

class5_Quarto

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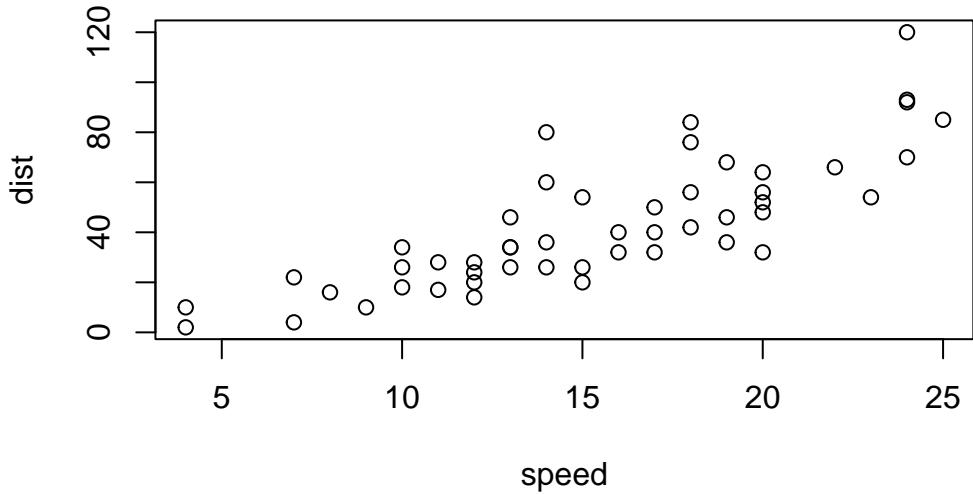
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Our First Plot

R has basic graphics

```
plot(cars)
```

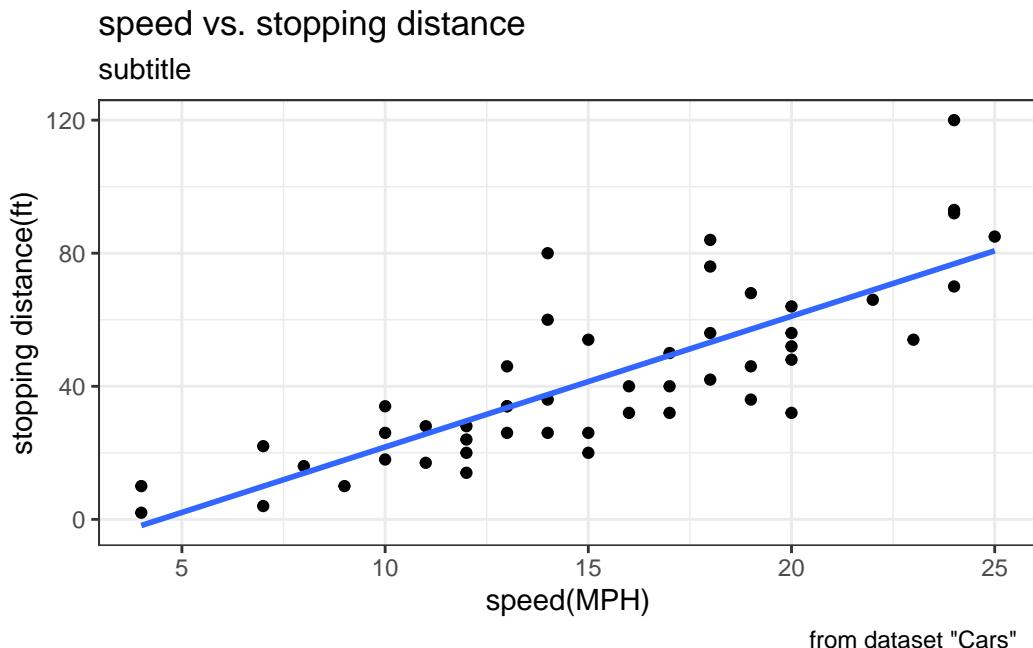


How would I plot this with ggplot2?

```
library("ggplot2")
```

```
Warning: package 'ggplot2' was built under R version 4.1.3
```

```
ggplot(cars)+  
  aes(speed, dist)+  
  geom_point() +  
  #blinker on a particular funciton and press F1 to get to the help page  
  geom_smooth(method="lm", se=FALSE) +  
  labs ( title = "speed vs. stopping distance",  
        x= "speed(MPH)",  
        y= "stopping distance(ft)",  
        subtitle = "subtitle",  
        caption ="    from dataset \"Cars\"    " ) +  
  theme_bw()  
  
`geom_smooth()` using formula 'y ~ x'
```



```
#introducing the genes dataset
url <- "https://bioboot.github.io/bimm143_S20/class-material/up_down_expression.txt"
genes <- read.delim(url)

head(genes)

      Gene Condition1 Condition2      State
1   A4GNT -3.6808610 -3.4401355 unchanging
2    AAAS  4.5479580  4.3864126 unchanging
3   AASDH  3.7190695  3.4787276 unchanging
4    AATF  5.0784720  5.0151916 unchanging
5    AATK  0.4711421  0.5598642 unchanging
6 AB015752.4 -3.6808610 -3.5921390 unchanging

nrow(genes)

[1] 5196

colnames(genes)
```

```

[1] "Gene"          "Condition1" "Condition2" "State"

  ncol(genes)

[1] 4

  table(genes$State)

    down unchanging      up
    72       4997      127

#what is the percentage of genes being upregulated?
round( 127/5196*100, 2)

[1] 2.44

  round(table(genes$State)/nrow(genes)*100, 2)

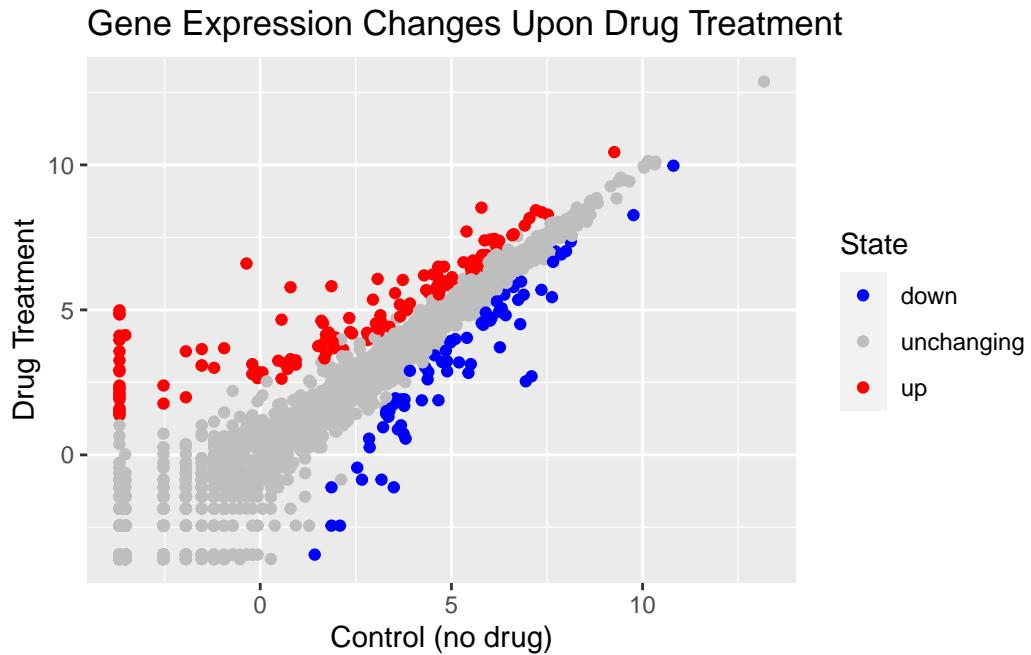
    down unchanging      up
    1.39      96.17      2.44

#ggplot practices for genes
library("ggplot2")
p <- ggplot(genes) +
  aes(Condition1, Condition2, col=State) +
  geom_point()

p_refine <- p +
  scale_color_manual( values=c("blue", "gray", "red")) +
  labs( x="Control (no drug)",
        y="Drug Treatment",
        title="Gene Expression Changes Upon Drug Treatment",
        )

p_refine

```



Below is an example of “in-line R-code”:

There are 5196 genes in this dataset

Going Further

```
library("gapminder")
```

Warning: package 'gapminder' was built under R version 4.1.3

```
library("ggplot2")
library("dplyr")
```

Warning: package 'dplyr' was built under R version 4.1.3

Attaching package: 'dplyr'

```
The following objects are masked from 'package:stats':
```

```
filter, lag
```

```
The following objects are masked from 'package:base':
```

```
intersect, setdiff, setequal, union
```

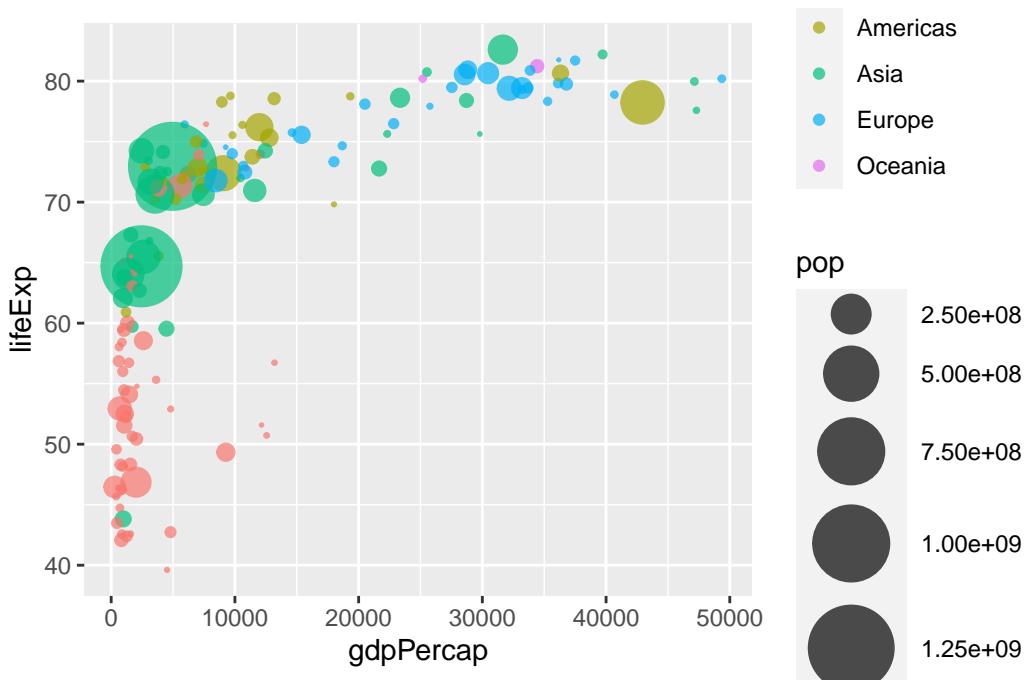
```
# File location online
url <- "https://raw.githubusercontent.com/jennybc/gapminder/master/inst/extdata/gapminder.csv"

gapminder <- read.delim(url)

#ggplot for 2007
gapminder_2007 <- gapminder %>% filter(year==2007)

ggplot_2007 <- ggplot(gapminder_2007)+  
  aes(gdpPercap, lifeExp, color=continent, size=pop)+  
  geom_point(alpha=0.7) +  
  scale_size_area(max_size=15)

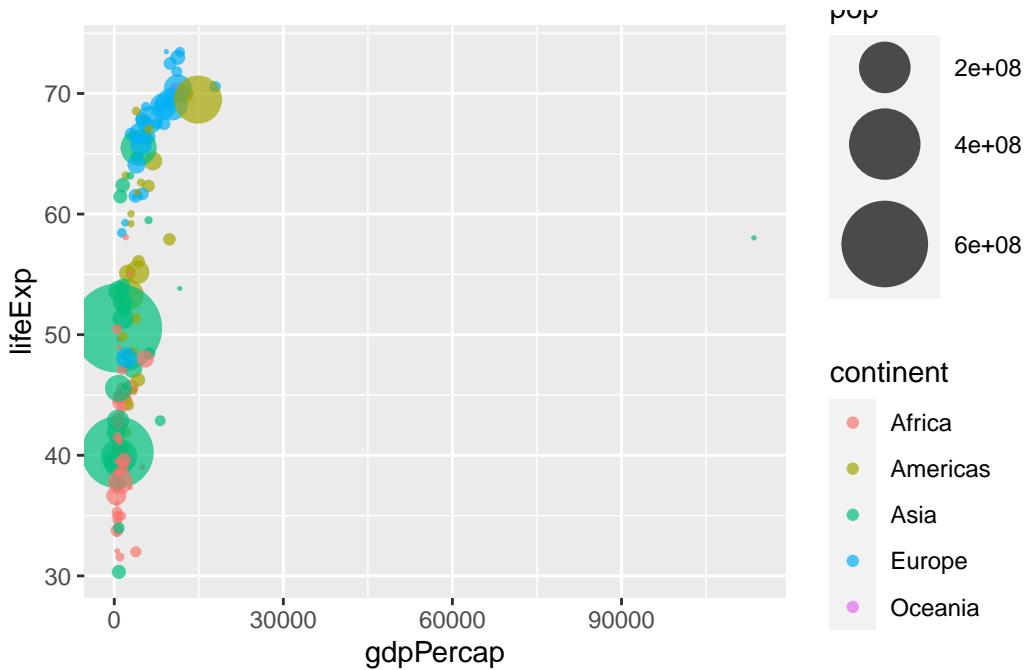
#print 2007 ggplot
ggplot_2007
```



```
#ggplot for 1957
gapminder_1957 <- gapminder %>% filter(year==1957)

ggplot_1957 <- ggplot(gapminder_1957)+ 
  aes(gdpPercap, lifeExp, color=continent, size=pop)+ 
  geom_point(alpha=0.7) + 
  scale_size_area(max_size=15)

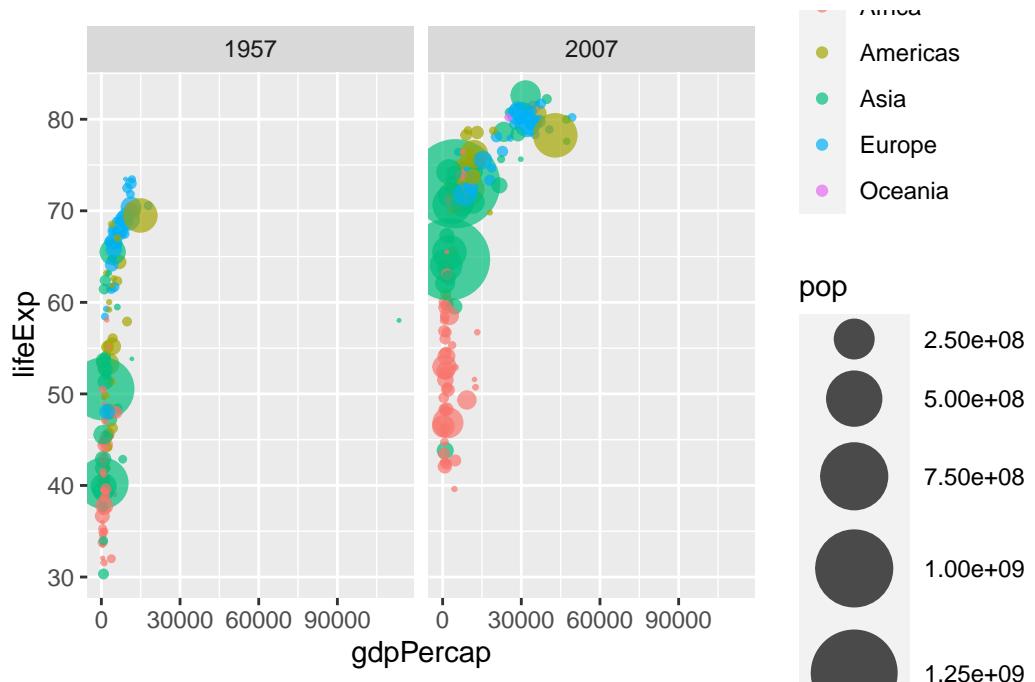
#print 1957 ggplot
ggplot_1957
```



```
#bringing two plots together
gapminder_50years <- gapminder %>% filter(year==1957 | year==2007)

ggplot_50years <- ggplot(gapminder_50years)+ 
  aes(gdpPercap, lifeExp, color=continent, size=pop)+ 
  geom_point(alpha=0.7) + 
  scale_size_area(max_size=15)+ 
#using the facet funciton
  facet_wrap(~year)

#print 50year difference
ggplot_50years
```



You can add options to executable code like this

```
[1] 4
```

The `echo: false` option disables the printing of code (only output is displayed).

```
#Bar Graphs
```

```
library("gapminder")
library("ggplot2")

# File location online
url <- "https://raw.githubusercontent.com/jennybc/gapminder/master/inst/extdata/gapminder.csv"

gapminder <- read.delim(url)

gapminder_top5 <- gapminder %>%
  filter(year==2007) %>%
  arrange(desc(pop)) %>%
  top_n(5, pop)

gapminder_top5
```

```

country continent year lifeExp      pop gdpPerCap
1       China      Asia 2007 72.961 1318683096 4959.115
2       India      Asia 2007 64.698 1110396331 2452.210
3 United States Americas 2007 78.242 301139947 42951.653
4    Indonesia     Asia 2007 70.650 223547000 3540.652
5      Brazil Americas 2007 72.390 190010647 9065.801

```

```

#bar chart ggplot

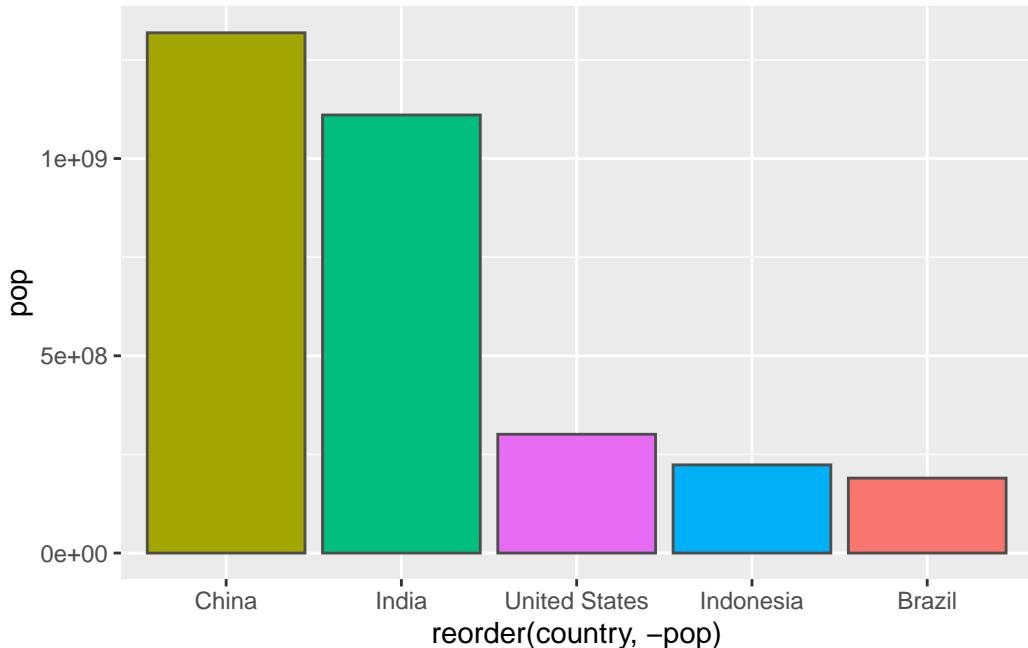
barplot_top5_bar <- ggplot(gapminder_top5)+  

  geom_col(aes(x= reorder(country, -pop), y=pop, fill= country ), col="gray30") +  

  guides(fill="none")

barplot_top5_bar

```



```

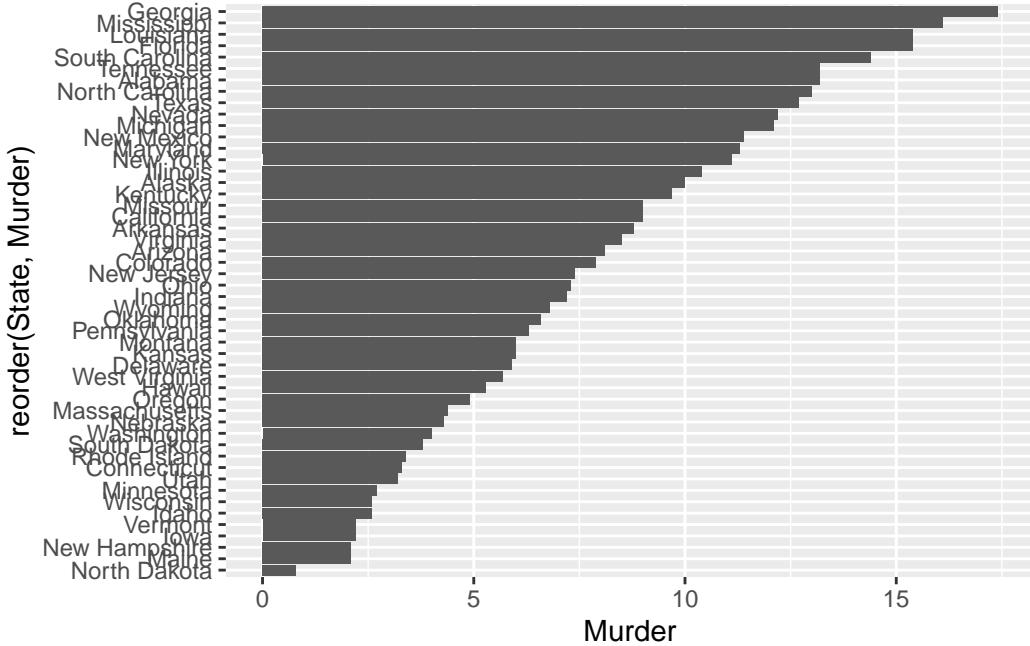
#to not run this chunk:  

#| eval: false

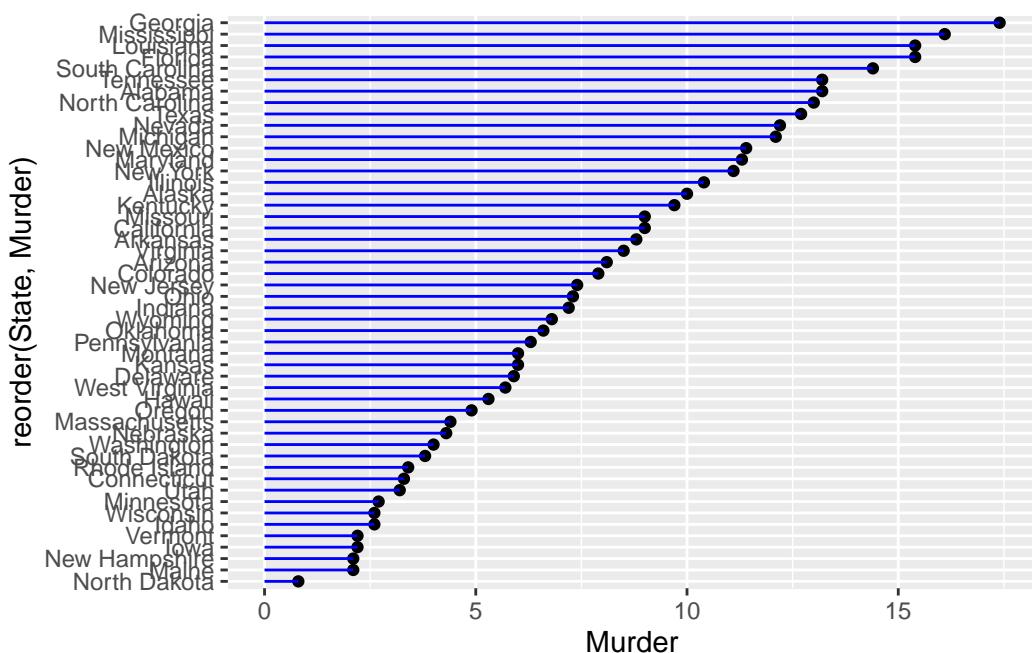
```

Flipping Bar Charts

```
library("ggplot2")  
  
head(USArrests)  
  
Murder Assault UrbanPop Rape  
Alabama     13.2      236       58 21.2  
Alaska      10.0      263       48 44.5  
Arizona      8.1       294       80 31.0  
Arkansas     8.8       190       50 19.5  
California   9.0       276       91 40.6  
Colorado     7.9       204       78 38.7  
  
#flipping bar chart  
USArrests$State <- rownames(USArrests)  
ggplot(USArrests) +  
  aes(x=reorder(State,Murder), y=Murder) +  
  geom_col() +  
  coord_flip()
```



```
# better aesthetics
USArrests$State <- rownames(USArrests)
ggplot(USArrests) +
  aes(x=reorder(State,Murder), y=Murder) +
  geom_point() +
  geom_segment( aes(x=State,
                     xend=State,
                     y=0,
                     yend=Murder), color="blue" )+
  coord_flip()
```



