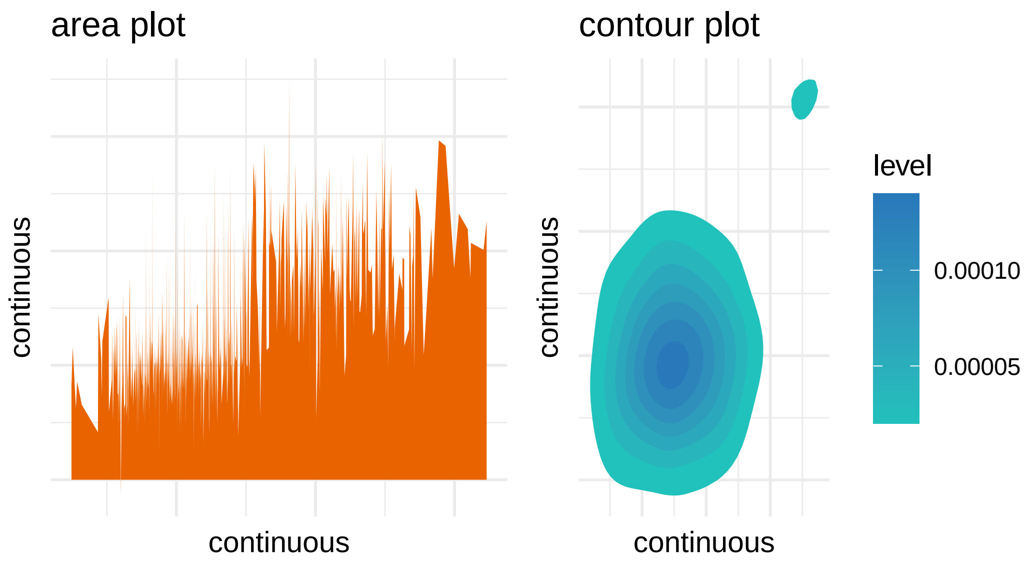
```
`geom_smooth()` using method = 'gam' and formula = 'y ~ s(x, bs = "cs")'
```



```
my_area <- ggplot(mydata, aes(x=x, y=y)) +
  geom_area(position = "stack", fill = ross_school_orange) +
  ggtitle("area plot") +
  xlab("continuous") +
  ylab("continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank())

my_contour <- ggplot(mydata, aes(x=x, y=y)) +
  stat_density_2d(aes(fill = ..level..),
                  geom = "polygon") +
  ggtitle("contour plot") +
  xlab("continuous") +
  ylab("continuous") +
  theme_minimal() +
  theme(axis.text.x = element_blank()) +
  theme(axis.text.y = element_blank())  +
  theme(axis.ticks = element_blank()) +
  scale_fill_gradient(low = taubman_teal,
                      high = arboretum_blue)
```

```r
plot_grid(my_area, my_contour)
```

```
Warning: The dot-dot notation (`..level..`) was deprecated in ggplot2 3.4.0.
i Please use `after_stat(level)` instead.
```



```
`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
`geom_smooth()` using formula = 'y ~ x'
`geom_smooth()` using method = 'gam' and formula = 'y ~ s(x, bs = "cs")'
`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
`geom_smooth()` using formula = 'y ~ x'
`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
`geom_smooth()` using formula = 'y ~ x'
```

Graphics made with the ggplot2 graphing library created by Hadley Wickham.

Available online at https://agrogan1.github.io/

Last updated: `March 30 2026` at `13:44`