Basics

```
print("hello")
# assigns value to object
my_number <- 5
# combines elements into vector
my_vector <- c(1,2,3)
# first element in vector
my_vector[1]
# variable in data frame
Fingers$Sex
```

Tables

```
tally(my_vector)
tally(~ Condition, data =
MindsetMatters)
tally(~ Thumb > 65, data = Fingers)
tally(Thumb ~ Sex, data = Fingers,
margins = TRUE, format =
"proportion")
```

Fitting and Evaluating Models

```
empty_model <- lm(Thumb ~ NULL,
data = Fingers)
Sex_model <- lm(Thumb ~ Sex, data
= Fingers)
Sex_fun<-makeFun(Sex_model)
Sex_fun("male")
predict(empty_model)
resid(empty_model)
anova(empty_model)
supernova(Sex_model)
t.test(Tip ~ Condition, data =
TipExperiment, var.equal=TRUE)
pairwise(game_model,
correction="none")
```

Data

```
str(MindsetMatters)
head(MindsetMatters)
tail(MindsetMatters)
sort(my_vector)
arrange(Fingers, Thumb)

# selects variables
select(Fingers, Sex, RaceEthnic,
Thumb)
# selects cases
filter(Fingers, SSLast != "NA")
head(select(Fingers, Thumb))

as.numeric(Fingers$Interest)
factor(Fingers$Sex)
factor(Fingers$Sex, levels =
c(1,2), labels = c("female",
"male"))
recode(Fingers$Job, "0" = 0, "1" =
50, "2" = 100)

# creates two equal sized groups
ntile(Fingers$Height, 2)

# creates data frame from csv file
new_dataframe <- read.csv("long-
csv-link-from-published-google-
spreadsheet", header = TRUE)
```

Operators

```
sum(1,2,100)
+, -, *, /
>, <, >=, <=, ==, !=

# results in TRUE or FALSE
Fingers$RingLonger <-
Fingers$Ring > Fingers$Index

abs(Fingers$Residual)
Fingers$Residual^2
sqrt(157)
```

Simple Statistics

```
mean(Fingers$Thumb)
var(Fingers$Thumb)
sd(Fingers$Thumb)
favstats(~ Wt, data = MindsetMatters)
cohensD(Thumb ~ Sex, data = Fingers)
cor(Thumb ~ Height, data = Fingers)
b1(Thumb ~ Sex, data = Fingers)
b1(Sex_model)
# PRE and fVal work like b1
PRE(Sex_model)
fVal(Sex_model)
```

Probability Distributions

```
xpnorm(65.1, Thumb_stats$mean,
Thumb_stats$sd)
zscore(Fingers$Thumb)

# returns t at this probability
qt(.975, df = 999)
# returns F at this probability
qf(.95, df1 = 1, df2 = 100)

# CI using t dist.
confint(empty_model)
```

Simulation & Resampling

```
# sample without replacement
sample(Fingers$Thumb, 10)

# sample with replacement
resample(Fingers$Thumb, 157)

do(3) * resample
(Fingers$Thumb,10)
# mixes up values in a variable
shuffle(servers$random_groups_1
)
# simulates sampling 10000
Thumbs from a normal dist.
sim_Thumb <- rnorm(10000,
Thumb_stats$mean,
Thumb_stats$sd)
```

```
# puts simulated Thumbs into data
frame
sim_Pop <- data.frame(sim_Thumb)

# simulates sampling dist.of means
sim_SDoM <- do(10000) *
mean(rnorm(157, Thumb_stats$mean,
Thumb_stats$sd))
# bootstraps sampling dist. of means
bootSDoM <- do(10000) *
mean(resample(Fingers$Thumb,157))

# bootstraps sampling dist. of b1s,
centered on sample b1
SDob1 <- do(10000) * b1(Tip ~
Condition, data =
resample(TipExperiment, 44))
```

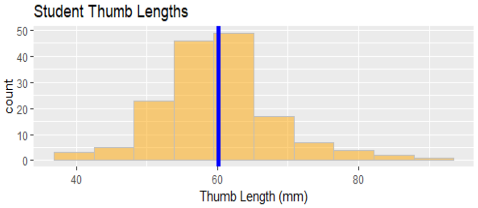
```
# randomizes sampling dist. of
b1s, centered on 0
SDob1 <- do(10000) * b1(Tip ~
shuffle(Condition), data =
TipExperiment)

#get the middle 95 percent of the
distribution
middle(b1, .95)
# randomizes sampling dist. of
PREs
SDoPRE <- do(10000) * PRE(Tip ~
shuffle(Condition), data =
TipExperiment)
# randomizes sampling dist. of Fs
sdoF <- do(10000) * fVal(Tip ~
shuffle(Condition), data =
TipExperiment)
```

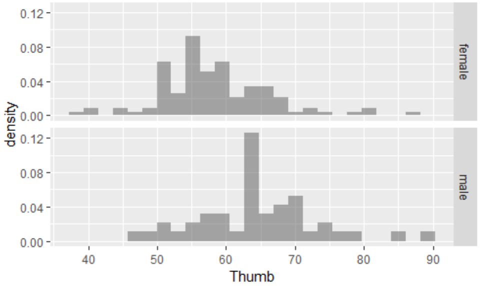
```
# plots sampling dist.
gf_histogram(~ fVal, data = SDoF,
fill = ~fVal>sample_F)
# counts extreme Fs
tally(~fVal>sample_F, data = SDoF)
# count the number of b1s at the
upper and lower extreme
tally(sdob1$b1 > sample_b1 |
sdob1$b1 < -sample_b1)
# fill the lower .95 of this
histogram with a different color
gf_histogram(~ fVal, data = sdoF,
fill = ~lower(fVal, .95))
# calculate a p-value using the F-
distribution
xpf(sample_F, df1 = , df2 = )
```

