

# Legends

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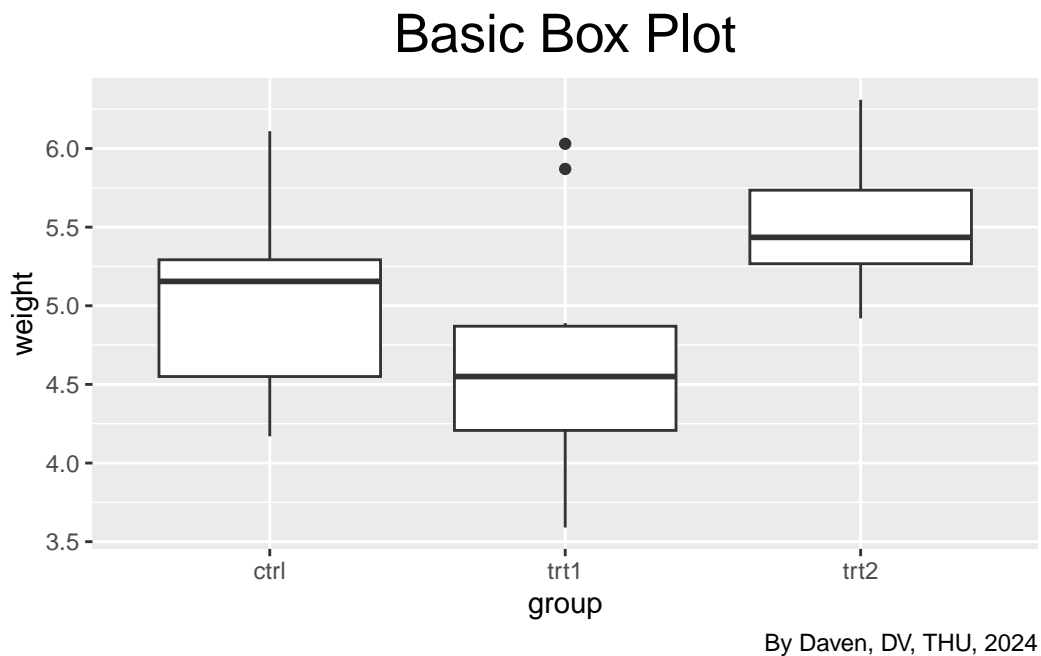
## 1 Basic Box Plot

- `library(ggplot2)`: This loads the `ggplot2` library.
- `ggplot(PlantGrowth, aes(x = group, y = weight))`:
  - Uses the built-in `PlantGrowth` dataset
  - Creates a plot with `group` on the x-axis and `weight` on the y-axis

- `aes()` defines the aesthetic mappings of the plot
- `geom_boxplot()`: Adds a box plot geometry to visualize the distribution of weights across different groups
- `labs(title = 'Basic Box Plot', caption = 'By Daven, DV, THU, 2024')`: Adds a title and caption to the plot
- `theme(plot.title = element_text(hjust = 0.5, size = 20))`: Centers the title horizontally (`hjust = 0.5`) and size of the text to `size = 20`

```
library(ggplot2)

ggplot(PlantGrowth, aes (x = group, y = weight)) +
  geom_boxplot() +
  labs(title = 'Basic Box Plot',
       caption = 'By Daven, DV, THU, 2024') +
  theme(plot.title = element_text(hjust = 0.5, size = 20))
```



## 2 Add a Legend

- `library(gridExtra)`: this load the `gridExtra` library
- `fill`: to add color inside the area of the box

- `color`: to add color around the outline of the box
- `grid.arrange()`: used to arrange multiple grid-based plots on a single page
- `ncol`: used to determine the number of column within the box plot chart
- `top`: Adds title into the box plot chart
- `bottom`: Adds caption into the box plot chart