GGplot Animation

```
#install.packages("gifski")      ##remove # if need installation
#install.packages("ggridge")      ##remove # if need installation
library("gifski")
```

Warning: package 'gifski' was built under R version 4.1.3

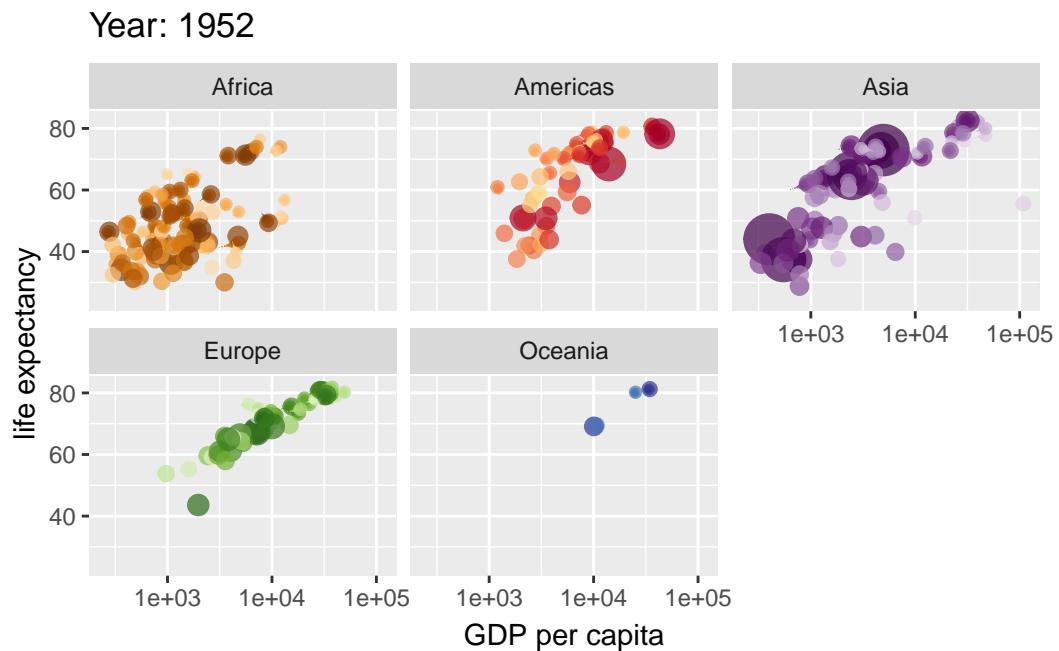
```
library("ggnimate")
```

Warning: package 'ggnimate' was built under R version 4.1.3

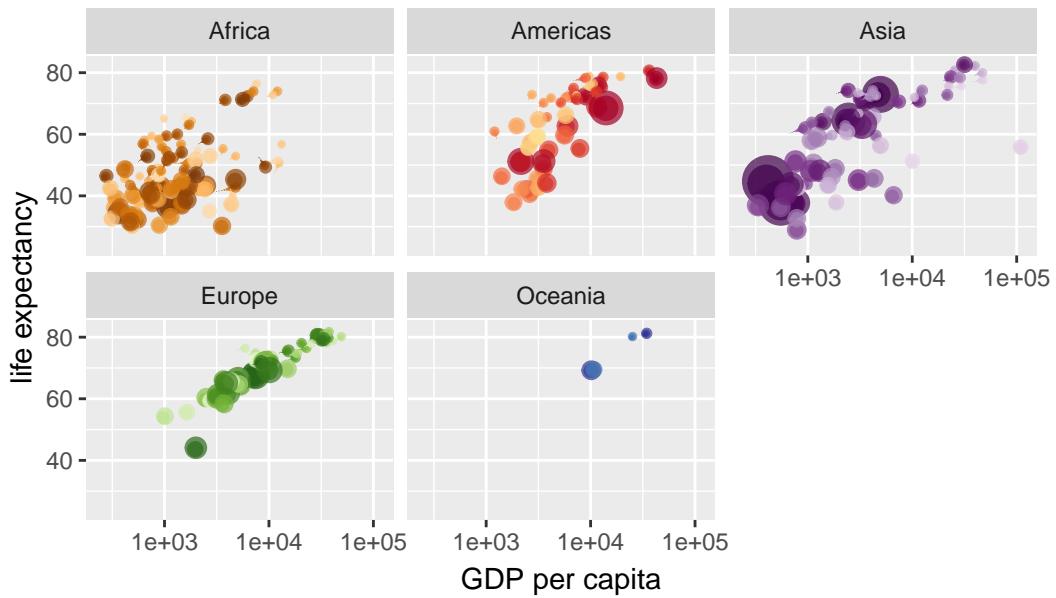
```
# File location online
url <- "https://raw.githubusercontent.com/jennybc/gapminder/master/inst/extdata/gapminder.csv"

gapminder <- read.delim(url)

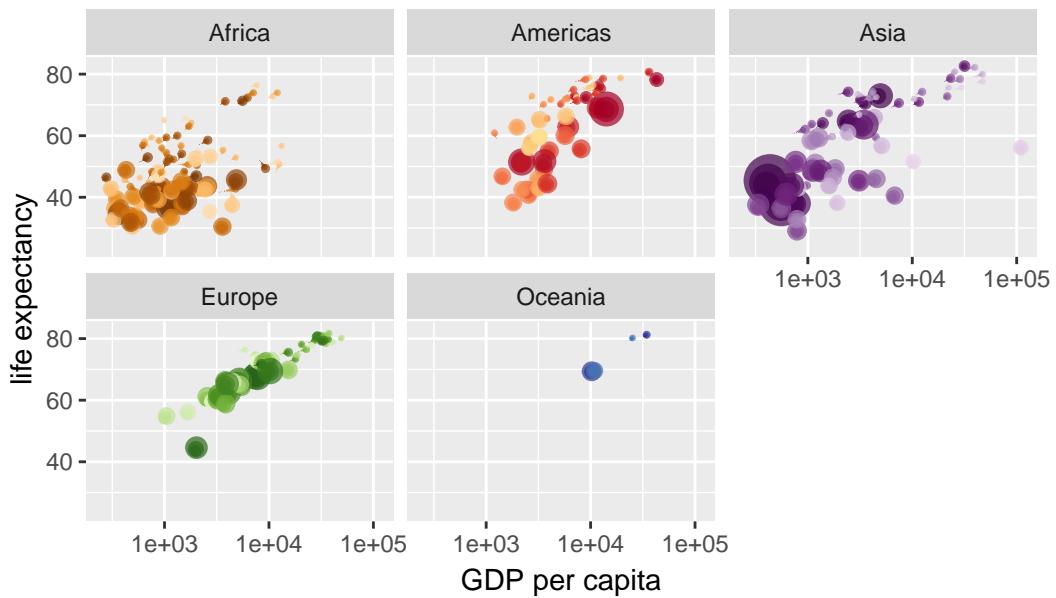
# Setup nice regular ggplot of the gapminder data
ggplot(gapminder, aes(gdpPercap, lifeExp, size = pop, colour = country)) +
  geom_point(alpha = 0.7, show.legend = FALSE) +
  scale_colour_manual(values = country_colors) +
  scale_size(range = c(2, 12)) +
  scale_x_log10() +
  # Facet by continent
  facet_wrap(~continent) +
  # Here comes the ggnimate specific bits
  labs(title = 'Year: {frame_time}', x = 'GDP per capita', y = 'life expectancy') +
  transition_time(year) +
  shadow_wake(wake_length = 0.1, alpha = FALSE)
```