Plots

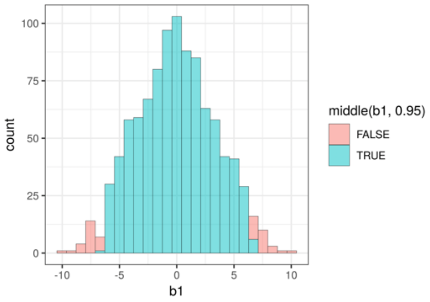
```
gf_histogram( ~ Thumb, data = Fingers, fill =
"orange", color = "gray", bins = 10) %>%
  # changes labels
  gf_labs(title= "Student Thumb Lengths", x =
"Thumb Length (mm)") %>%
  # adds density curve to a histogram
  gf_density() %>%
  # adds vertical line
  gf_vline(xintercept = ~mean, data =
Thumb_stats, color = "blue", size = 2)
```



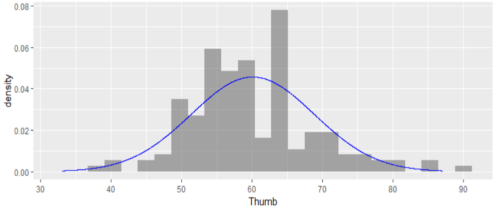
```
gf_dhistogram(~ Thumb, data = Fingers) %>%
  gf_facet_grid(Sex ~ .)
```



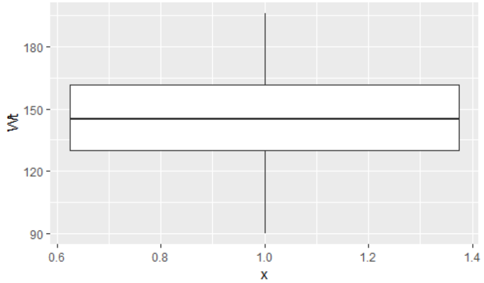
```
gf_histogram(~b1, data = sdob1, fill =
~middle(b1, .95))
```



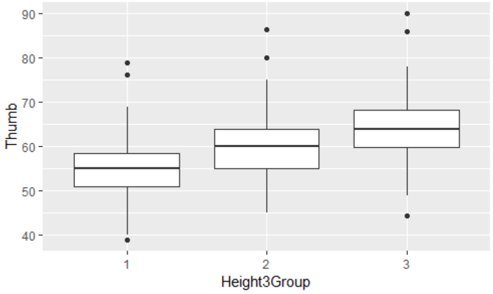
```
gf_dist("norm", color = "blue", params =
list(Thumb_stats$mean, Thumb_stats$sd))
```



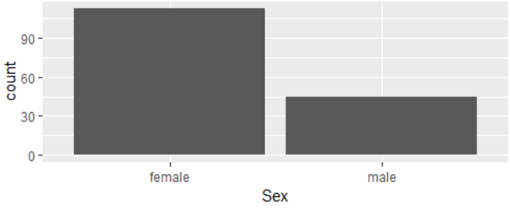
```
gf_boxplot(Wt ~ 1, data = MindsetMatters)
```



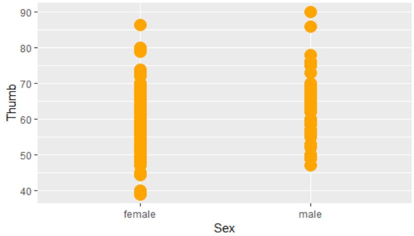
```
gf_boxplot(Thumb ~ Height3Group, data =
Fingers)
```



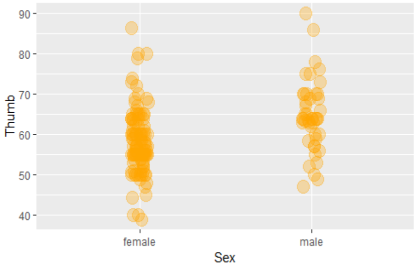
```
# creates bar graph
gf_bar( ~ Sex, data = Fingers)
```



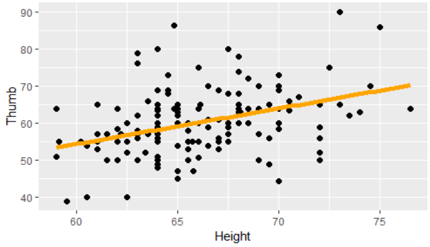
```
gf_point(Thumb ~ Sex, data = Fingers, color =
"orange", size = 5)
```



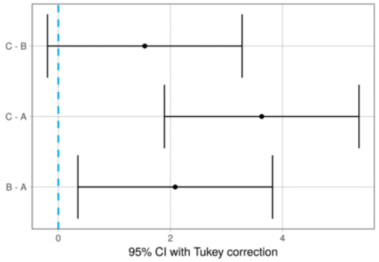
```
gf_jitter(Thumb ~ Sex, data = Fingers, color =
"orange", size = 5, alpha = .5)
```



```
gf_point(Thumb ~ Height, data = Fingers, size
= 2) %>%
# adds a regression line
  gf_lm(color = "orange", size = 2)
```



```
pairwise(game_model, plot = TRUE)
```


C - B
C - A
B - A
95% CI with Tukey correction