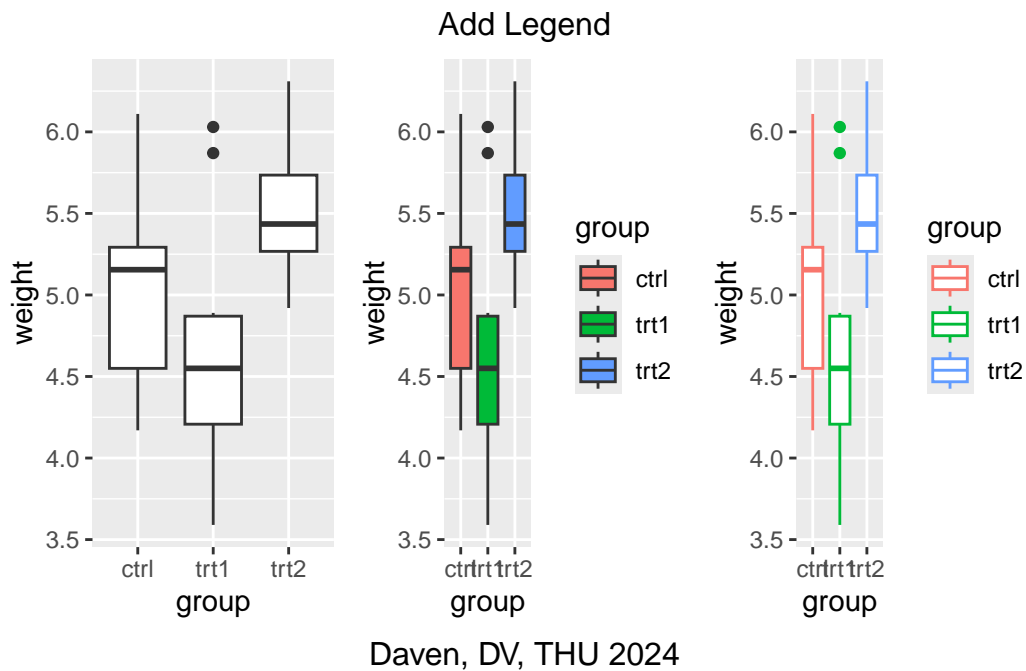
```
library(ggplot2)
library(gridExtra)

p1 <- ggplot(PlantGrowth, aes(x = group, y = weight)) +
  geom_boxplot()

p2 <- ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot()

p3 <- ggplot(PlantGrowth, aes(x = group, y = weight, color = group)) +
  geom_boxplot()

grid.arrange(p1, p2, p3, ncol = 3, top = 'Add Legend',
              bottom = 'Daven, DV, THU 2024')
```

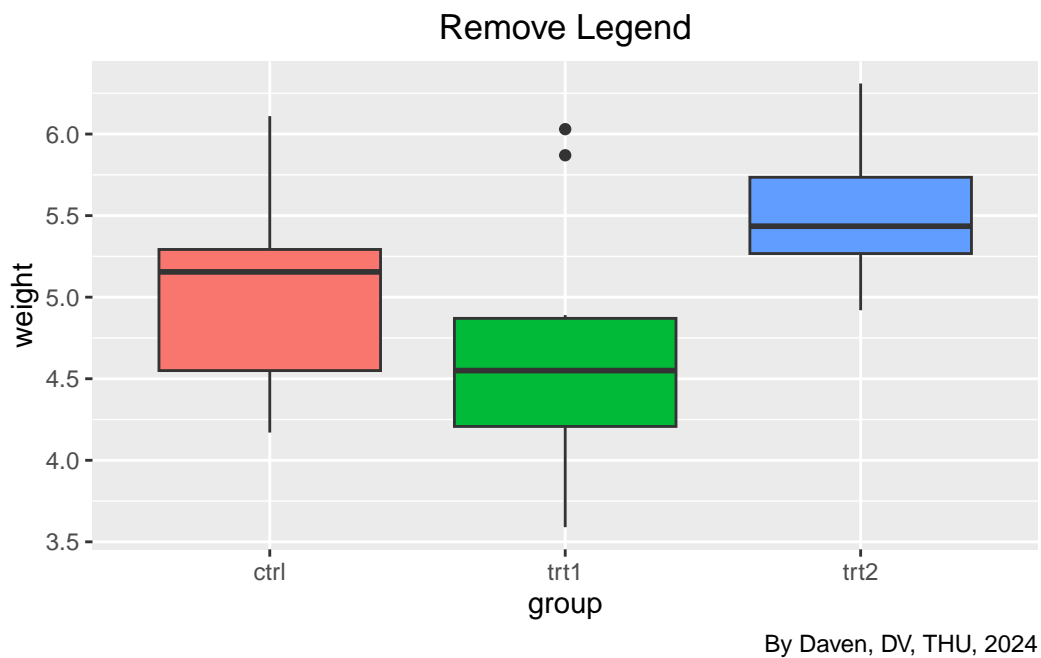


### 3 Remove Legend

Using the same chart in [Basic Box Plot](#), The legend is removed by `guides(fill = FALSE)`

- `guides(fill)`: use to activating/disabling legends

```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +  
  geom_boxplot() +  
  guides(fill = FALSE) +  
  labs(title = 'Remove Legend',  
        caption = 'By Daven, DV, THU, 2024') +  
  theme(plot.title = element_text(hjust=0.5))
```