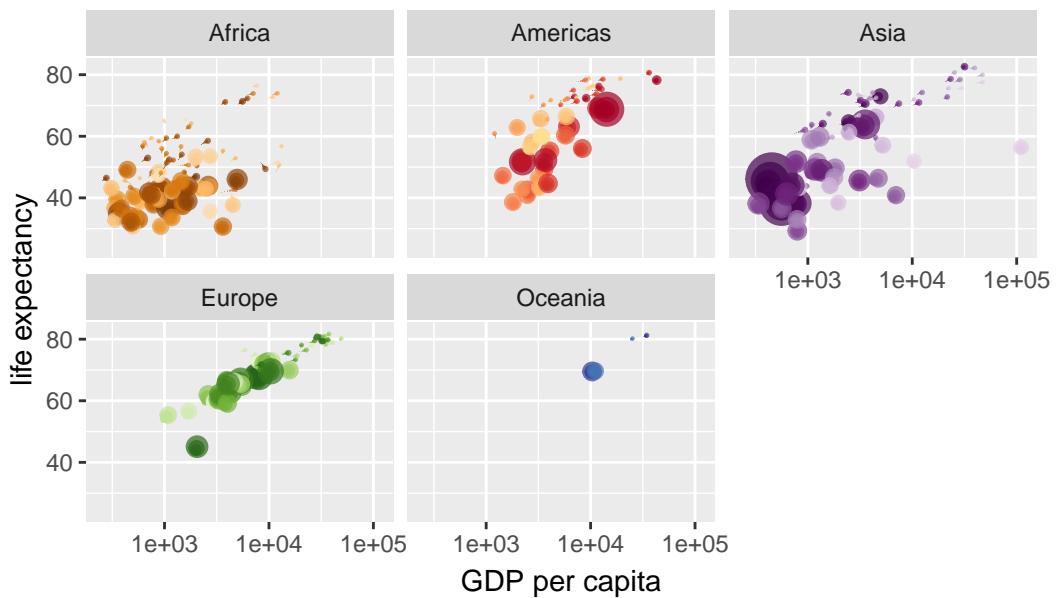
Year: 1953



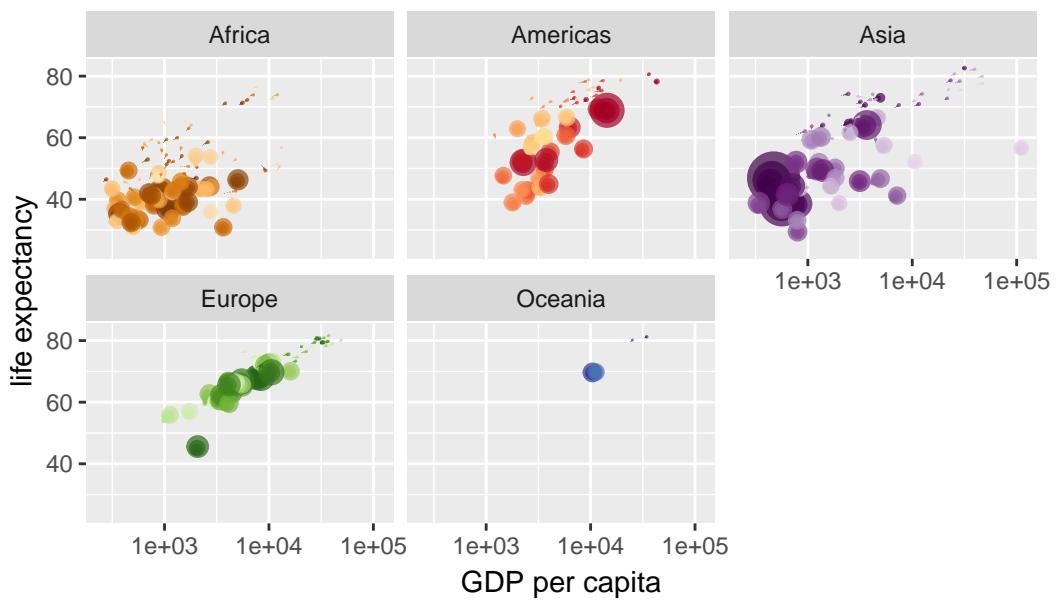
Year: 1953



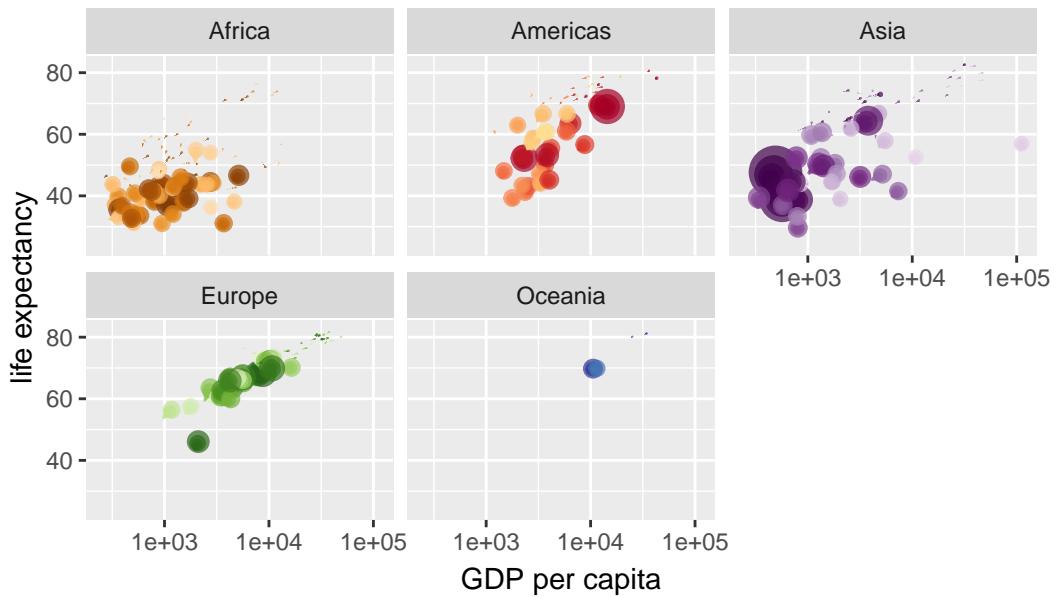
Year: 1954



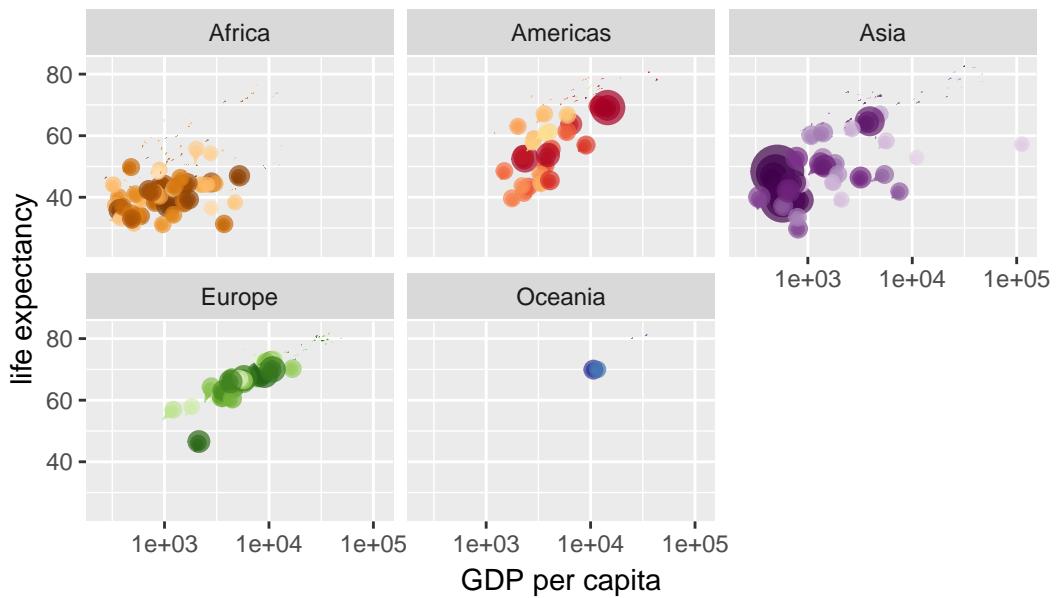
Year: 1954



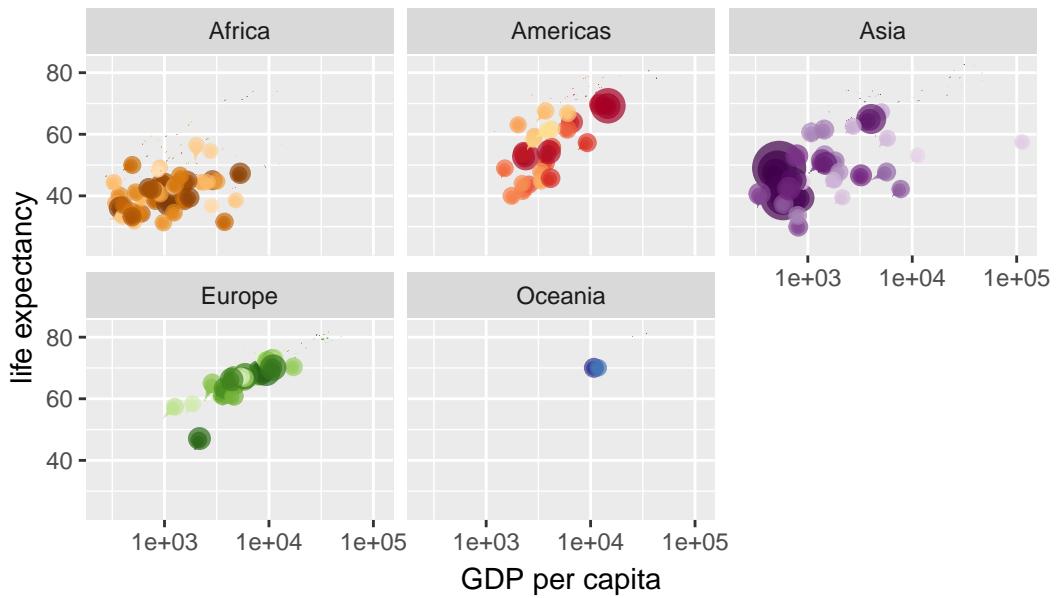
Year: 1955



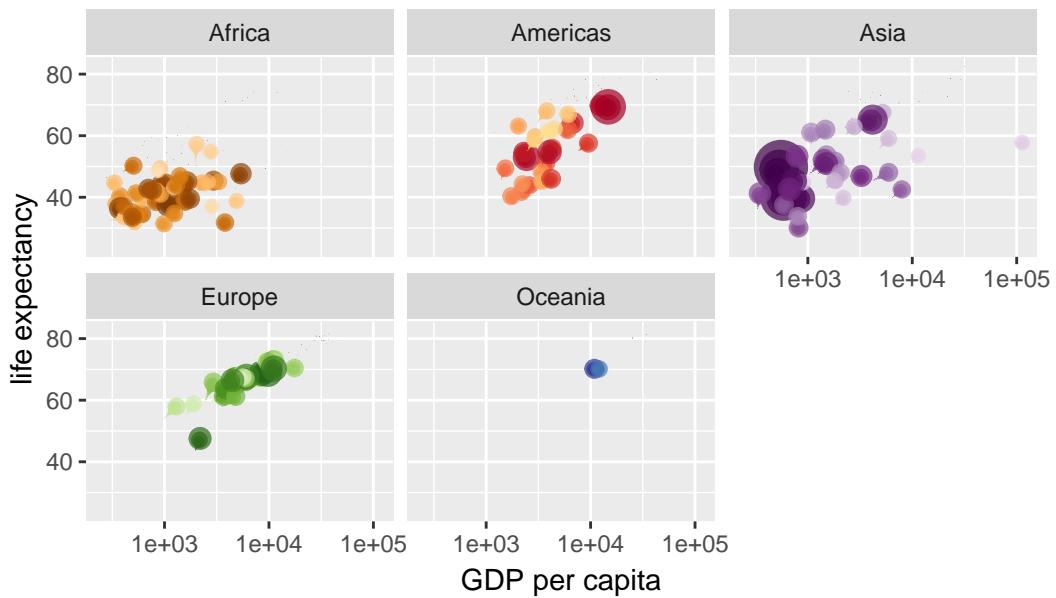
Year: 1955



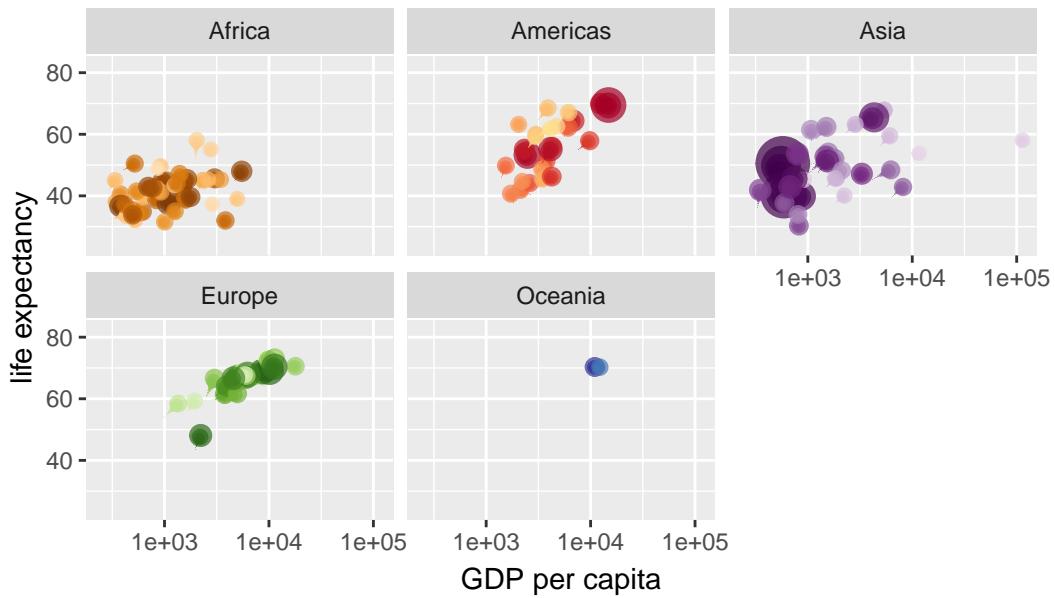
Year: 1956



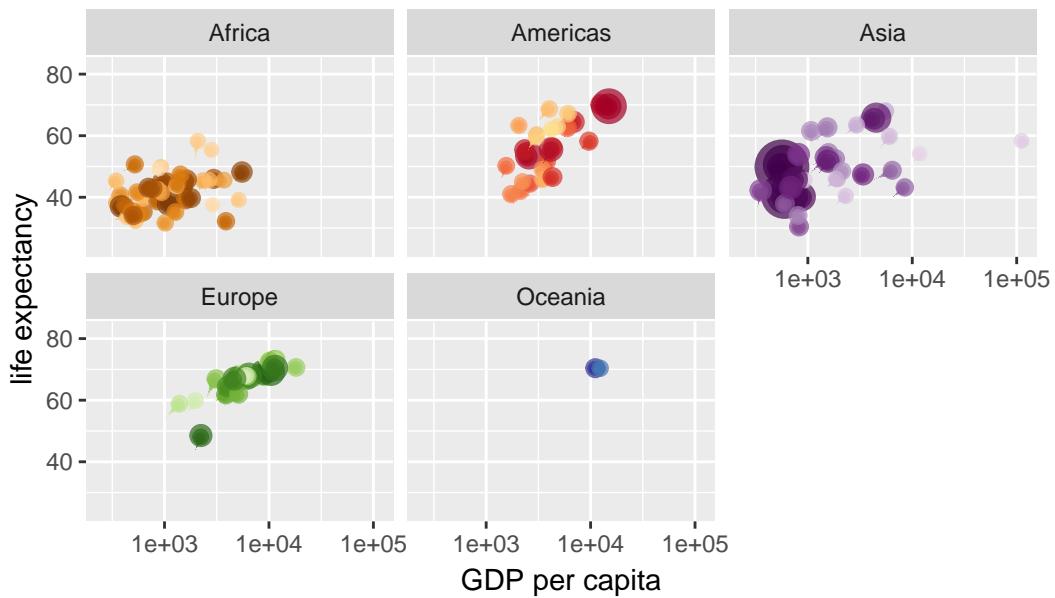
Year: 1956



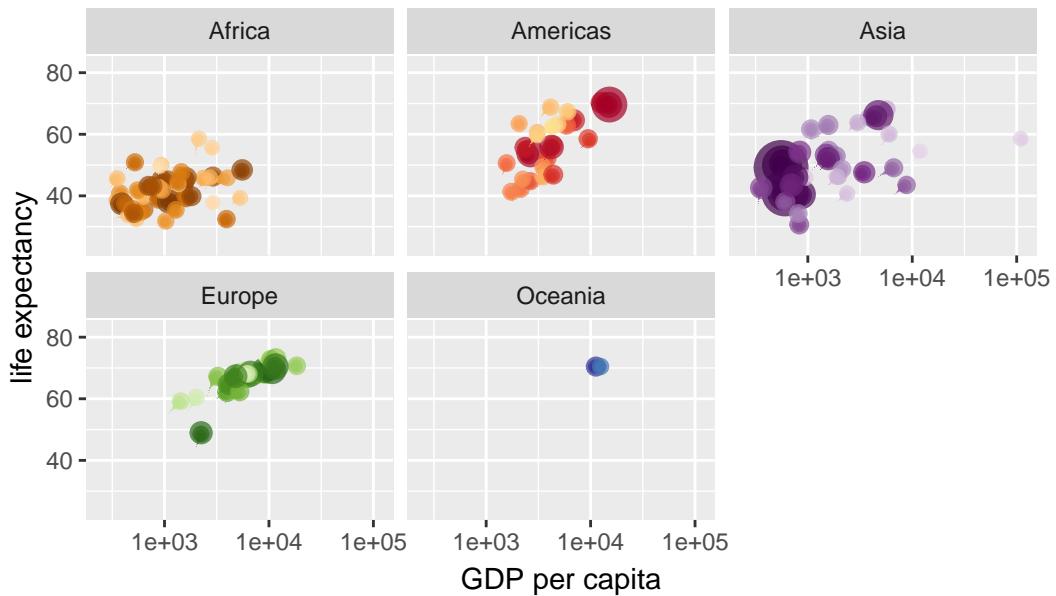
Year: 1957



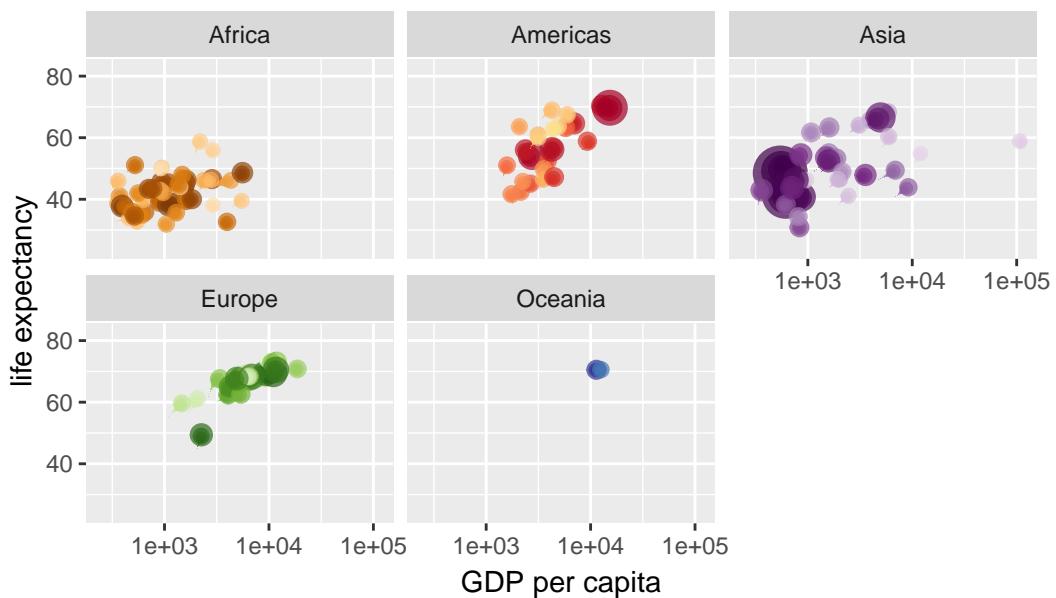
Year: 1958



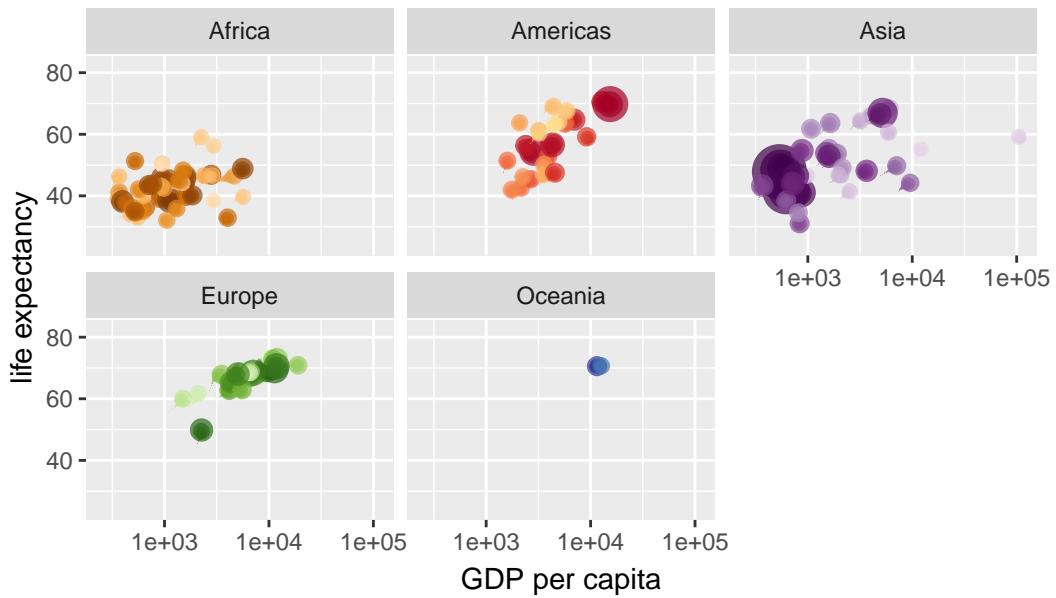
Year: 1958



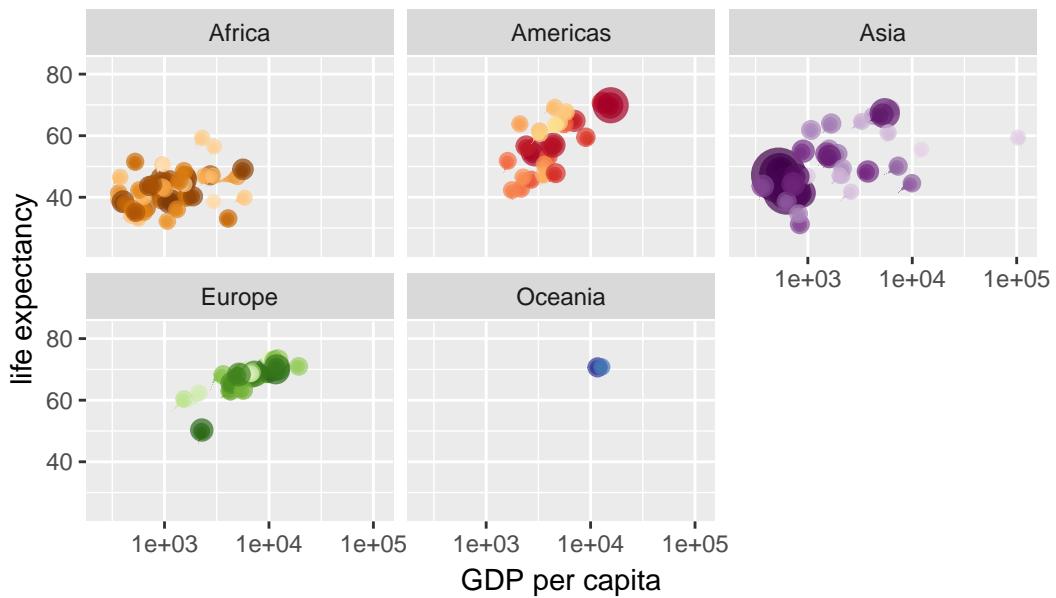
Year: 1959



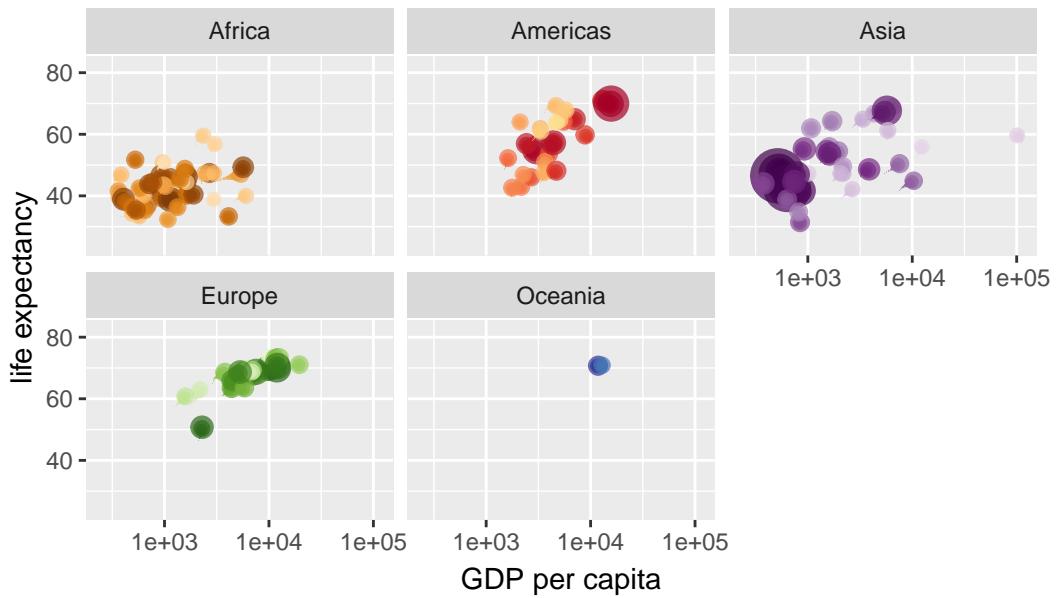
Year: 1959



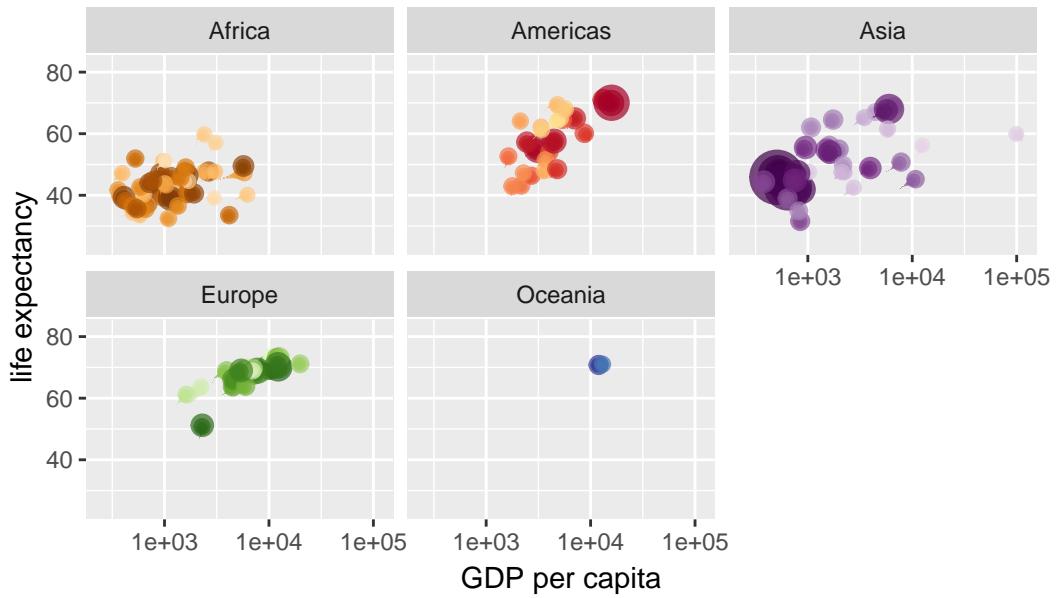