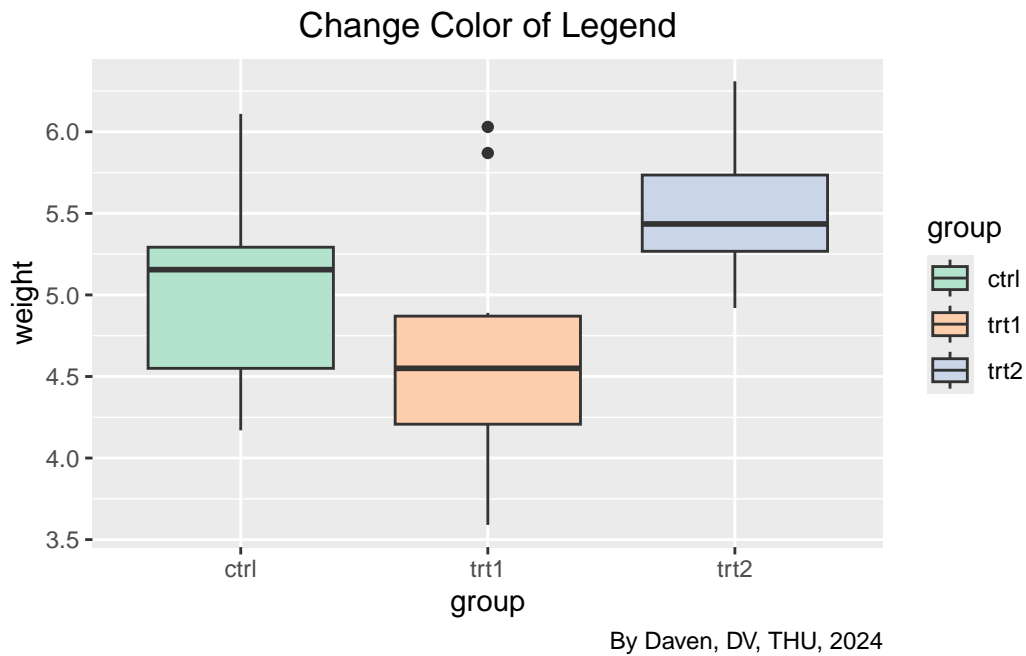


### 4 Change Color of Legend

Using the same chart in [Basic Box Plot](#), we'll change the box plot's fill using "Pastel2"

- `scale_fill_brewer(palette = "Pastel2")`:
  - `scale_fill_brewer()`: add aesthetically pleasing color palettes to the box plot
  - `palette = "Pastel2"`: give "Pastel2" color palette to the box plot

```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot() +
  scale_fill_brewer(palette = "Pastel2") +
  labs(title = 'Change Color of Legend',
        caption = 'By Daven, DV, THU, 2024') +
  theme(plot.title = element_text(hjust=0.5))
```



## 5 Change Posistion of Legend

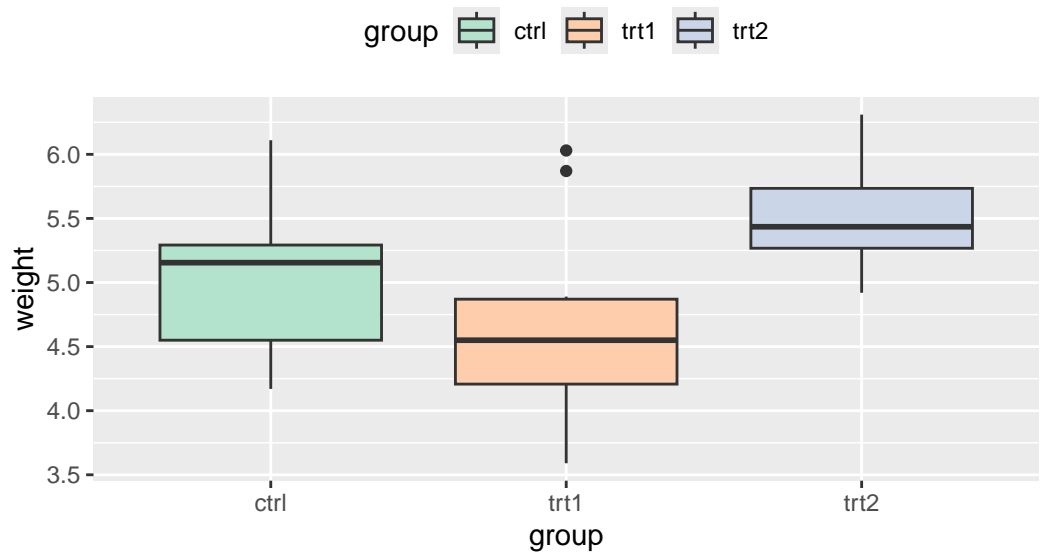
Continuing from [Change Color of Legend](#), we'll change the legend's position to the top