Year: 1960



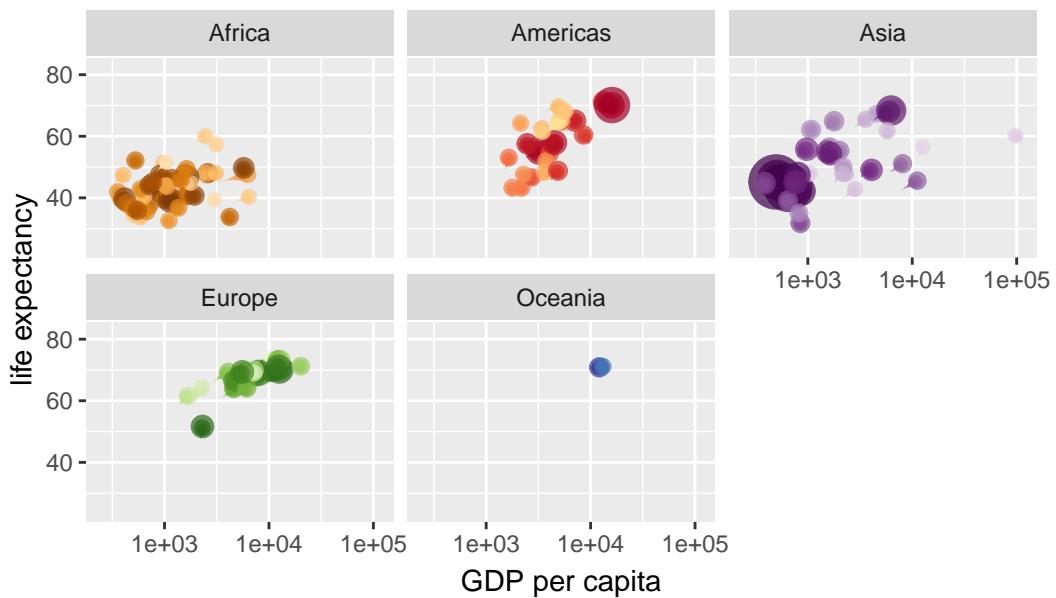
Year: 1960



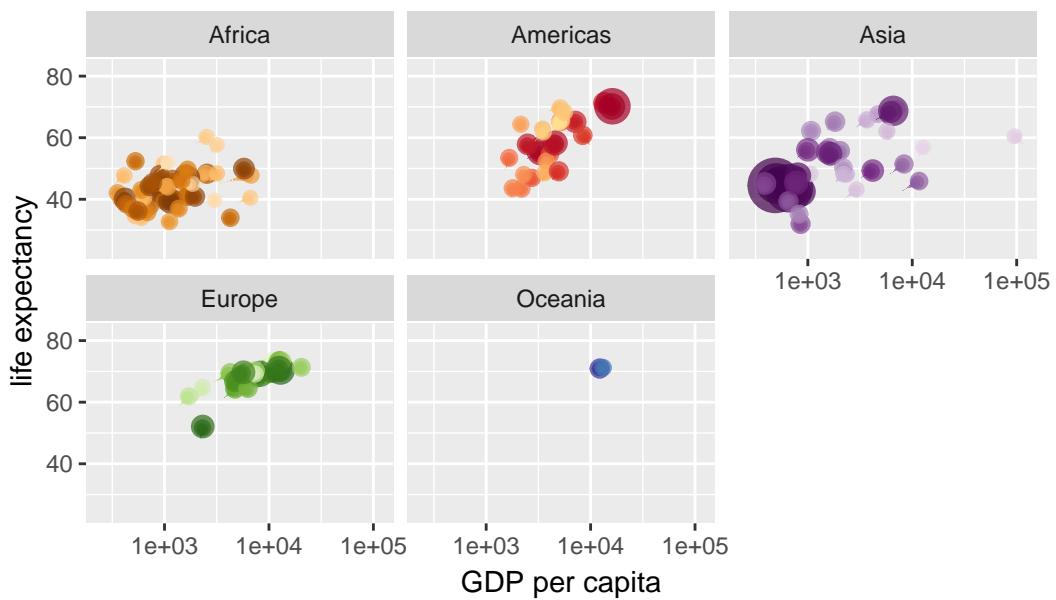
Year: 1961



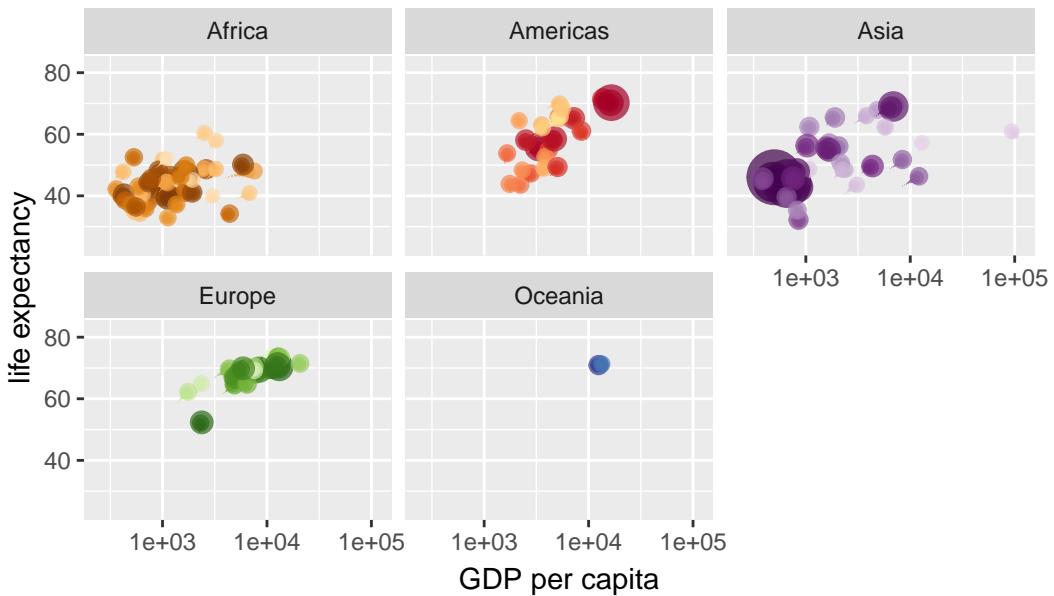
Year: 1961



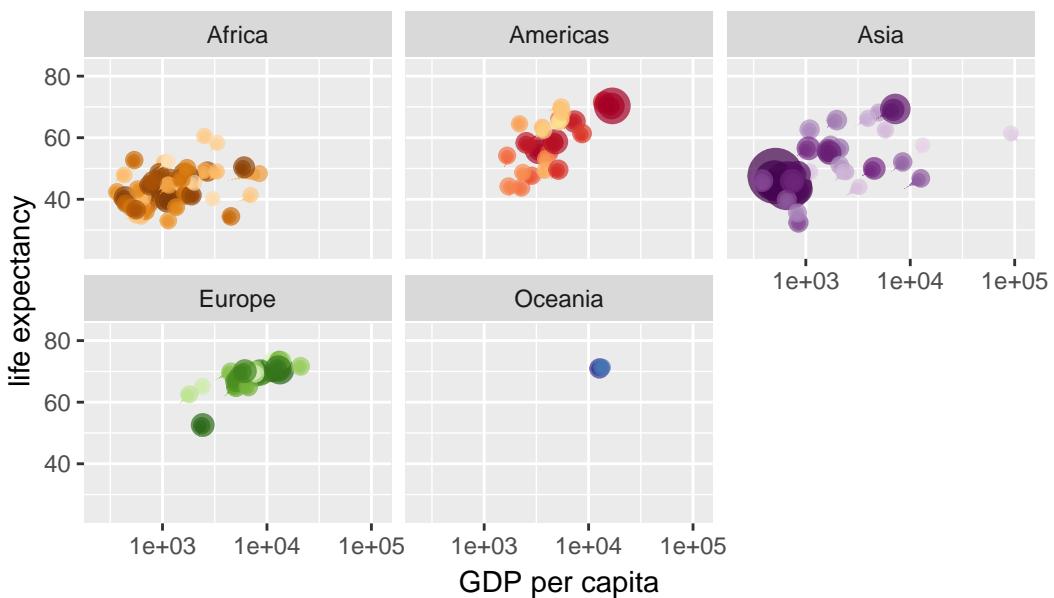
Year: 1962



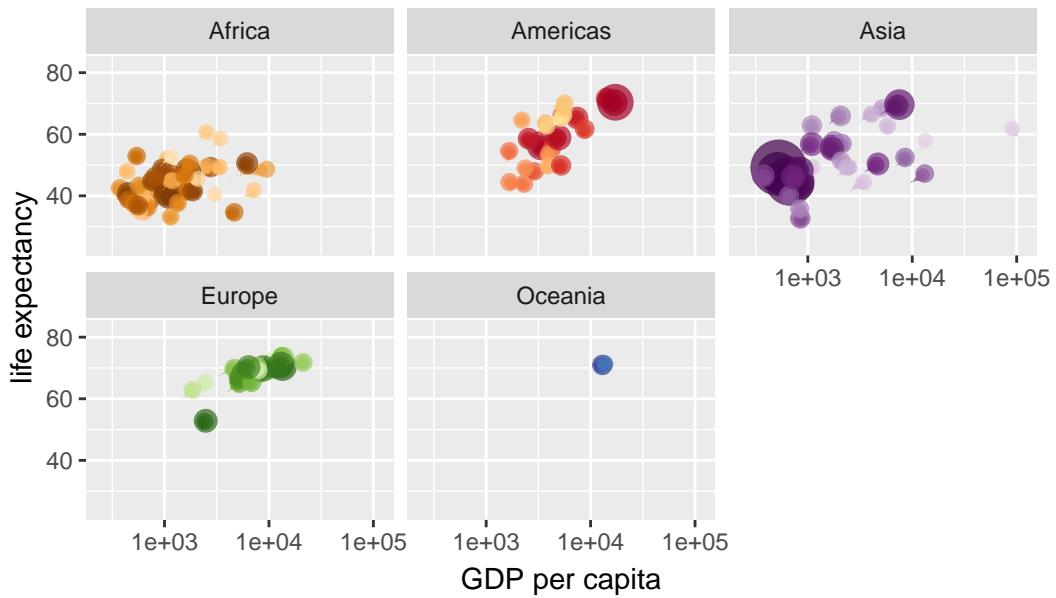
Year: 1963



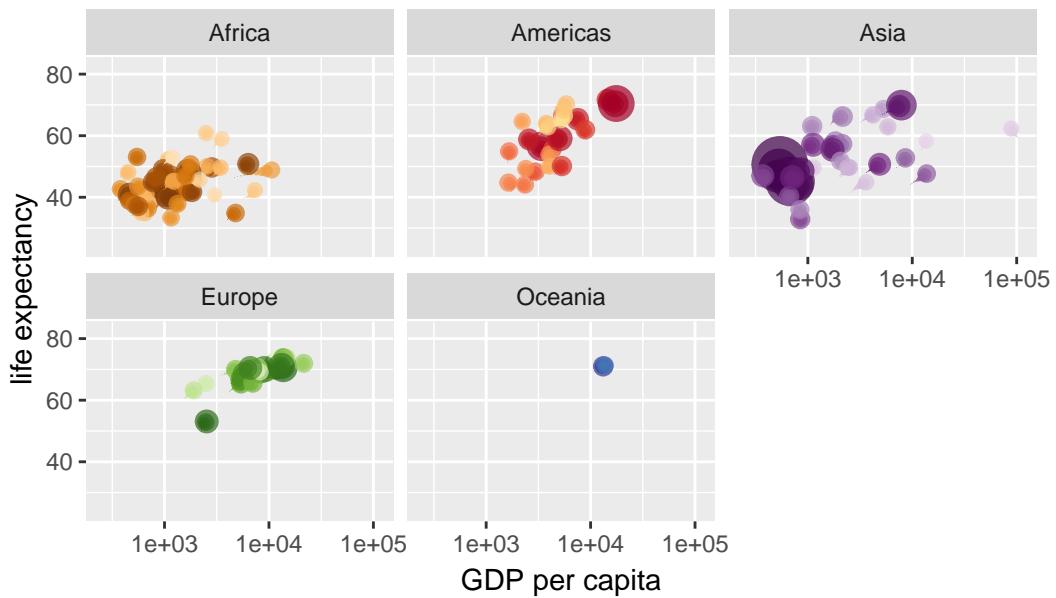
Year: 1963



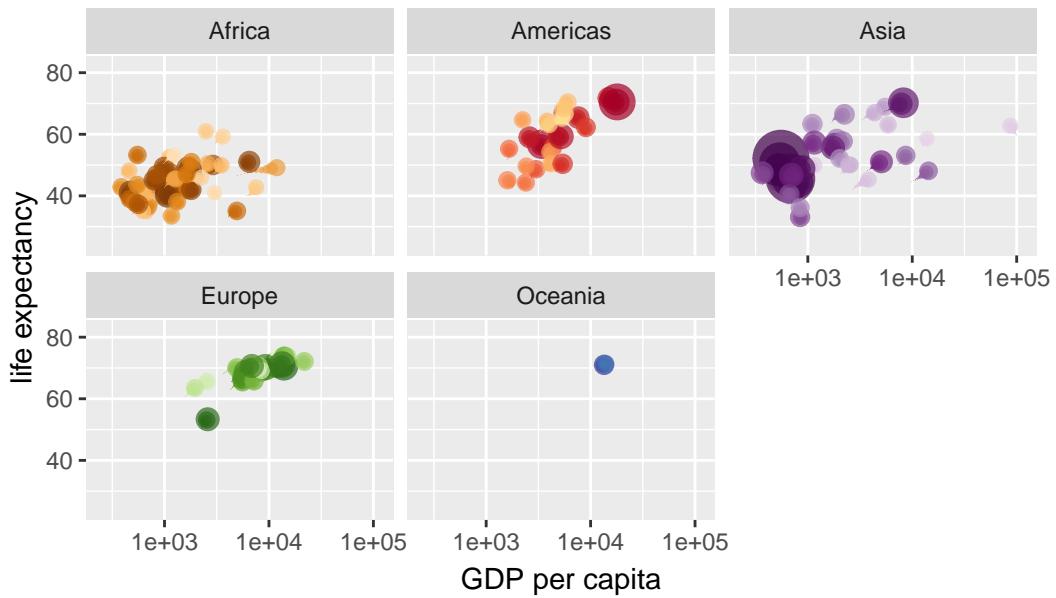
Year: 1964



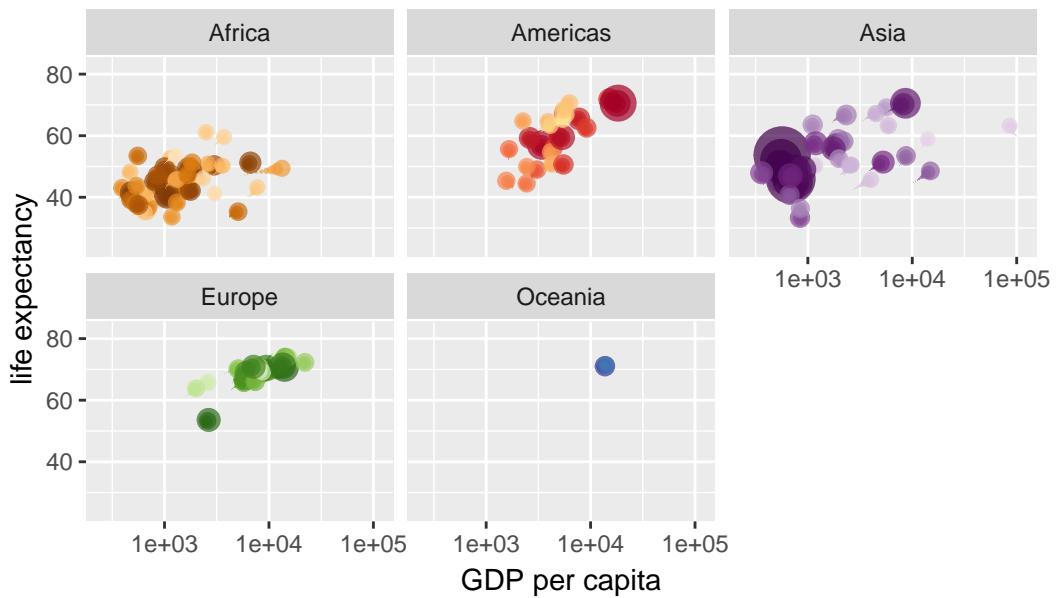
Year: 1964



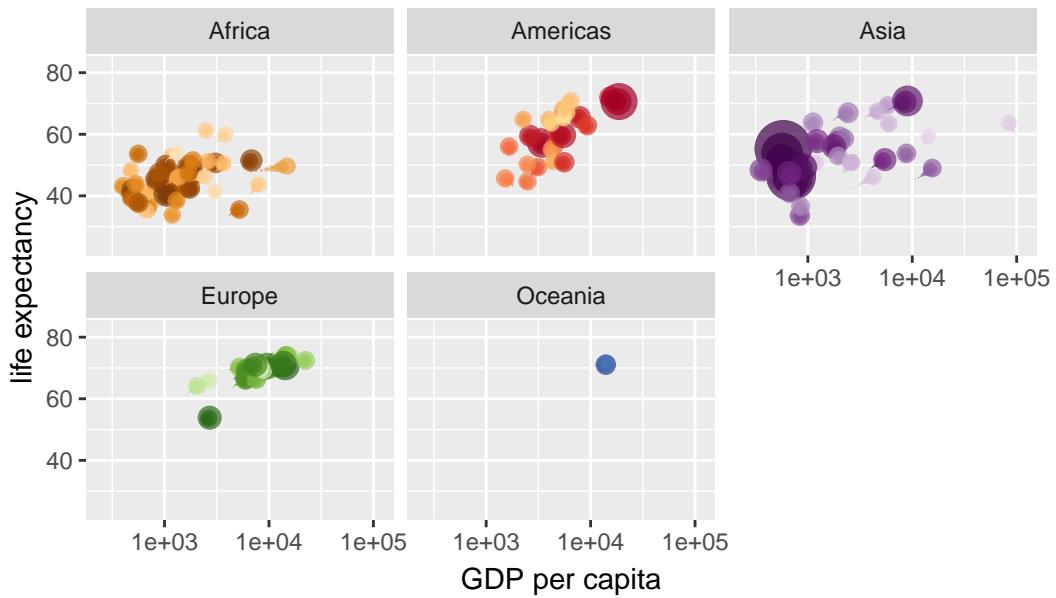
Year: 1965



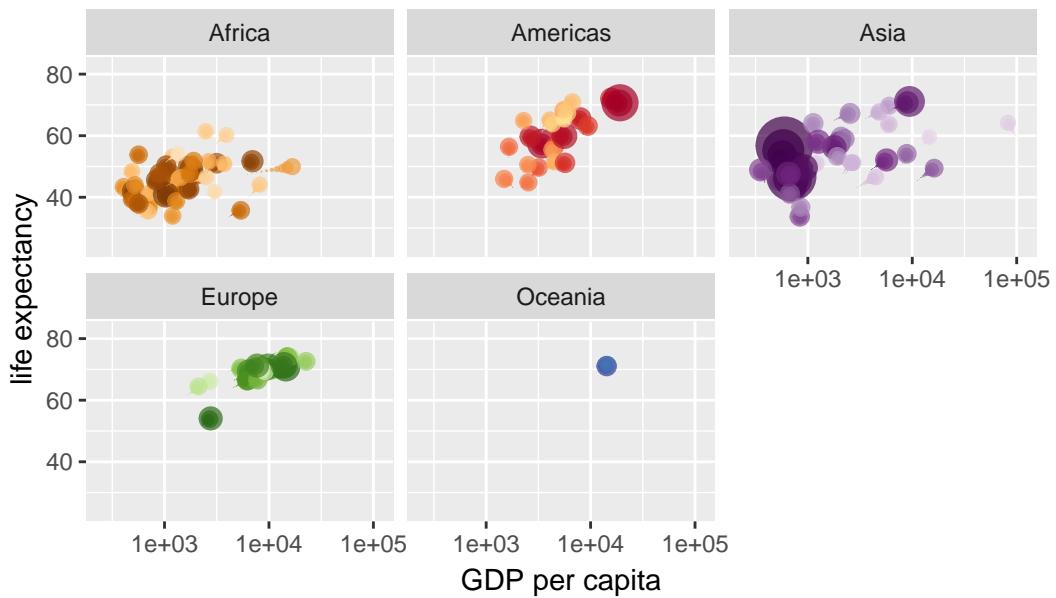
Year: 1965



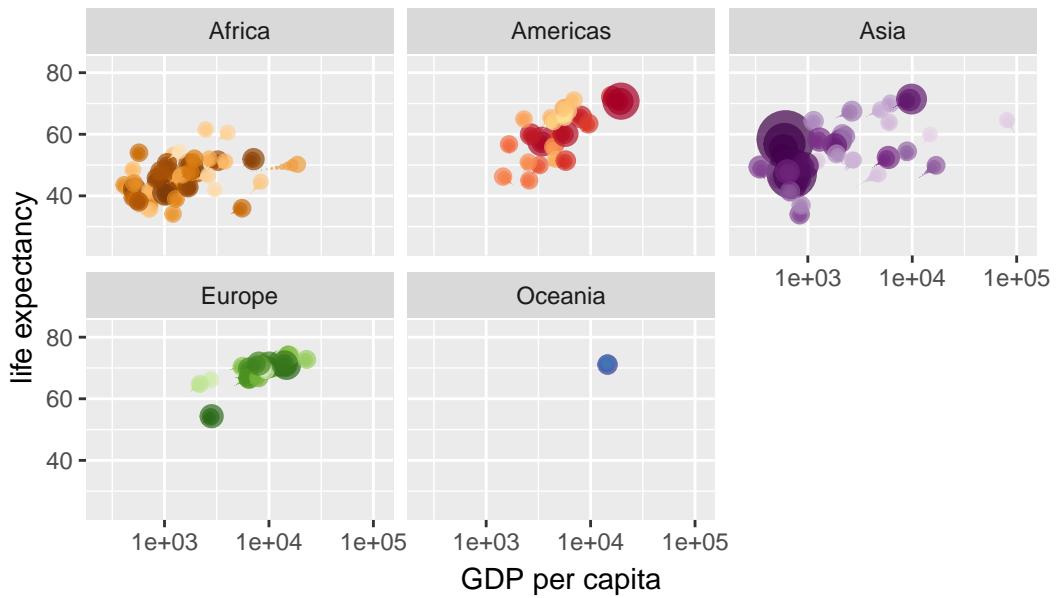
Year: 1966



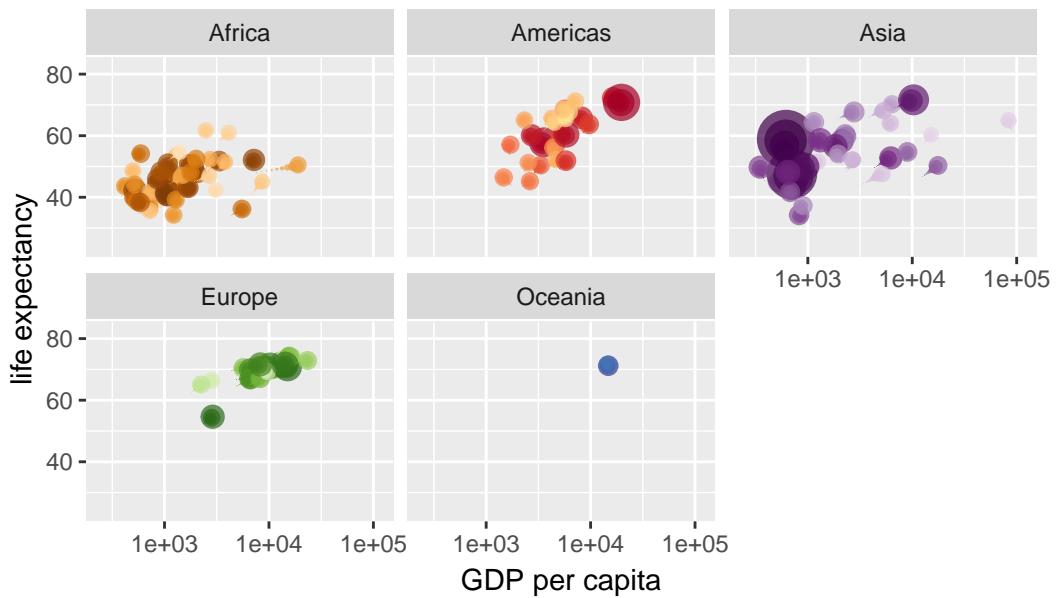
Year: 1966



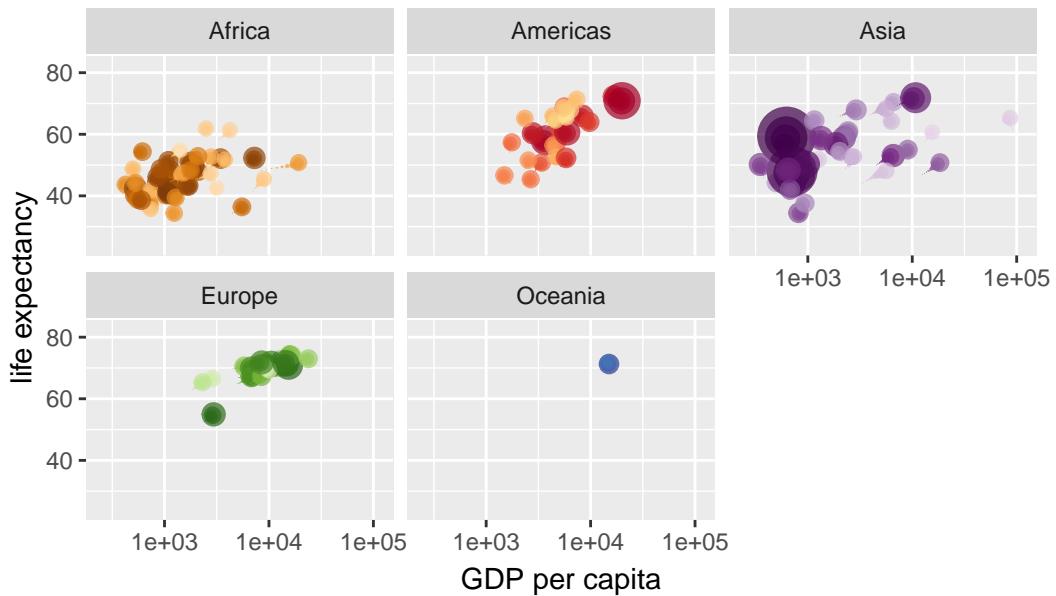
Year: 1967



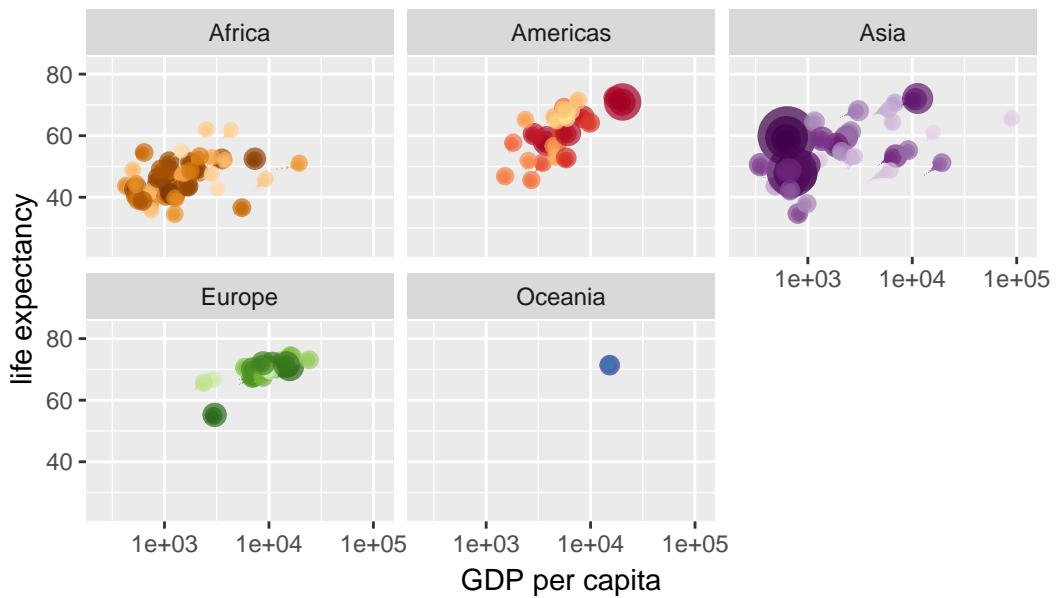
Year: 1968



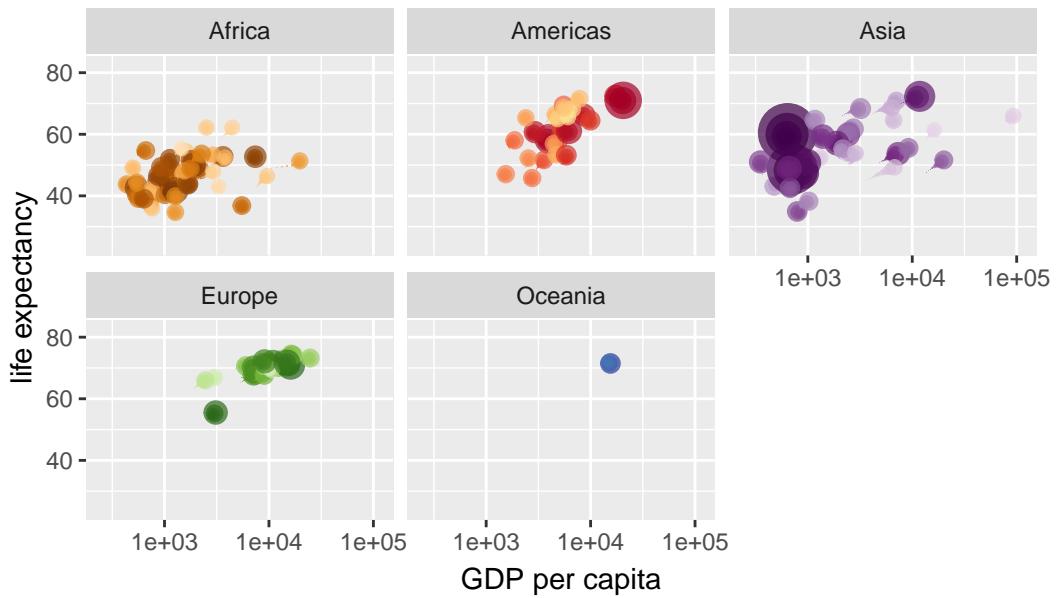
Year: 1968



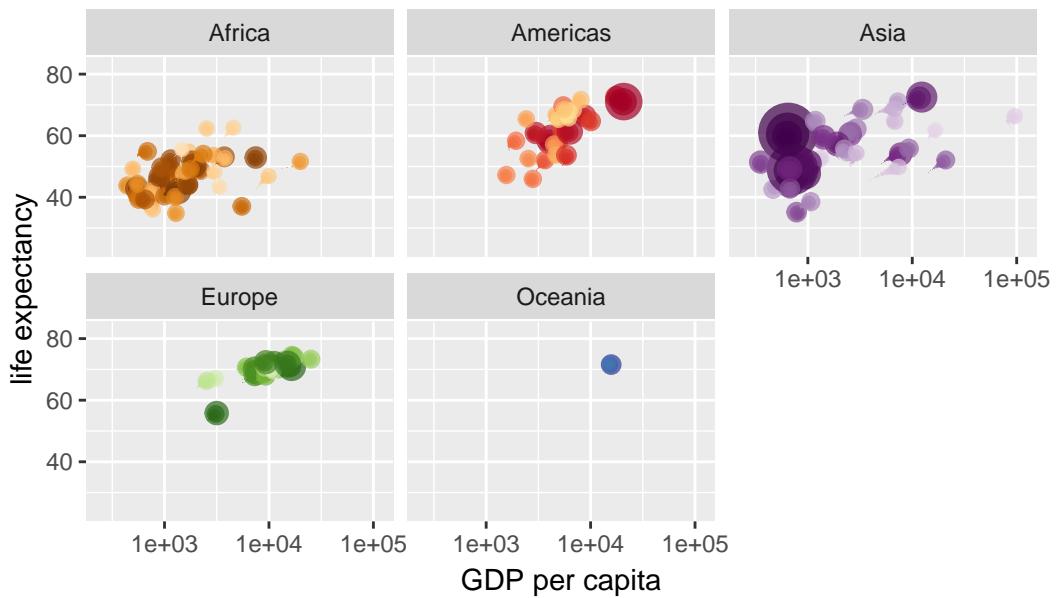
Year: 1969



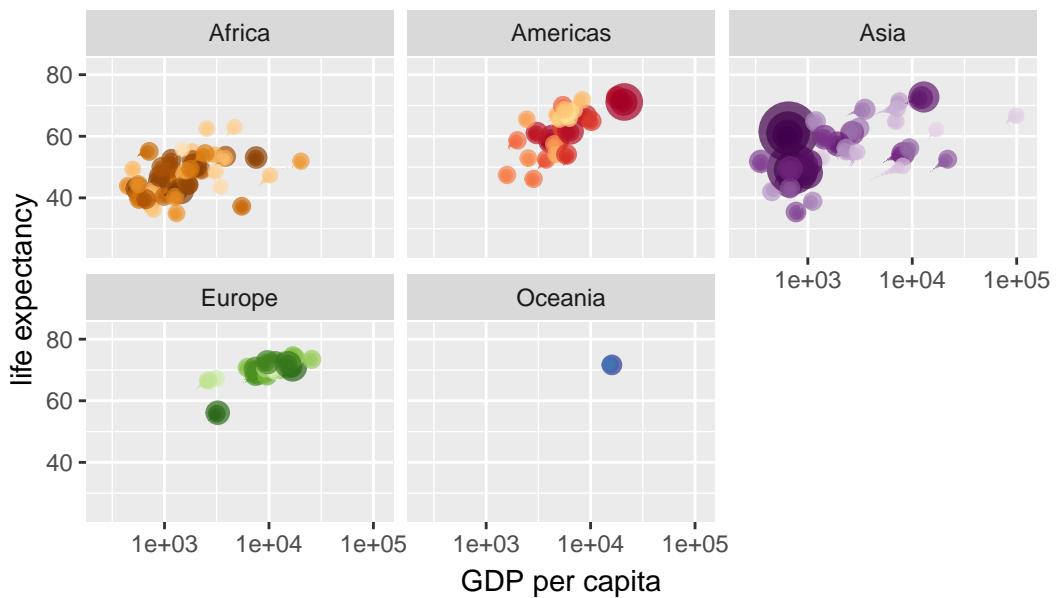
Year: 1969



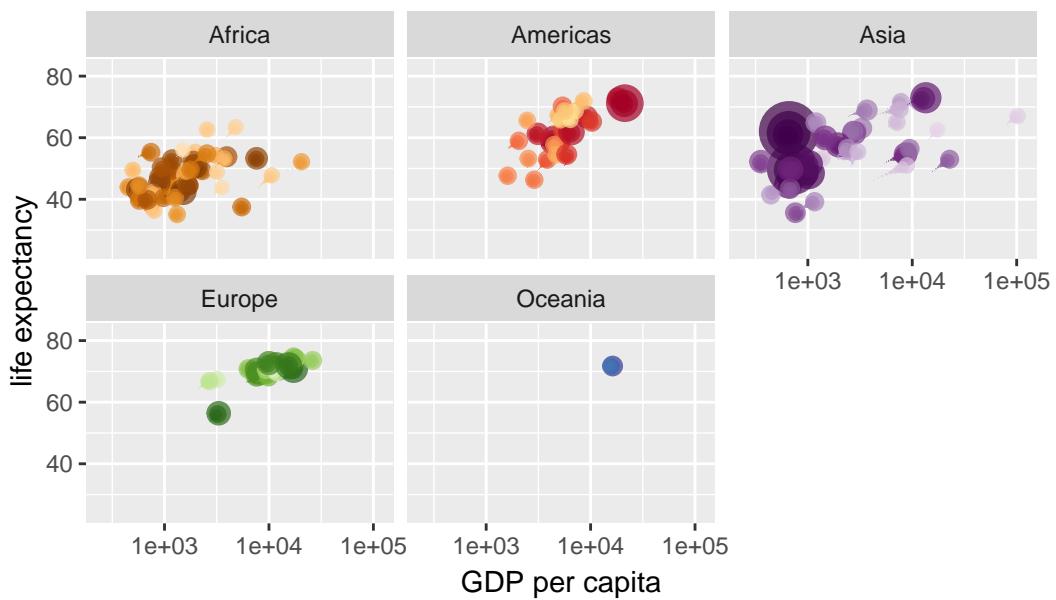
Year: 1970



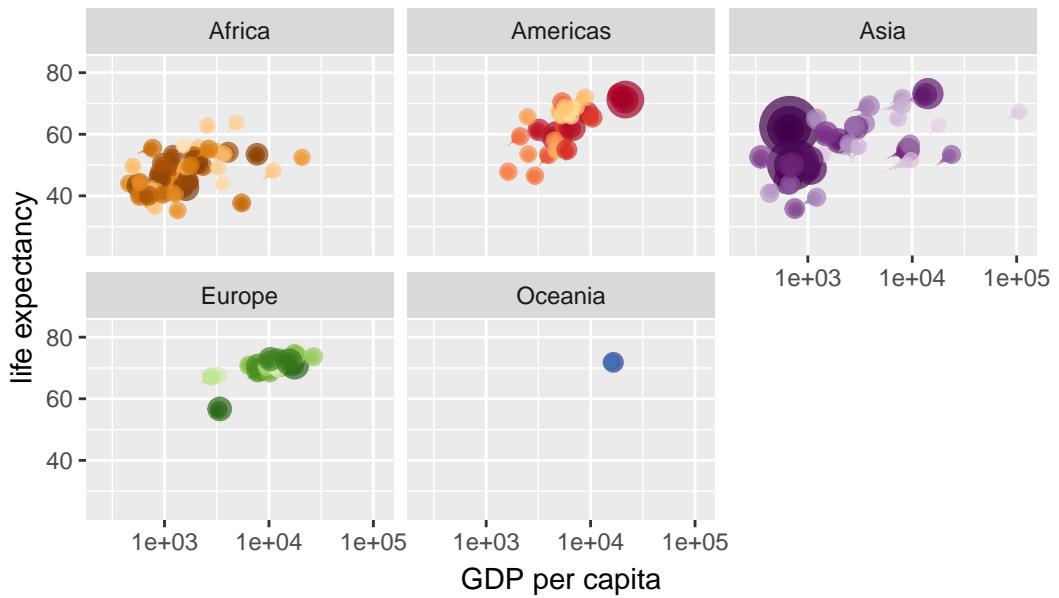
Year: 1970



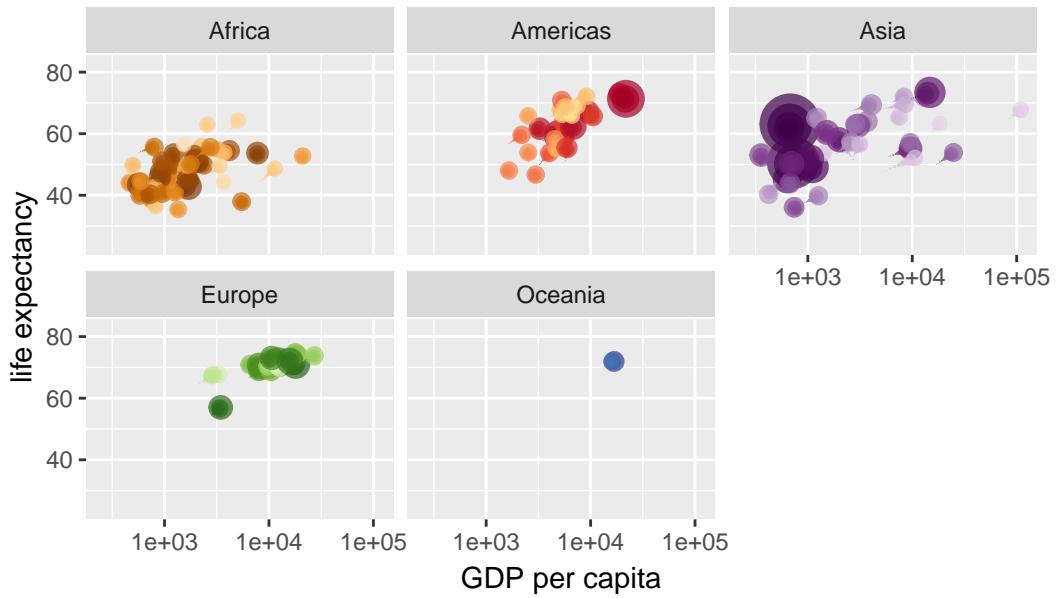
Year: 1971



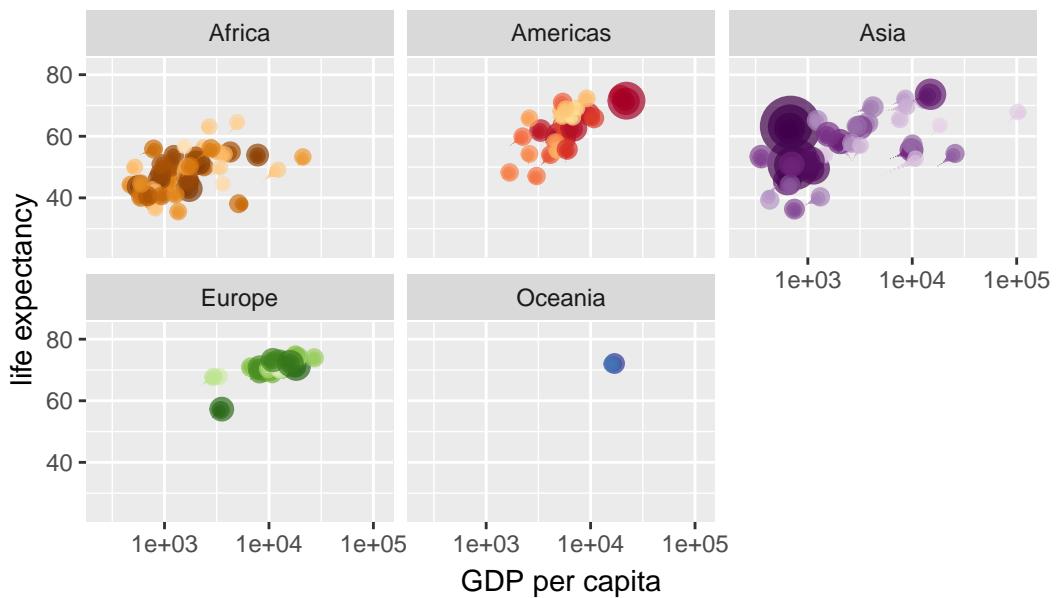
Year: 1971



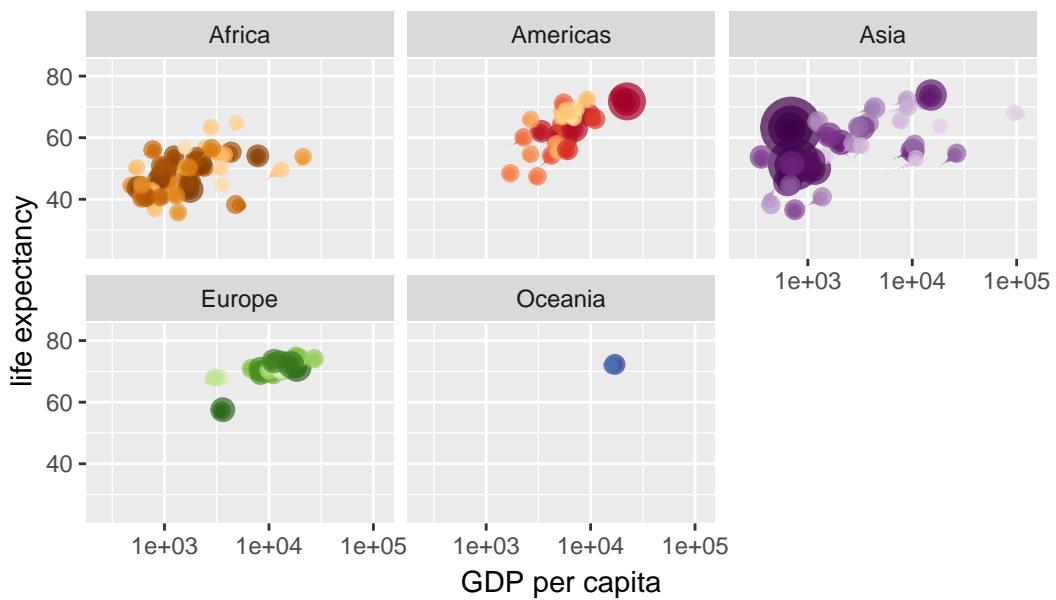
Year: 1972



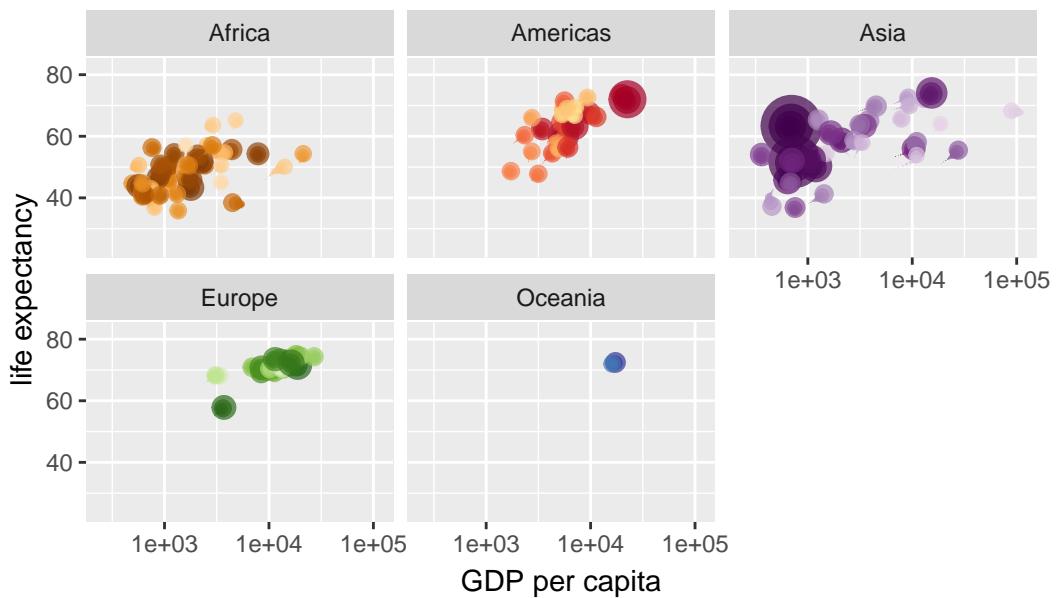
Year: 1973



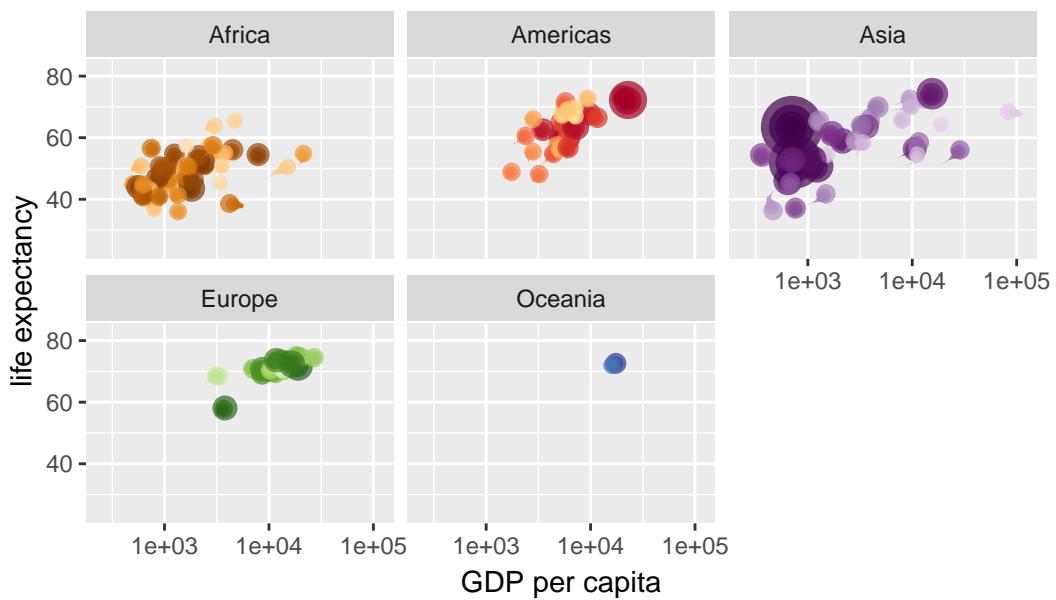
Year: 1973



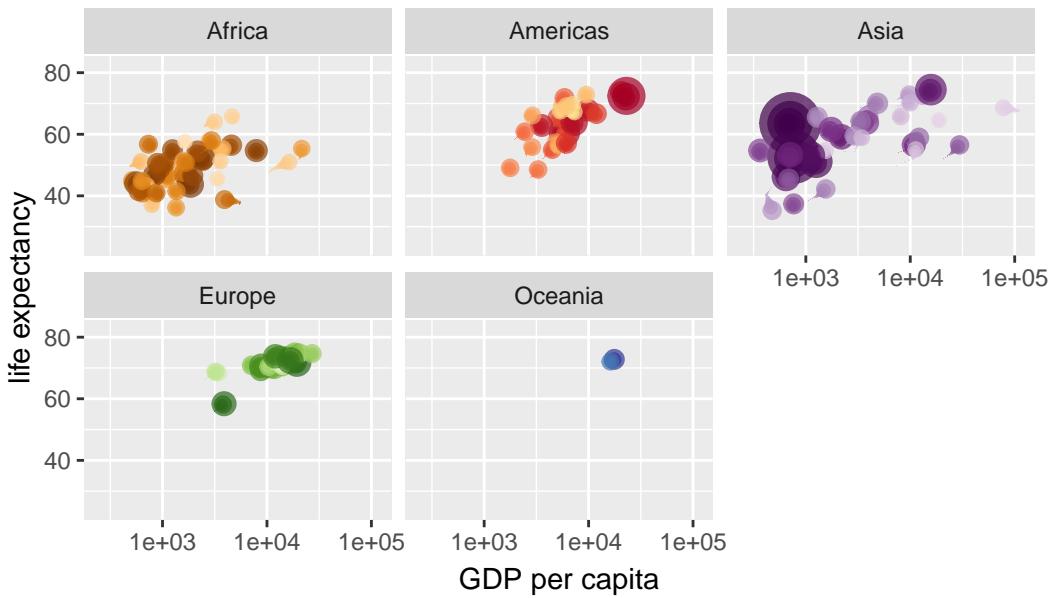
Year: 1974



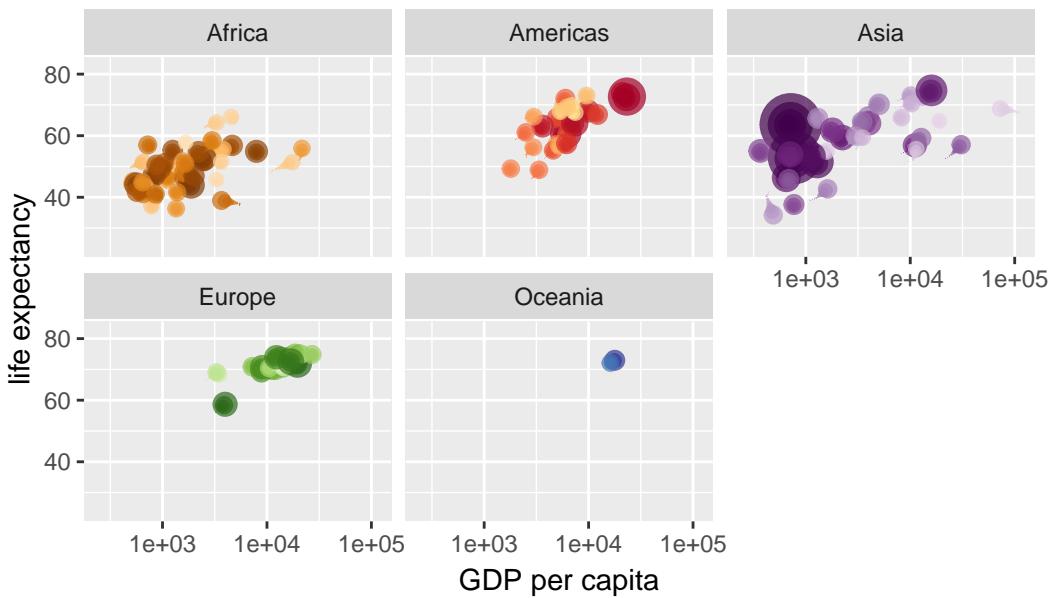
Year: 1974



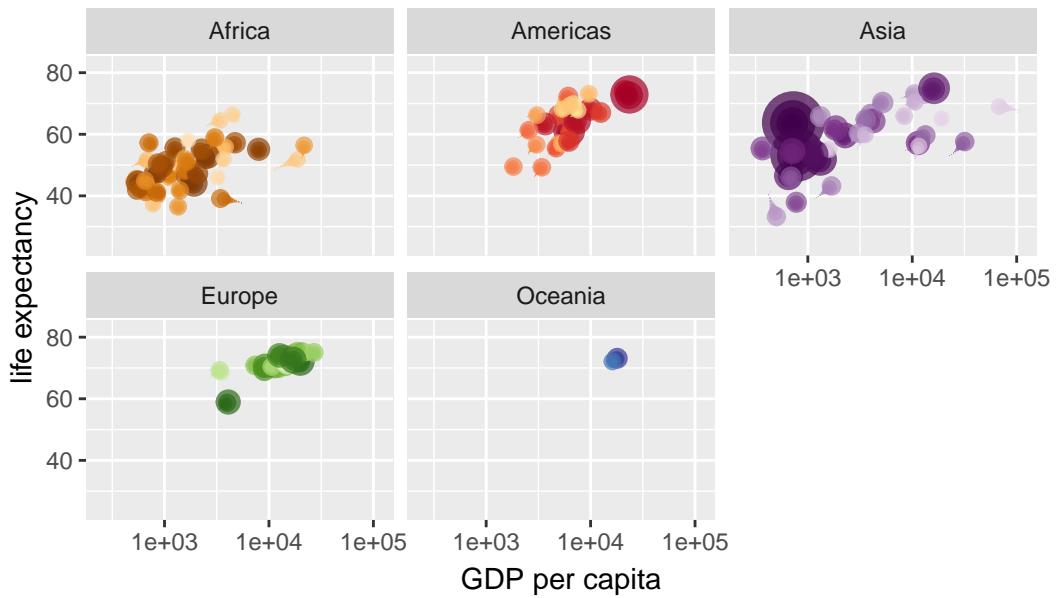