- `theme(plot.title = element_text(hjust = 0.5), legend.position = 'top')`:
  - Centers the title horizontally (`hjust=0.5`)
  - Putting the legend's position on top of the box plot chart `legend.position = 'top'`

```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot() +
  scale_fill_brewer(palette = "Pastel2") +
  labs(title = 'Change Posistion of Legend',
```

```
caption = 'By Daven, DV, THU, 2024') +
theme(plot.title = element_text(hjust=0.5),
      legend.position = 'top')
```

## Change Position of Legend



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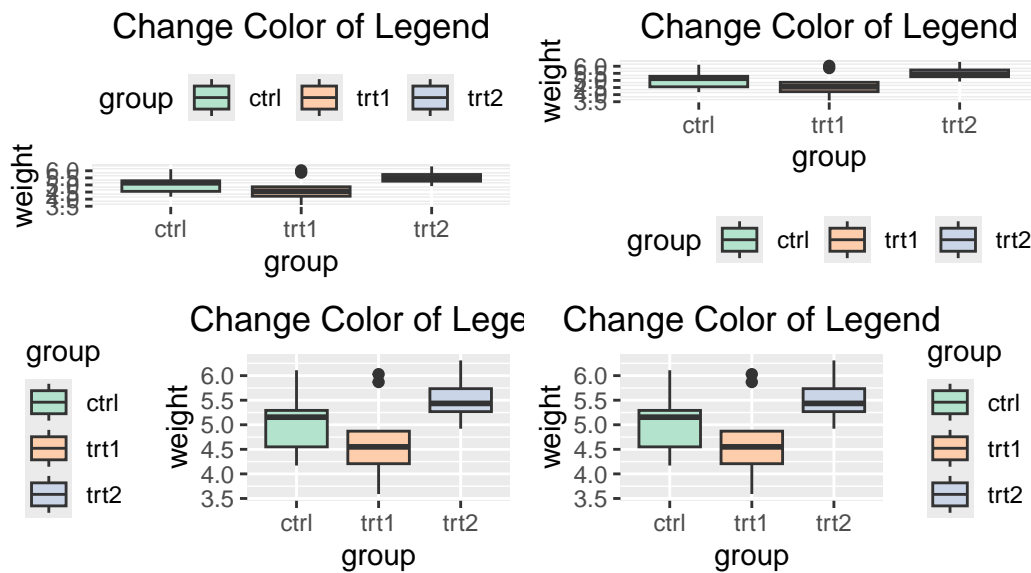
## 6 Practice

Change legend position to top, bottom, left, and right.

```
p1 <- ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot() +
  scale_fill_brewer(palette = "Pastel2") +
  ggtitle('Change Color of Legend') +
  theme(plot.title = element_text(hjust = 0.5),
        legend.position = 'top')
p2 <- p1 + theme(legend.position = 'bottom')
p3 <- p1 + theme(legend.position = 'left')
p4 <- p1 + theme(legend.position = 'right')

grid.arrange(p1, p2, p3, p4, ncol=2,
              top = 'Practice',
              bottom = 'Daven, DV, THU 2024')
```

## Practice



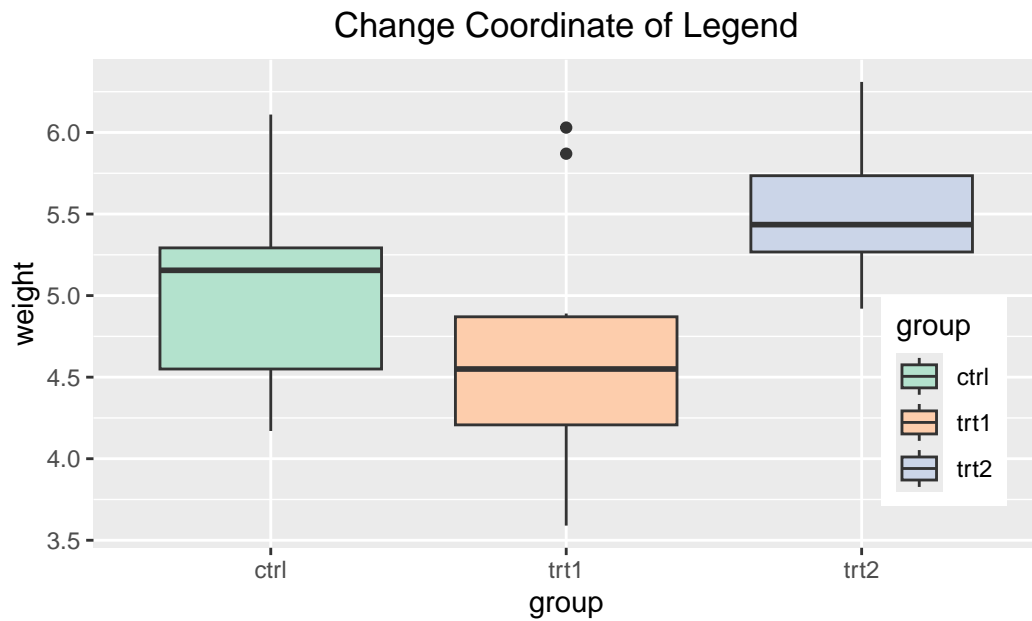
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## 7 Change Coordinate of Legend