Year: 1975



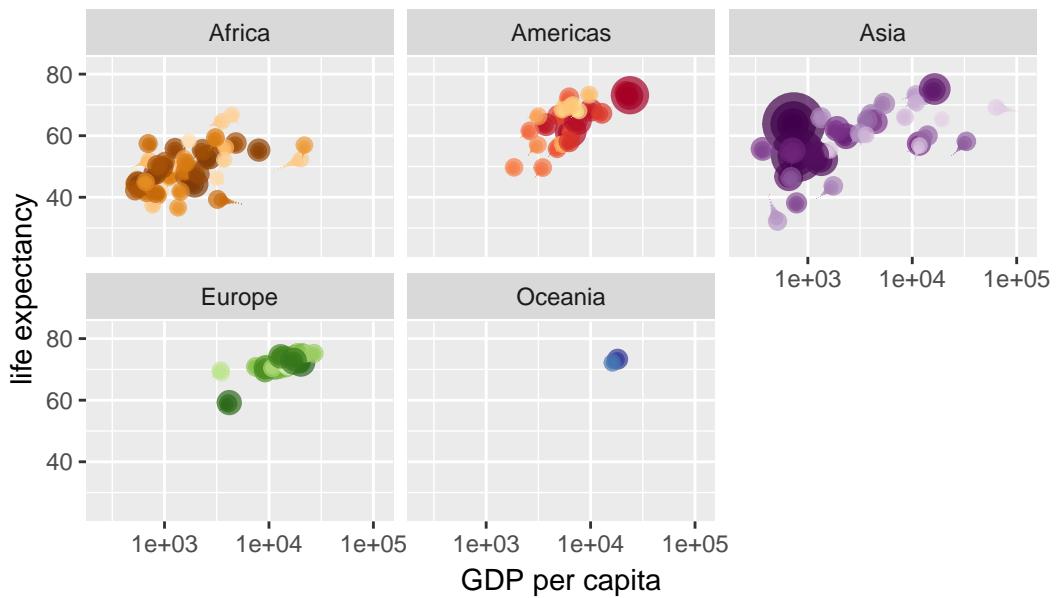
Year: 1975



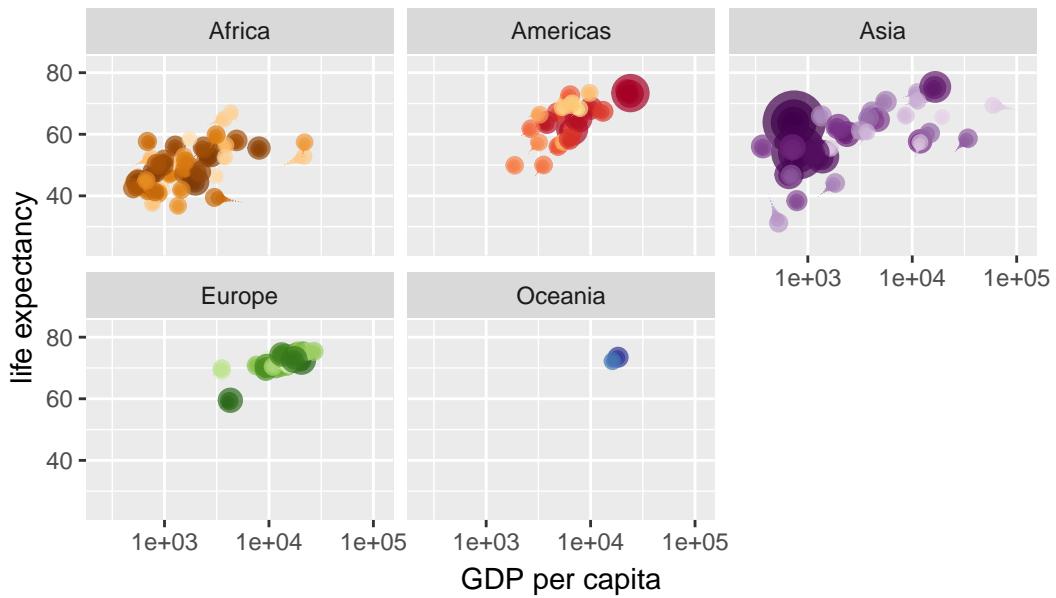
Year: 1976



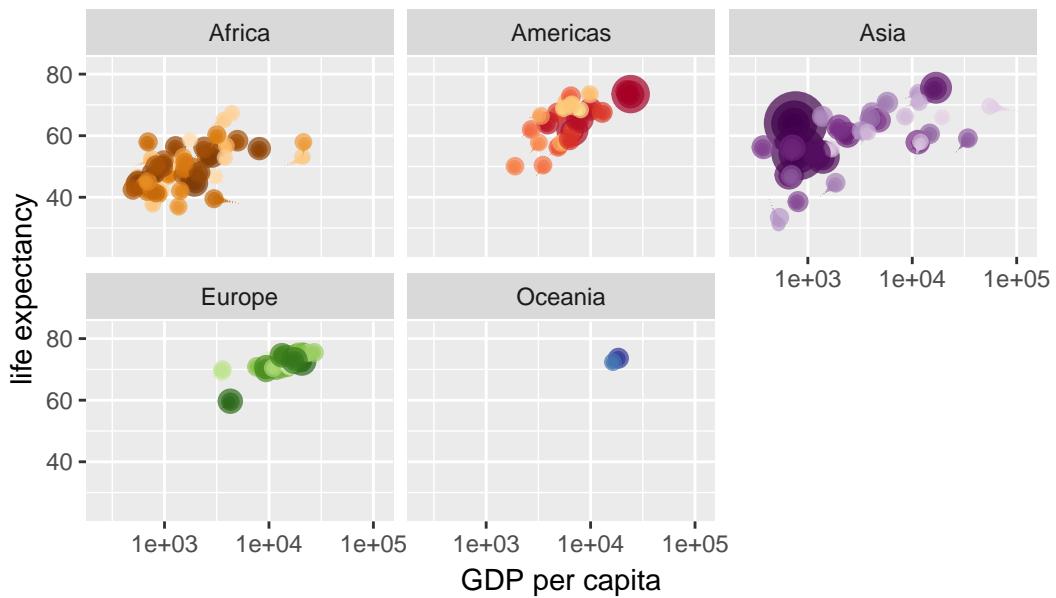
Year: 1976



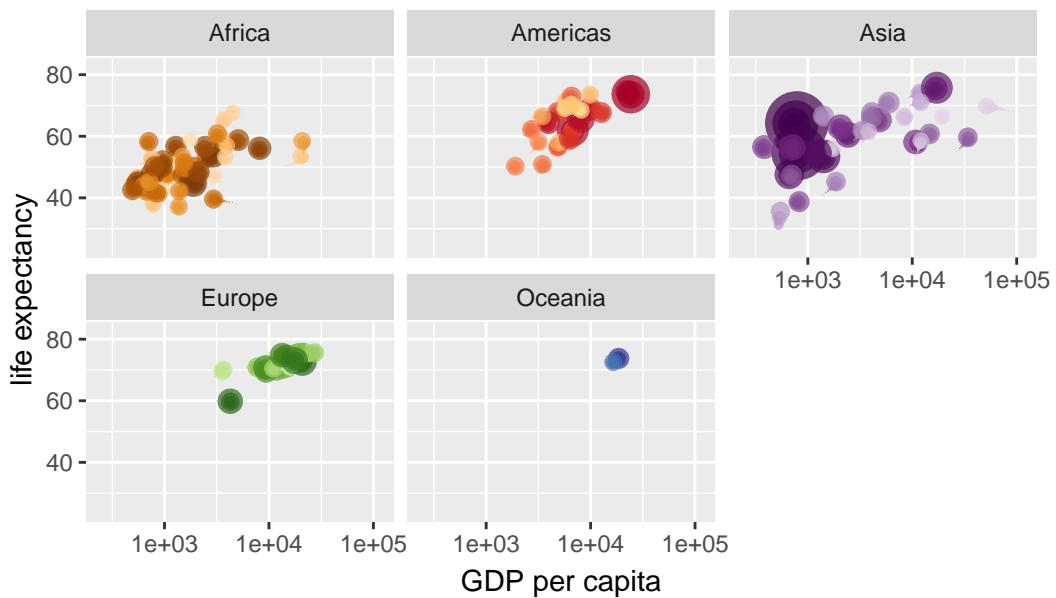
Year: 1977



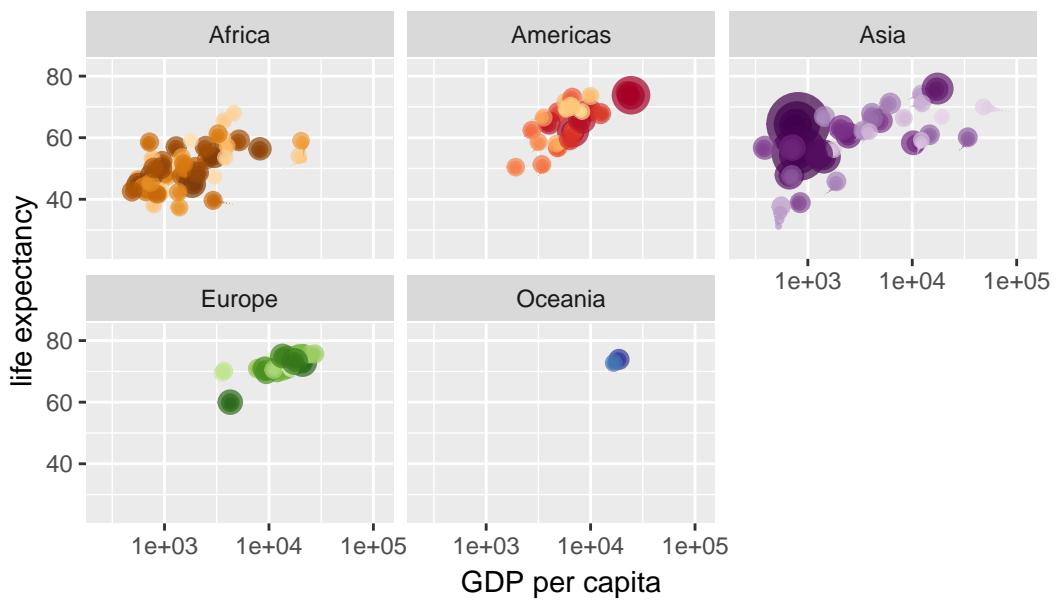
Year: 1978



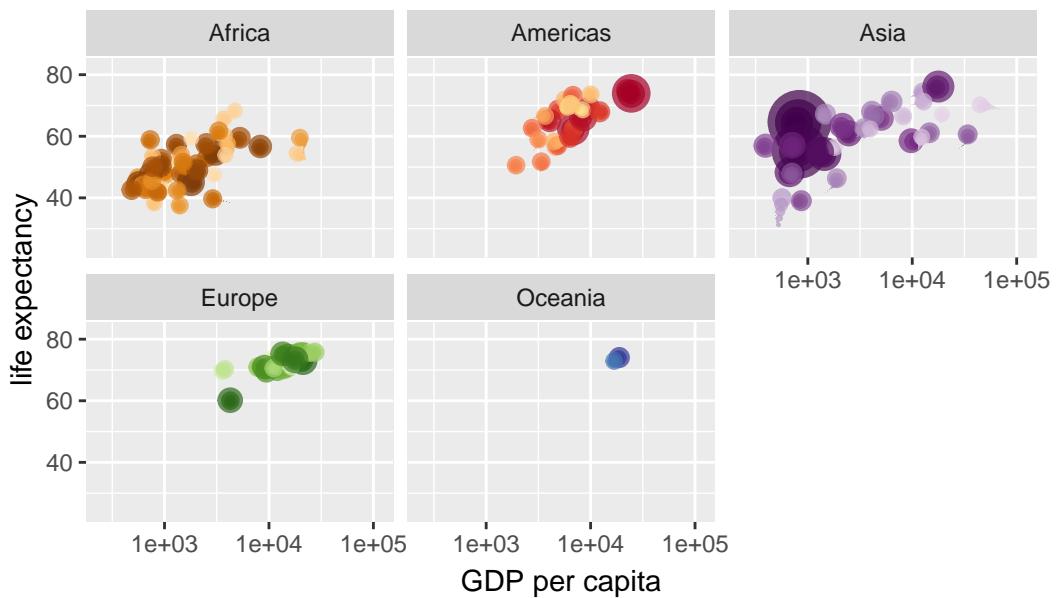
Year: 1978



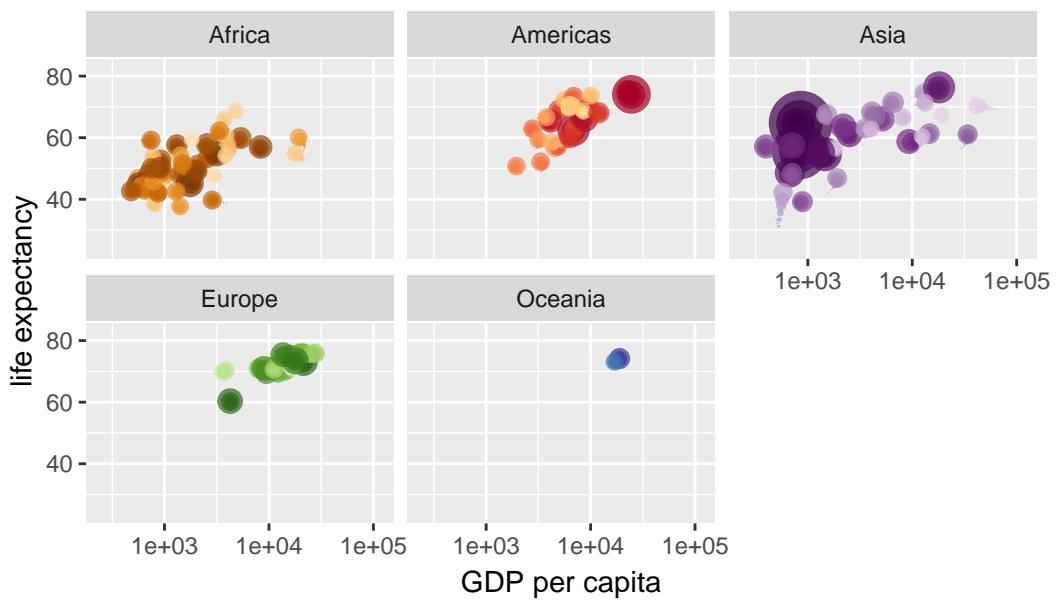
Year: 1979



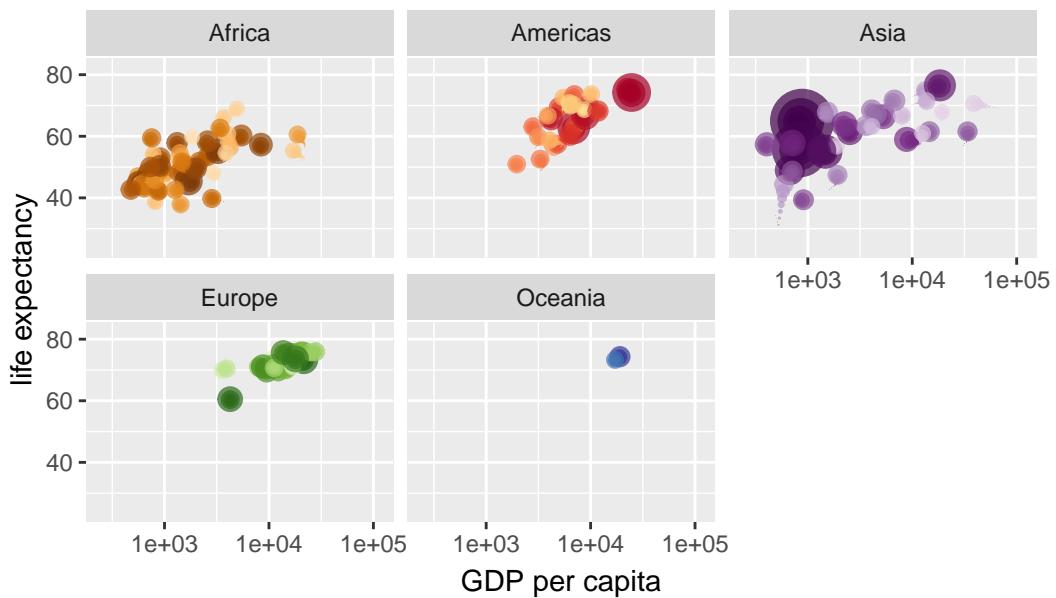
Year: 1979



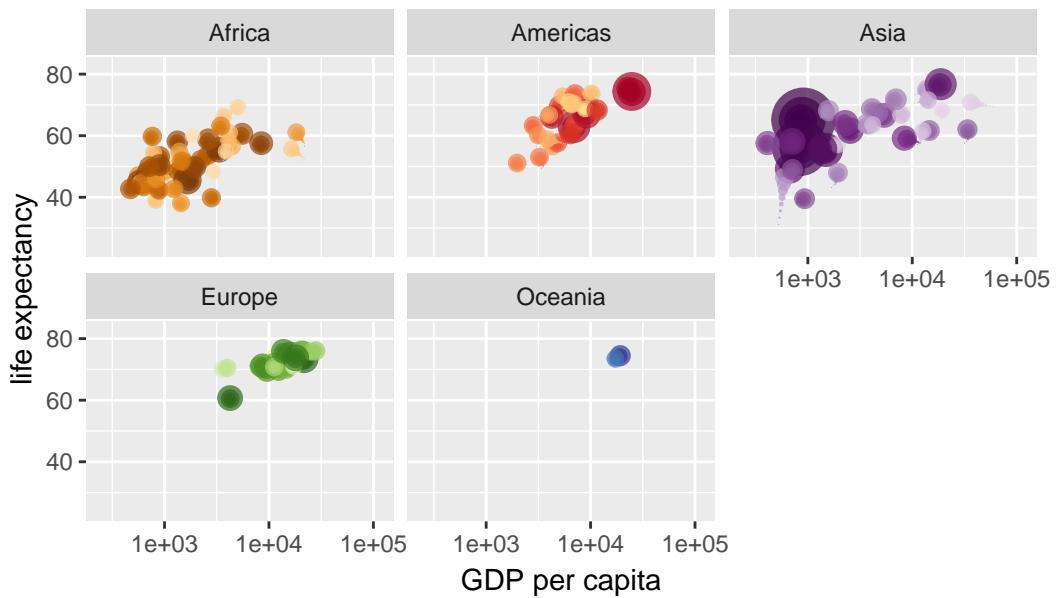
Year: 1980



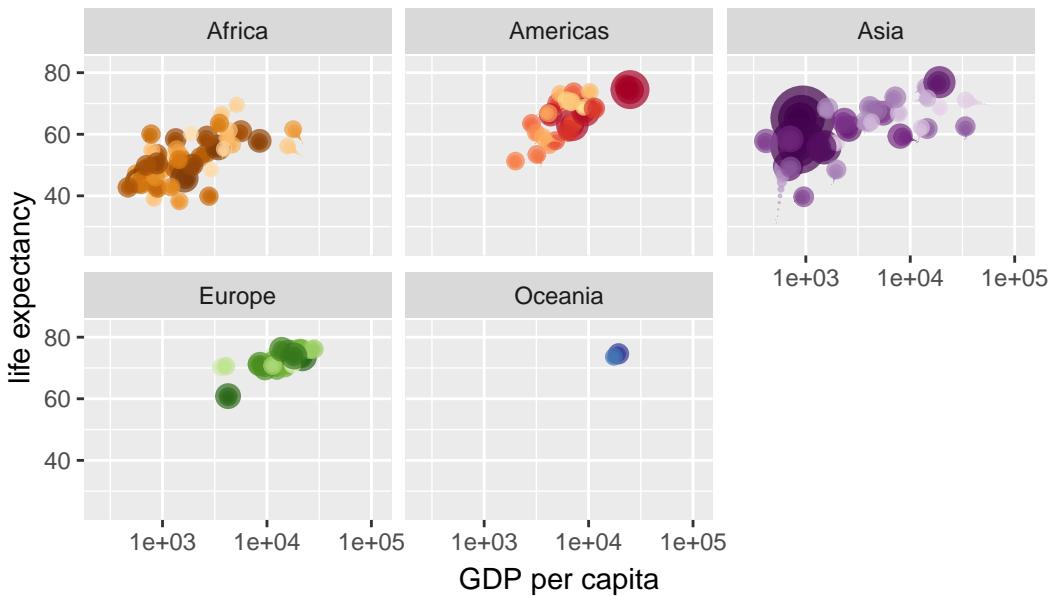
Year: 1980



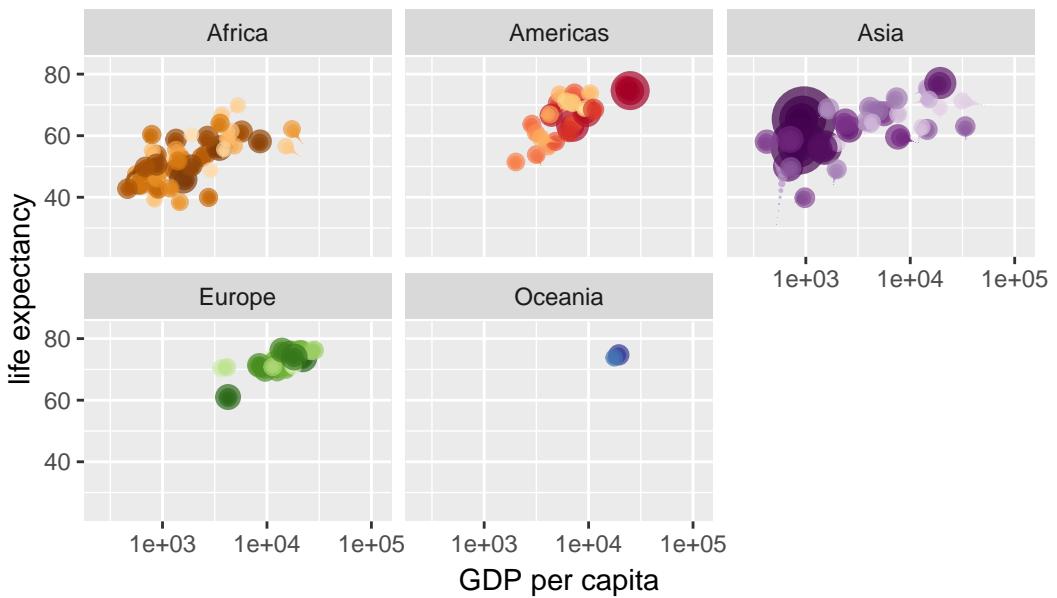
Year: 1981



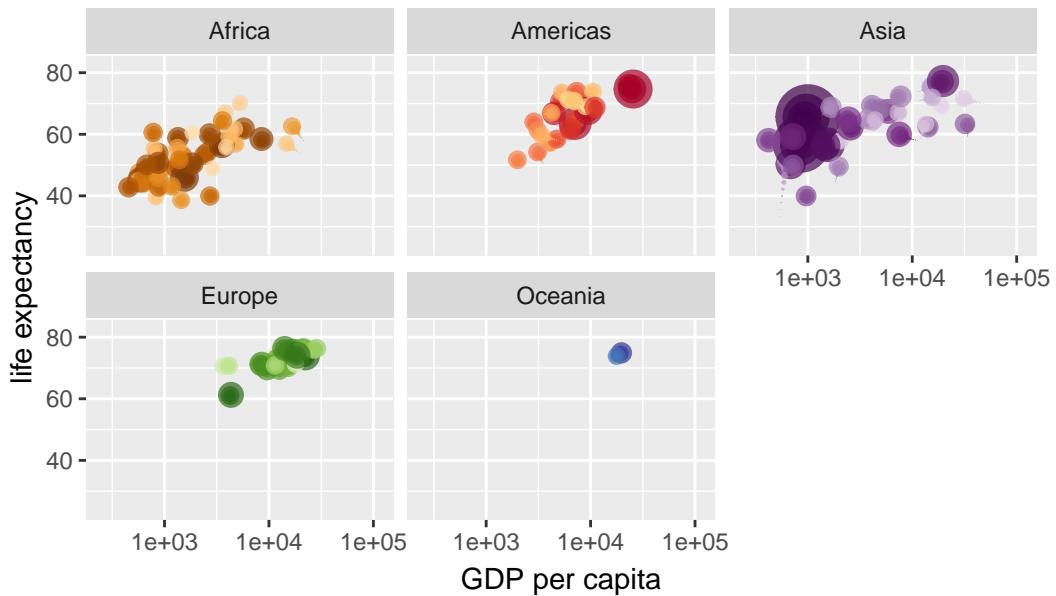
Year: 1981



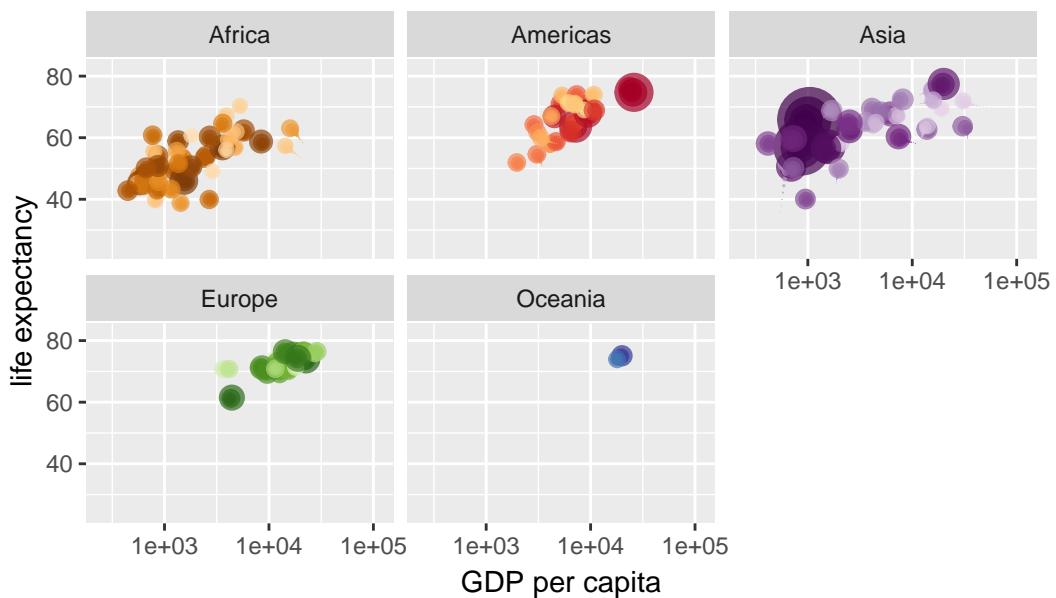
Year: 1982