Using the same chart in [Change Color of Legend](#), we'll change the `coordinate` of the legend

- `legend.position = c(x, y):`
  - Setting the coordinates of the legend's position as a proportion of the chart
    - \* x: horizontal position
    - \* y: vertical position
- `legend.justification = c():`
  - Controls the anchor point of the legend that aligns with the specified position
    - \* x: horizontal justification
    - \* y: vertical justification

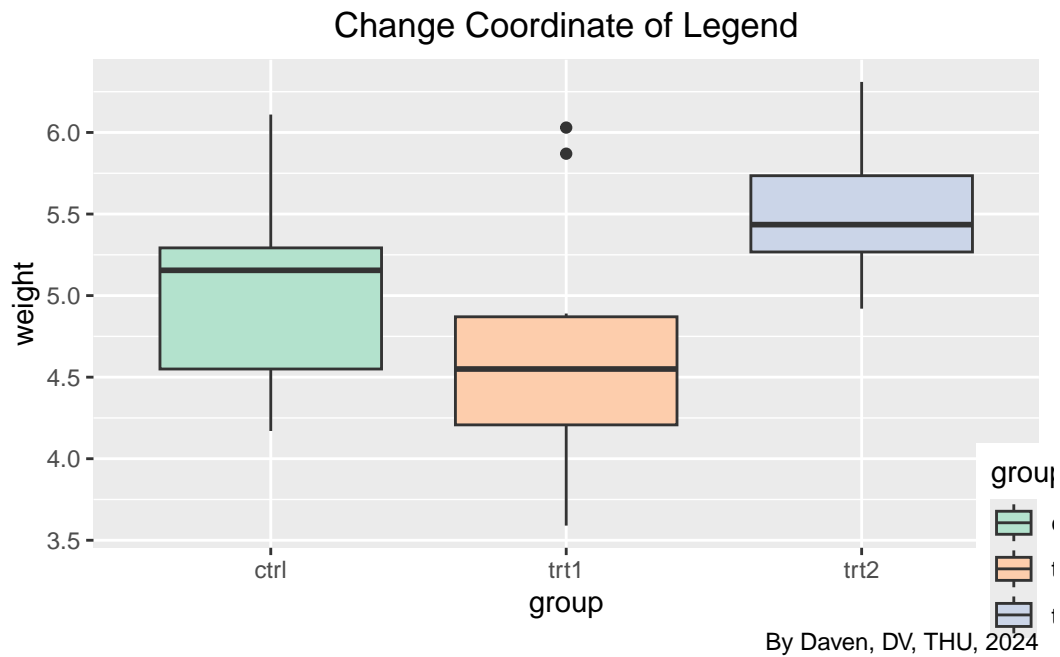
```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot() +
  scale_fill_brewer(palette = "Pastel2") +
  labs(title = 'Change Coordinate of Legend',
       caption = 'By Daven, DV, THU, 2024') +
  theme(plot.title = element_text(hjust = 0.5),
       legend.position = c(.9, .3))
```



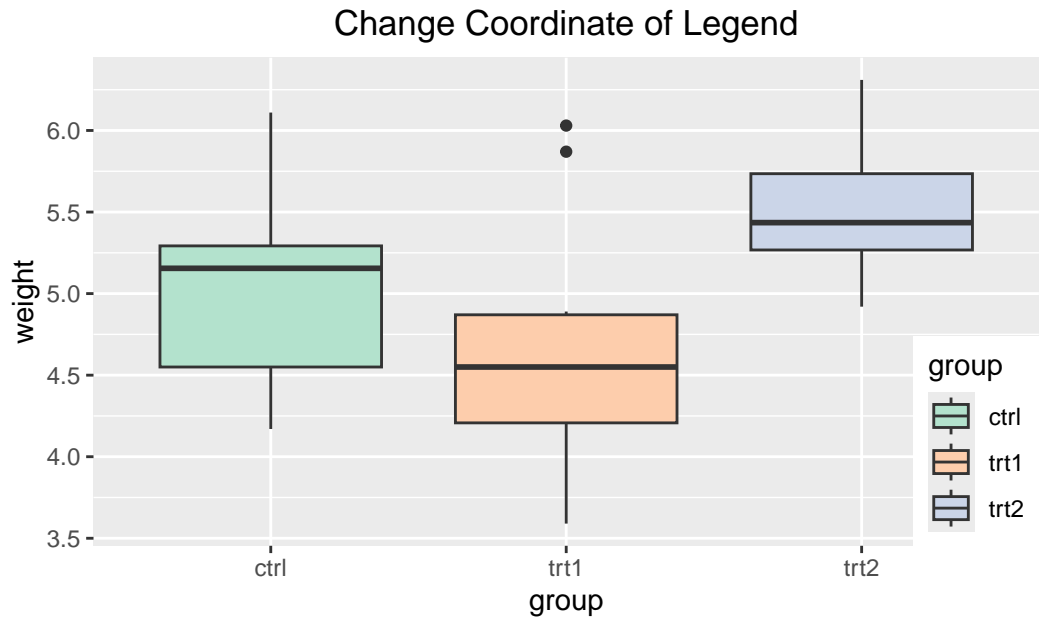
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```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +  
  geom_boxplot() +  
  scale_fill_brewer(palette = "Pastel2") +  
  labs(title = 'Change Coordinate of Legend',  
        caption = 'By Daven, DV, THU, 2024') +  
  theme(plot.title = element_text(hjust = 0.5),  
        legend.position = c(1, 0))
```





```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +  
  geom_boxplot() +  
  scale_fill_brewer(palette = "Pastel2") +  
  labs(title = 'Change Coordinate of Legend',  
       caption = 'By Daven, DV, THU, 2024') +  
  theme(plot.title = element_text(hjust = 0.5),  
        legend.position = c(1, 0),  
        legend.justification = c(1, 0))
```



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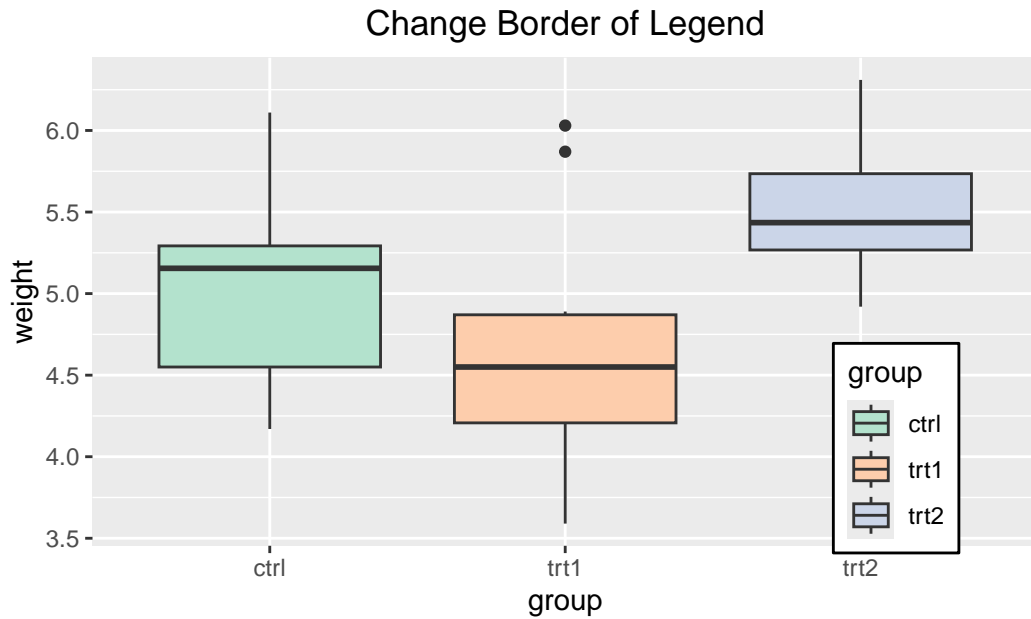
## 8 Change Border of Legend

Using the same chart in [Change Color of Legend](#), we'll change the border of the legend

`legend.background = element_rect(fill = 'white', color = 'black'):`

- `legend.background`: applies an `element_rect()` to the legend's background.
- `element_rect()`: provides the customization options for the legends' style