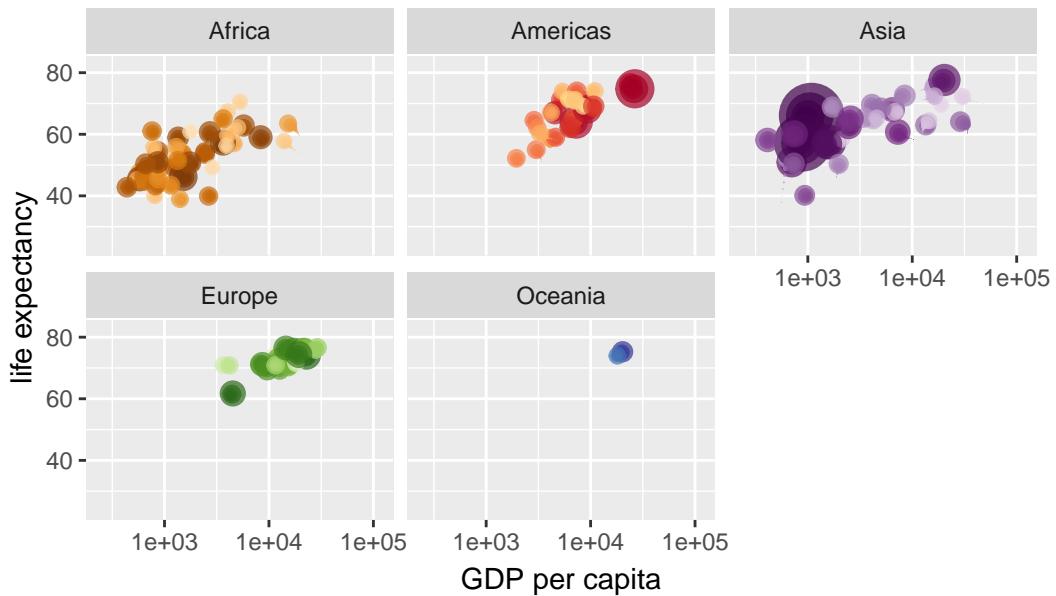
Year: 1983



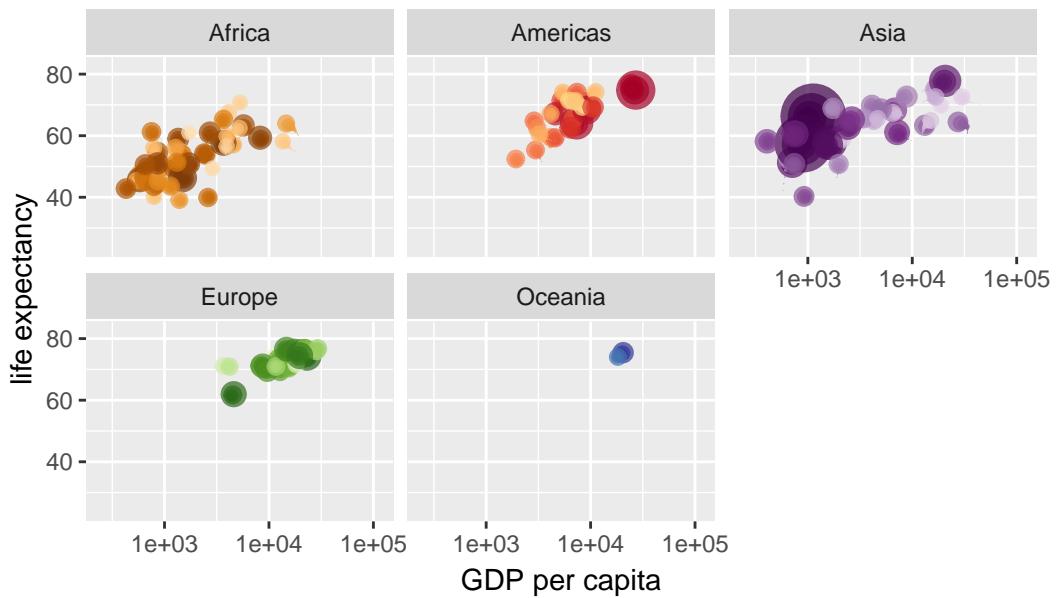
Year: 1983



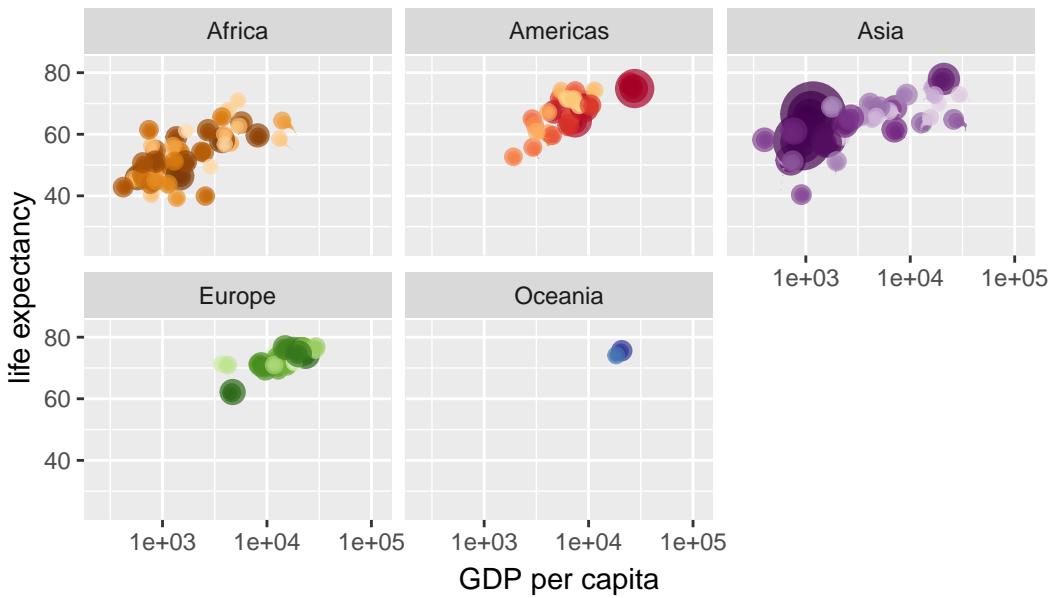
Year: 1984



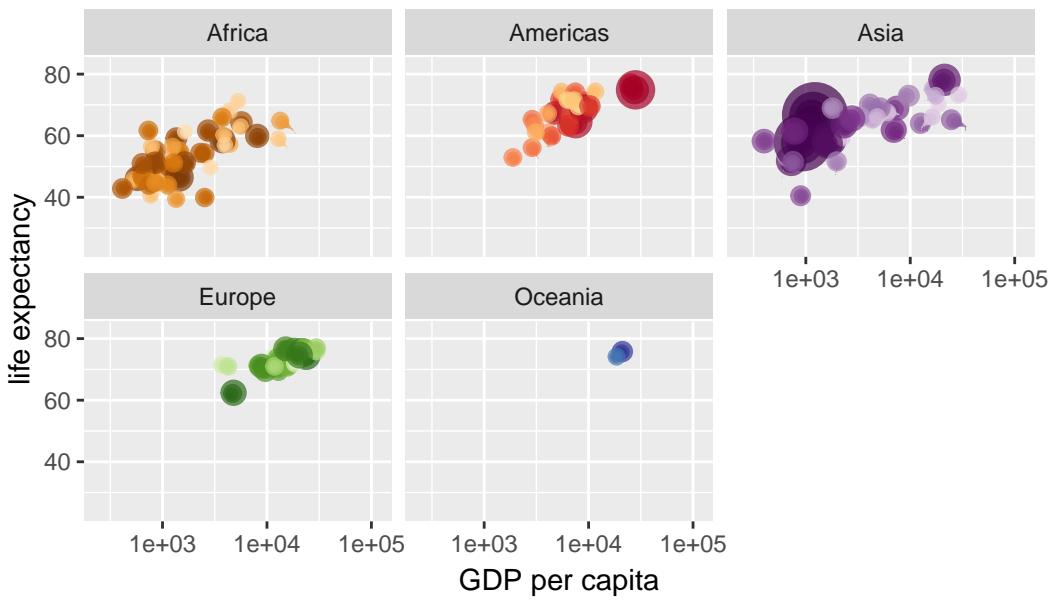
Year: 1984



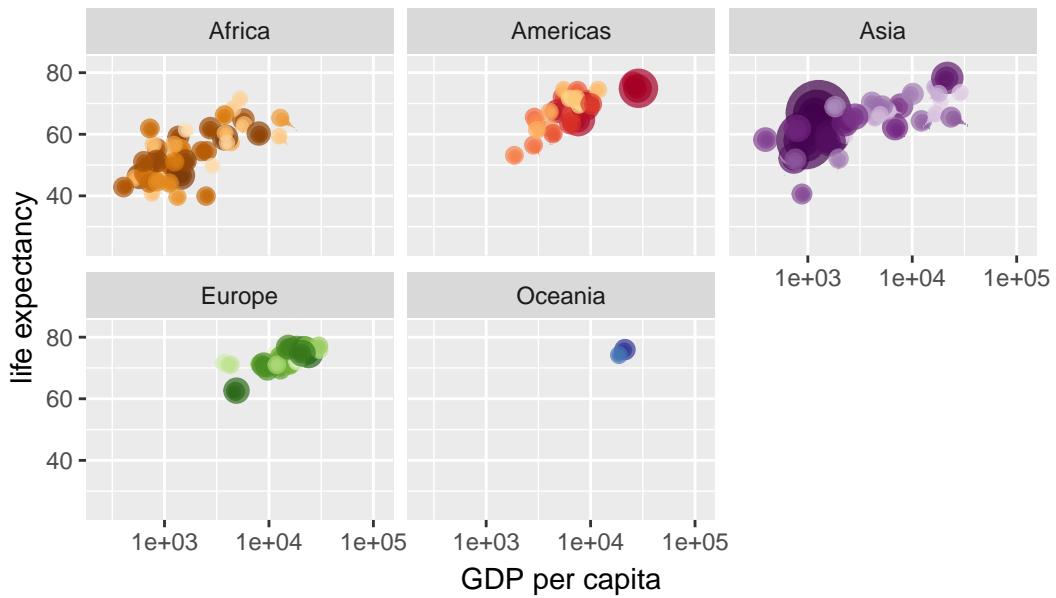
Year: 1985



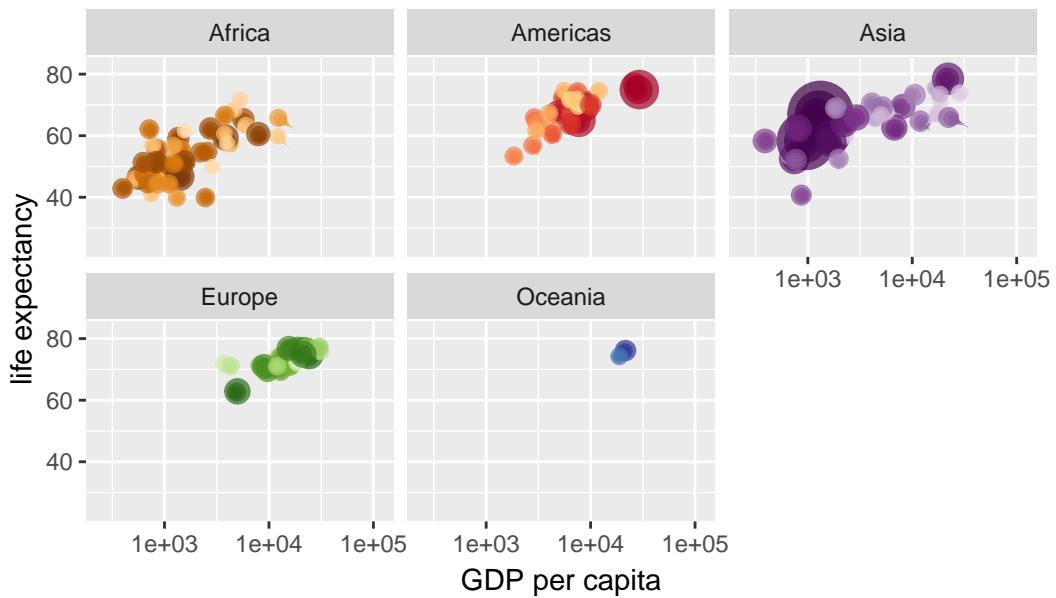
Year: 1985



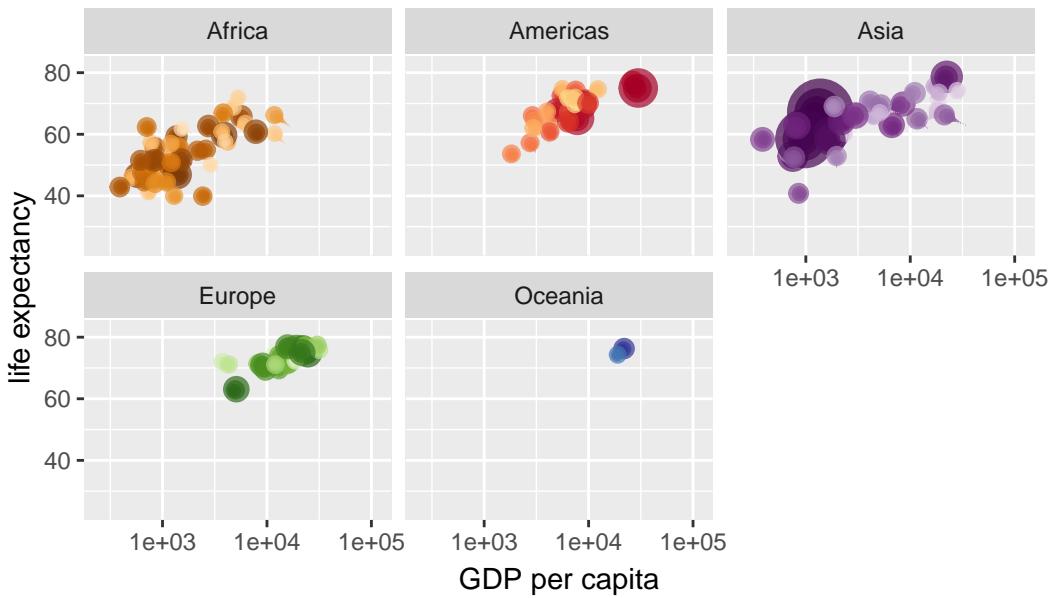
Year: 1986



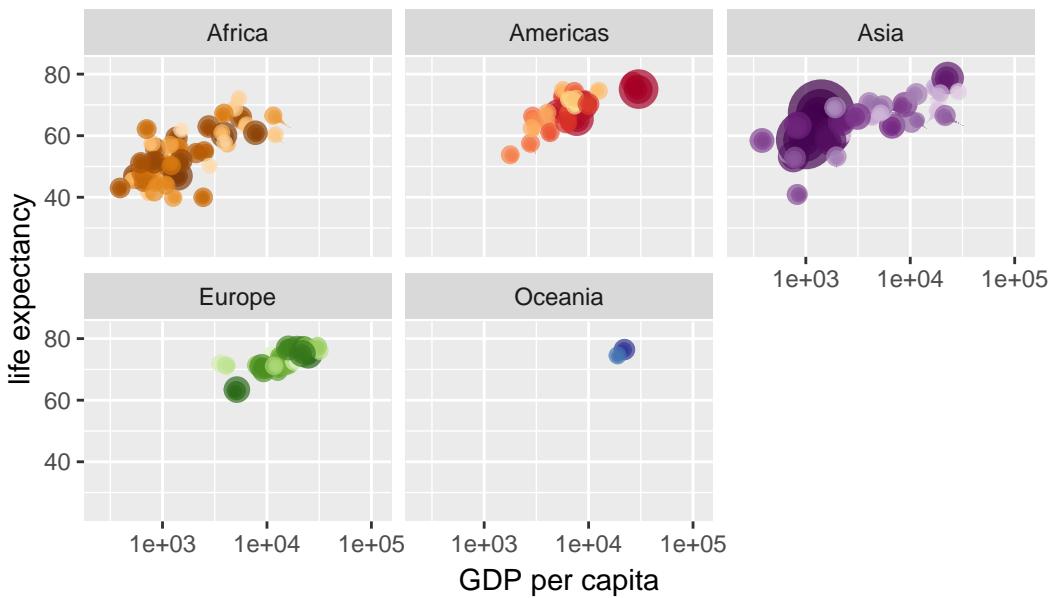
Year: 1986



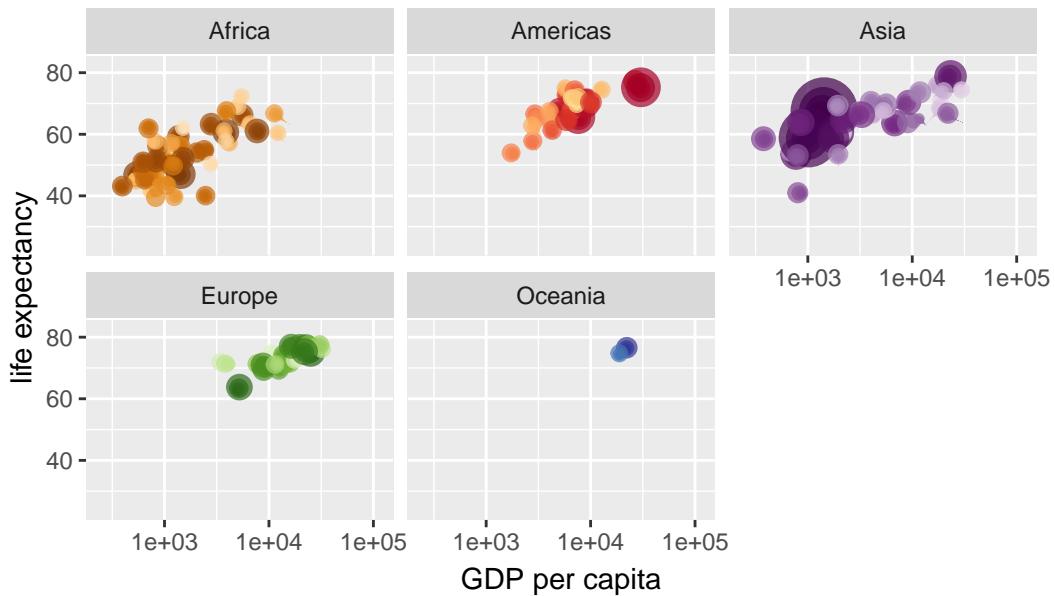
Year: 1987



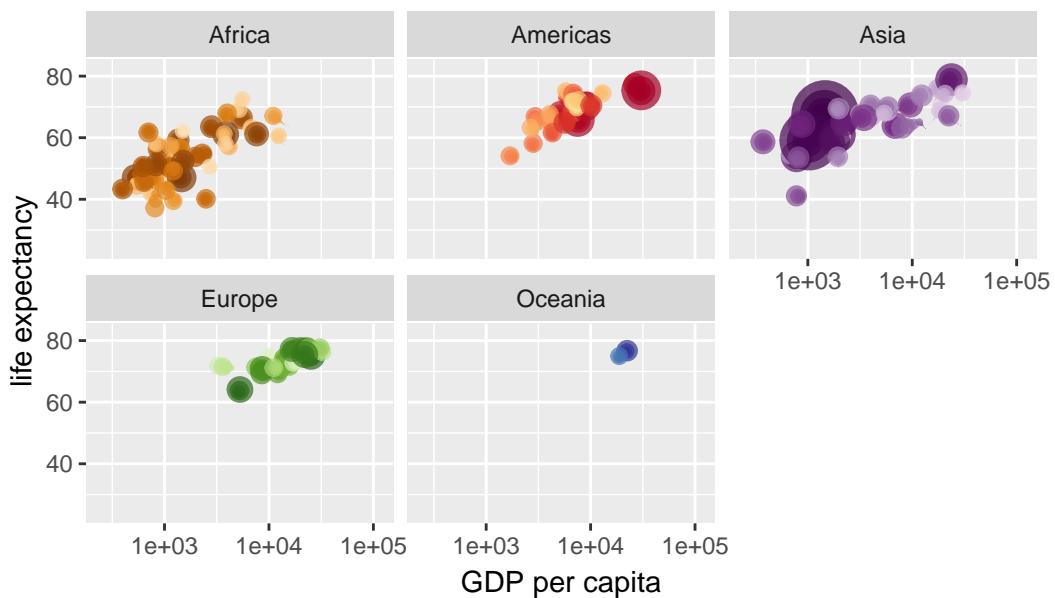
Year: 1988



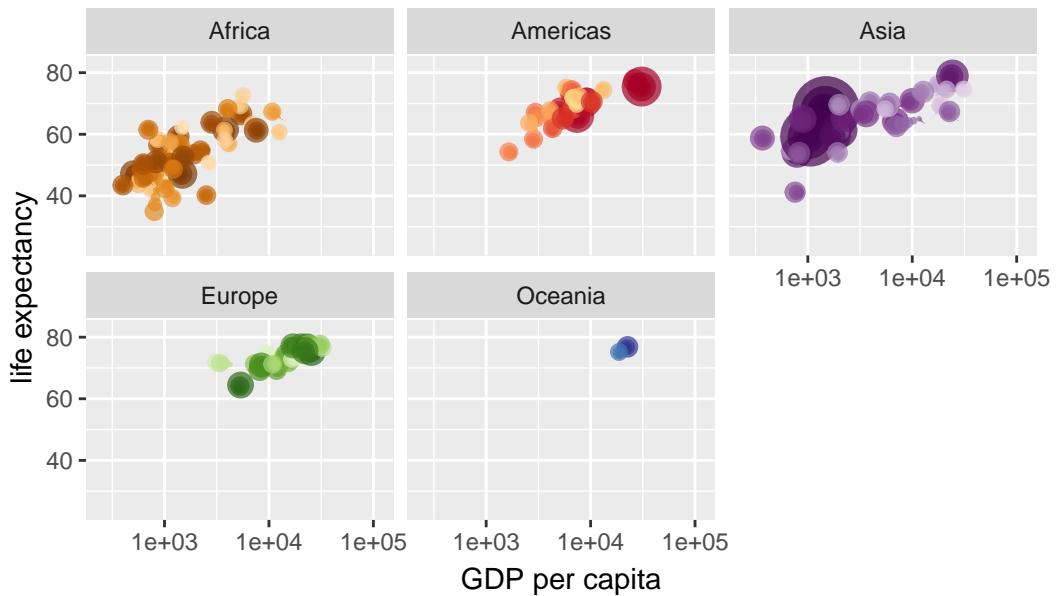
Year: 1988



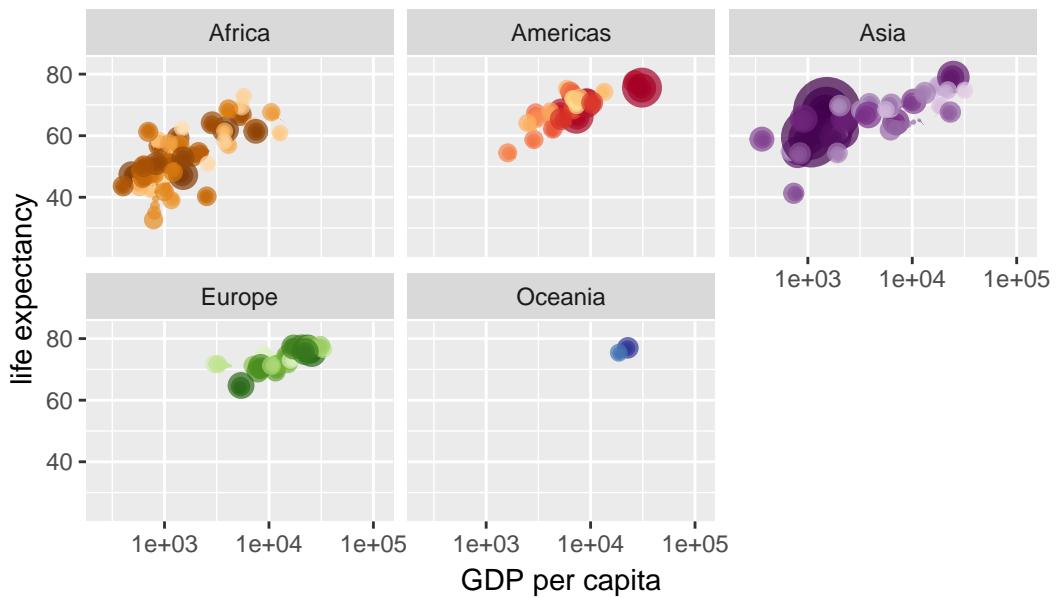
Year: 1989



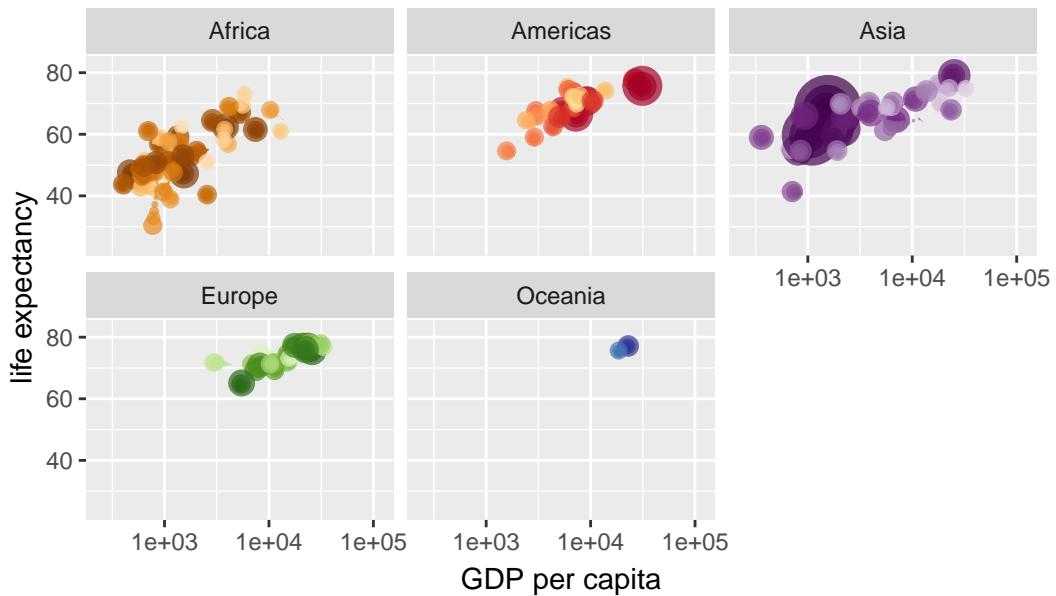
Year: 1989



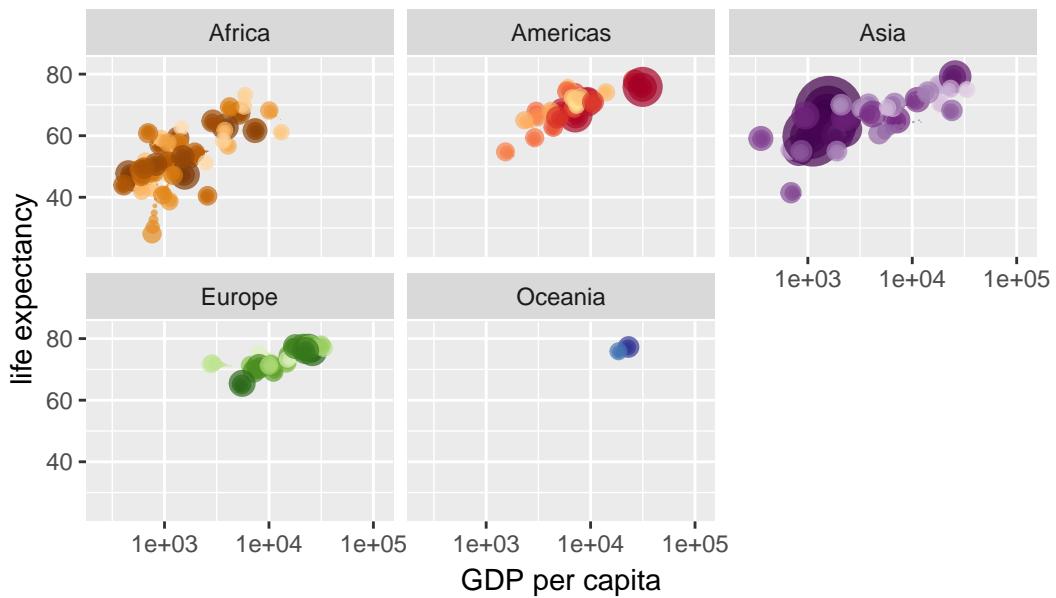