```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot() +
  scale_fill_brewer(palette = "Pastel2") +
  labs(title = 'Change Border of Legend',
       caption = 'By Daven, DV, THU, 2024') +
  theme(plot.title = element_text(hjust = 0.5),
       legend.position = c(0.85, 0.2),
       legend.background = element_rect(fill = 'white',
                                       color = 'black'))
```



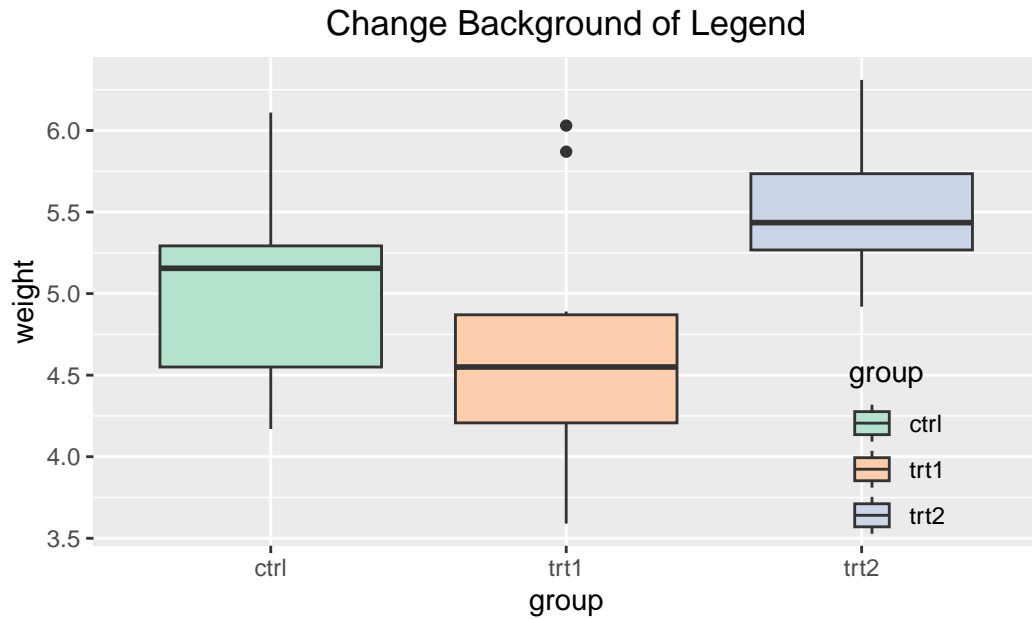
By Daven, DV, THU, 2024

## 9 Change background of Legend

Using the same chart in [Change Color of Legend](#), we'll change the background of the legend

- `legend.key`: appearance of the box inside the legend
- `element_blank()`: removes an element from the legend

```
ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot() +
  scale_fill_brewer(palette = "Pastel2") +
  labs(title = 'Change Background of Legend',
       caption = 'By Daven, DV, THU, 2024') +
  theme(plot.title = element_text(hjust = 0.5),
       legend.position = c(0.85, 0.2),
       legend.background = element_blank(),
       legend.key = element_blank())
```



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## 10 Change Order of Items in Legend

Using the same chart in [Change Color of Legend](#), we'll change the `items` order of the legend

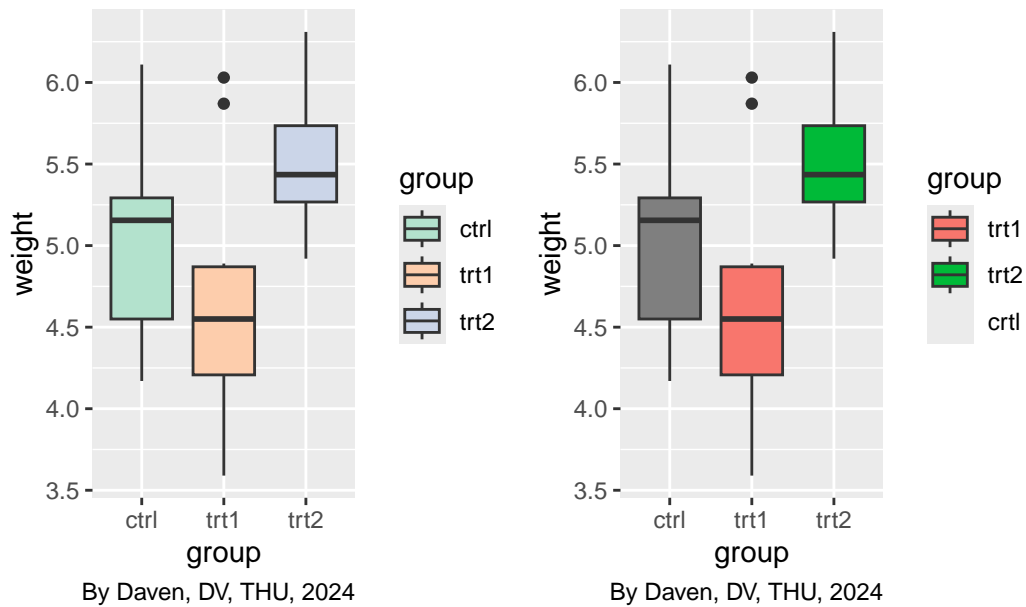
- `scale_fill_discrete()`: Controls the aesthetic mapping of discrete values
- `limits`: Specifies the order and inclusion of levels for the discrete scale

```
p1 <- ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +
  geom_boxplot() +
  scale_fill_brewer(palette = "Pastel2") +
  labs(title = 'Change Order of Items in Legend',
       caption = 'By Daven, DV, THU, 2024') +
  theme(plot.title = element_text(hjust = 0.5))

p2 <- p1 + scale_fill_discrete(limits = c('trt1', 'trt2', 'ctrl'))

grid.arrange(p1, p2, ncol = 2)
```

## Change Order of Items in Legend



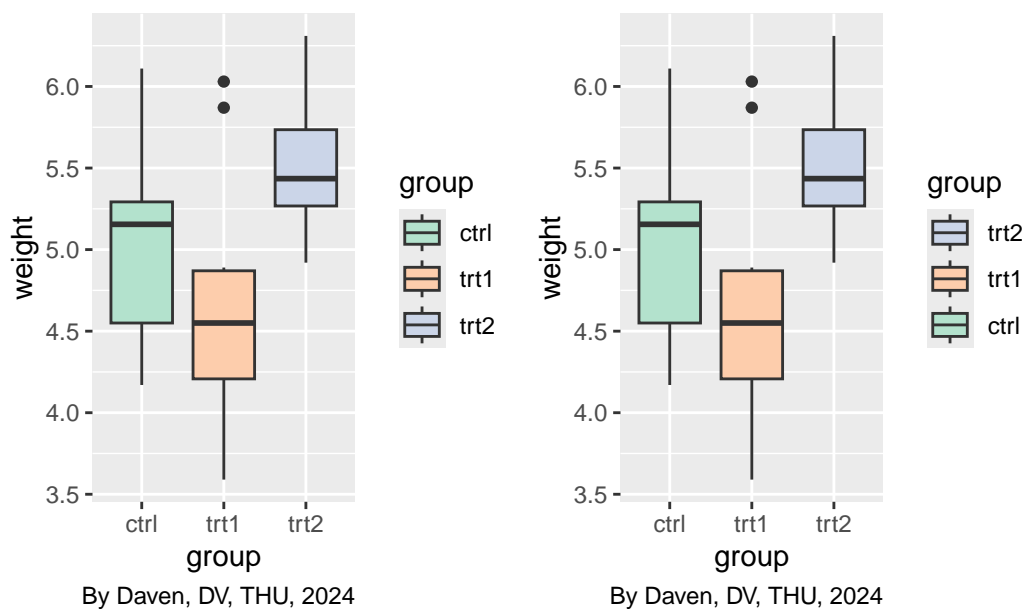
## 11 Reverse Order of Items in Legend

Using the same chart in [Change Color of Legend](#), we'll reverse the item order in the legend

- `guide()`: used to customize legends and axes guides
- `fill = guide_legend()`: specify the guide for discrete legends

```
p1 <- ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +  
  geom_boxplot() +  
  scale_fill_brewer(palette = "Pastel2") +  
  labs(title = 'Reverse Order of Items in Legend',  
       caption = 'By Daven, DV, THU, 2024') +  
  theme(plot.title = element_text(hjust = 0.5))  
  
p2 <- p1 + guides(fill = guide_legend(reverse = TRUE))  
  
grid.arrange(p1, p2, ncol = 2)
```

## Reverse Order of Items in Legend Reverse Order of Items in Legend



## 12 Change Legend Title

Using the same chart in [Change Color of Legend](#), we'll change the legend title

- `labs(fill = 'Condition')`: add 'Condition' title as a legend title

```
p1 <- ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) +  
  geom_boxplot() +  
  scale_fill_brewer(palette = "Pastel2") +  
  labs(title = 'Change Legend Title',  
       caption = 'By Daven, DV, THU, 2024') +  
  theme(plot.title = element_text(hjust = 0.5))  
  
p2 <- p1 + labs(fill = 'Condition')  
  
grid.arrange(p1, p2, ncol = 2)
```