Year: 1990



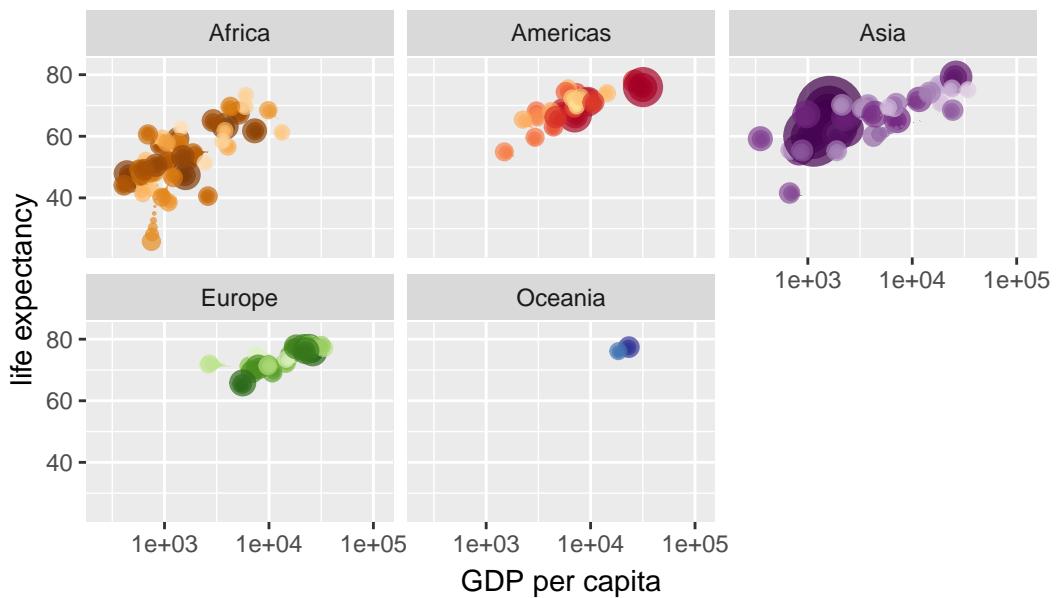
Year: 1990



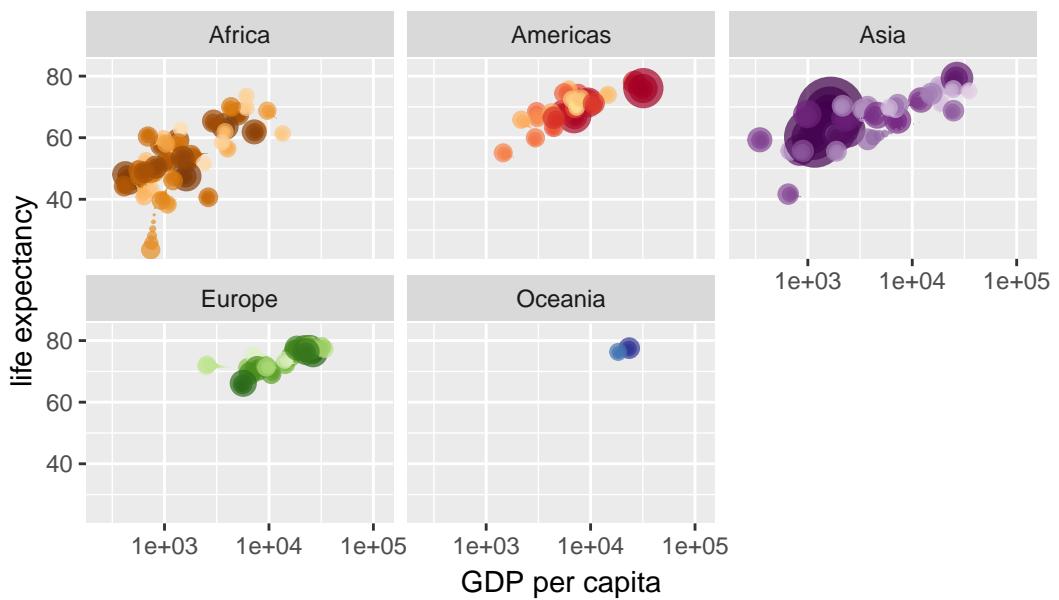
Year: 1991



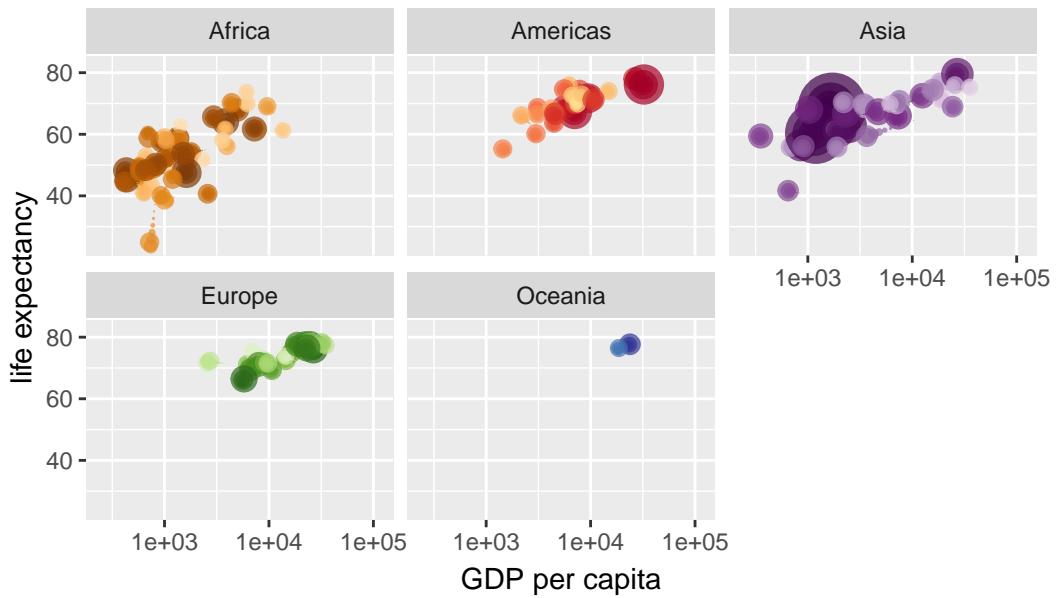
Year: 1991



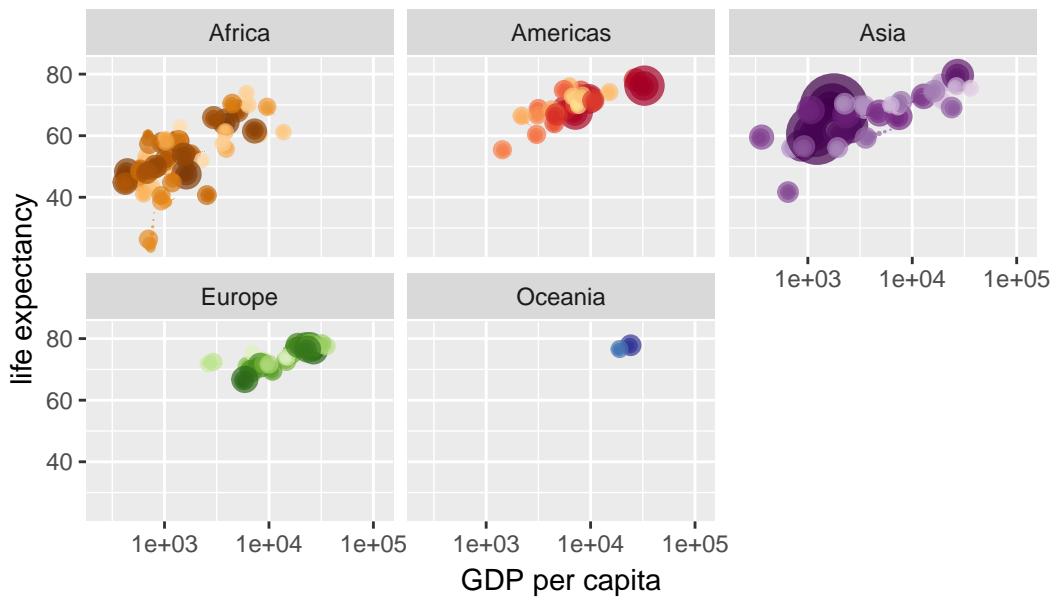
Year: 1992



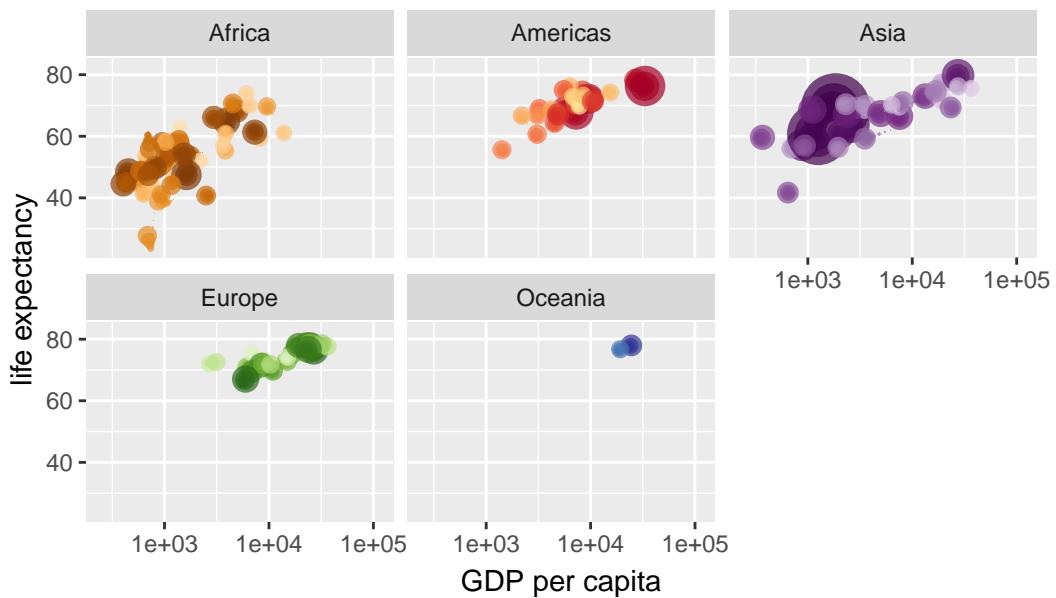
Year: 1993



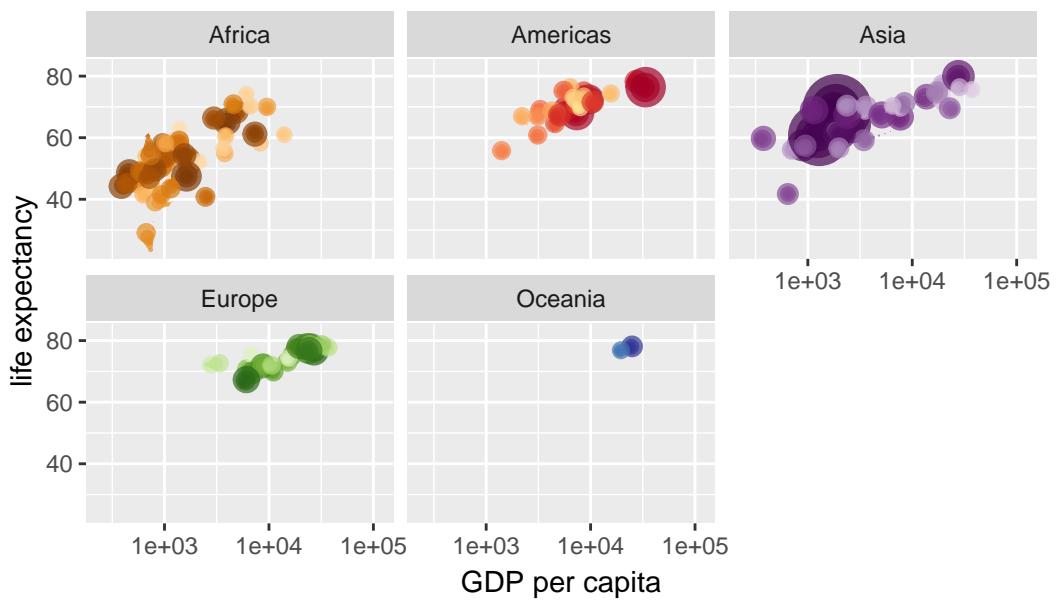
Year: 1993



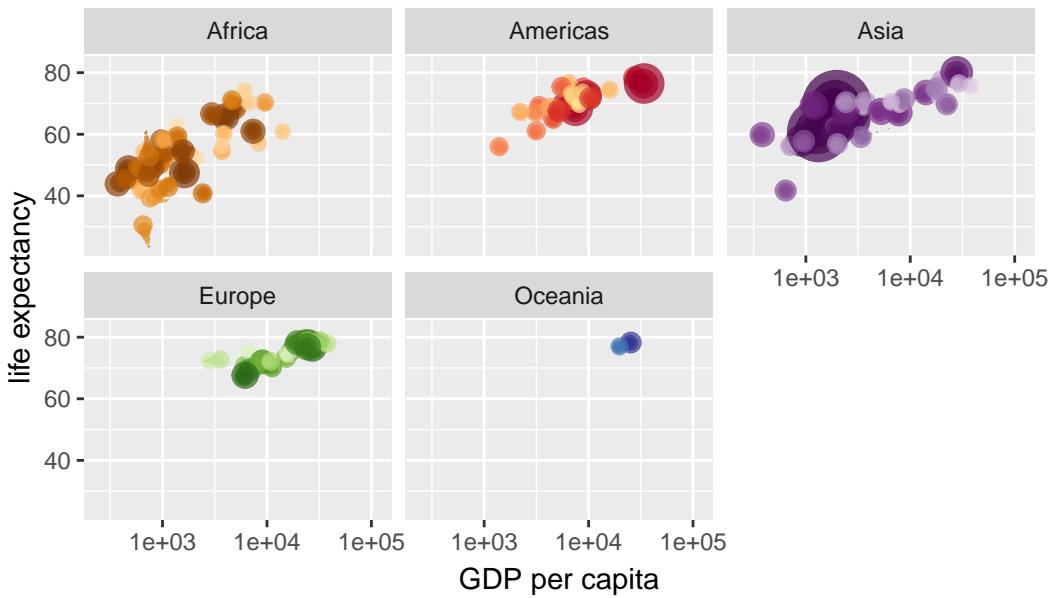
Year: 1994



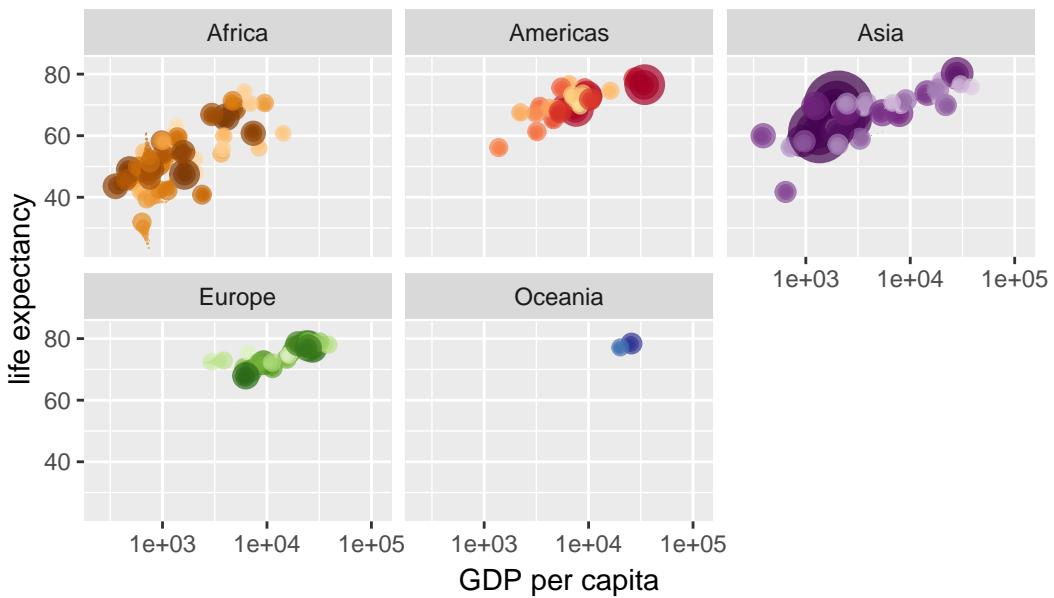
Year: 1994



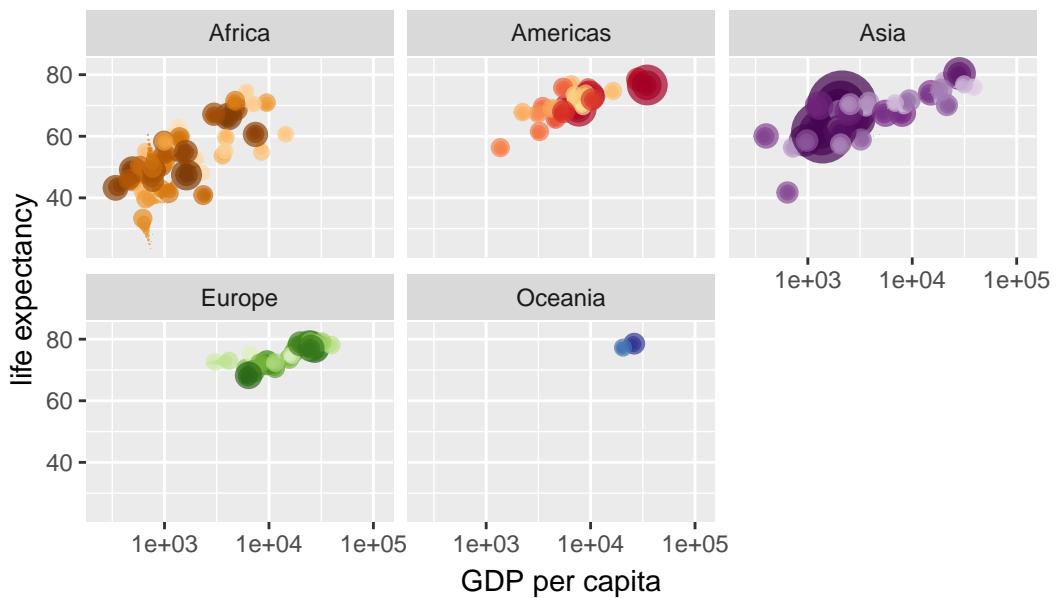
Year: 1995



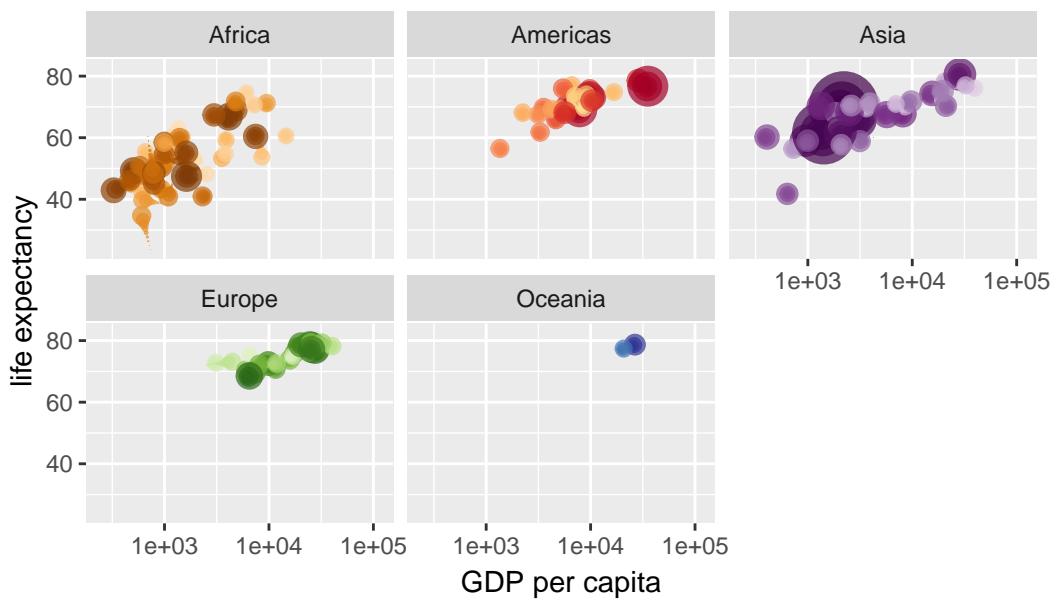
Year: 1995



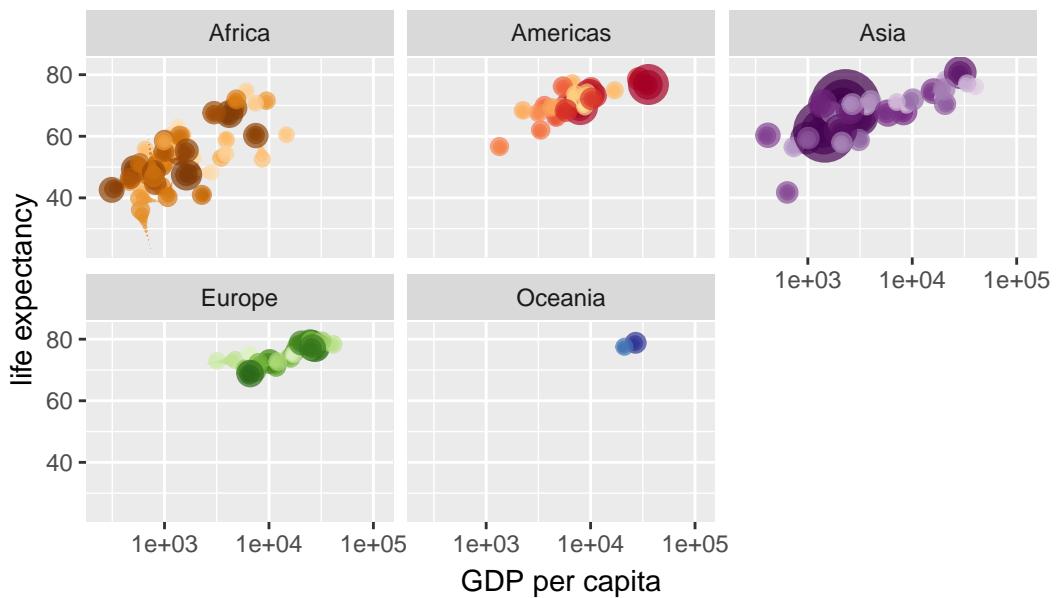
Year: 1996



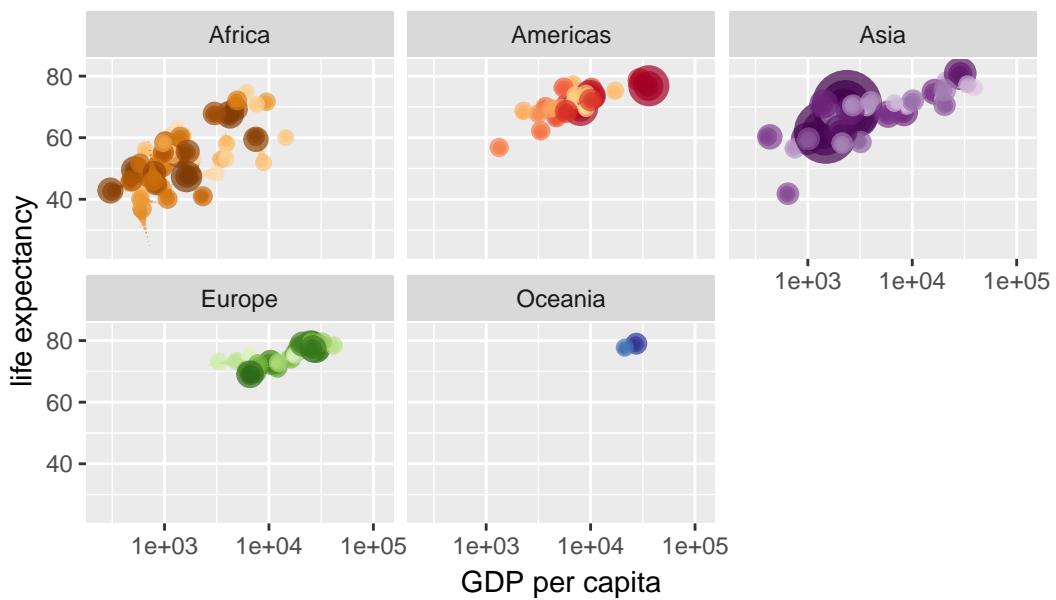
Year: 1996



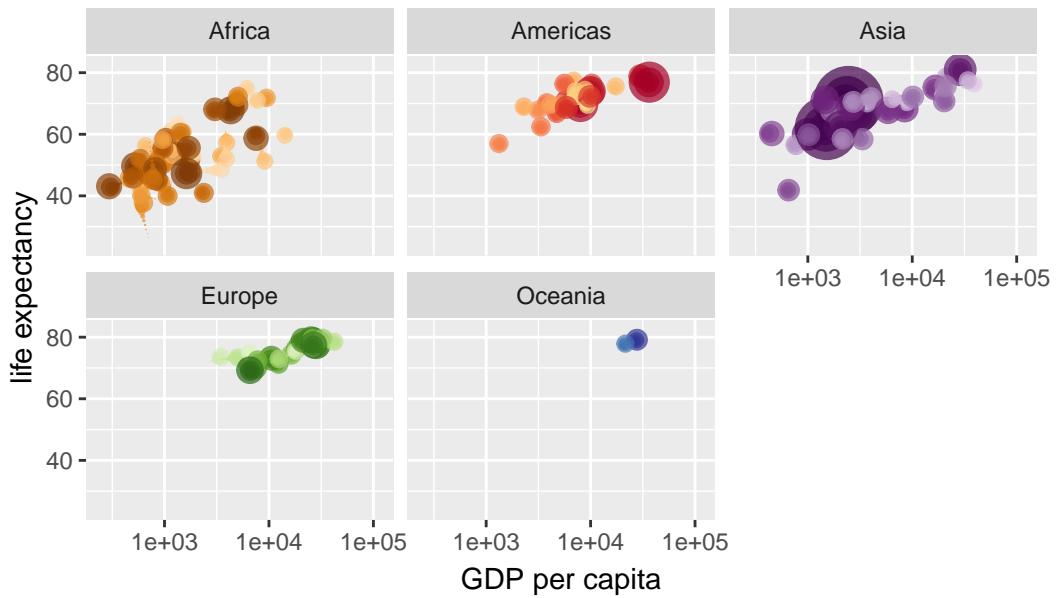
Year: 1997



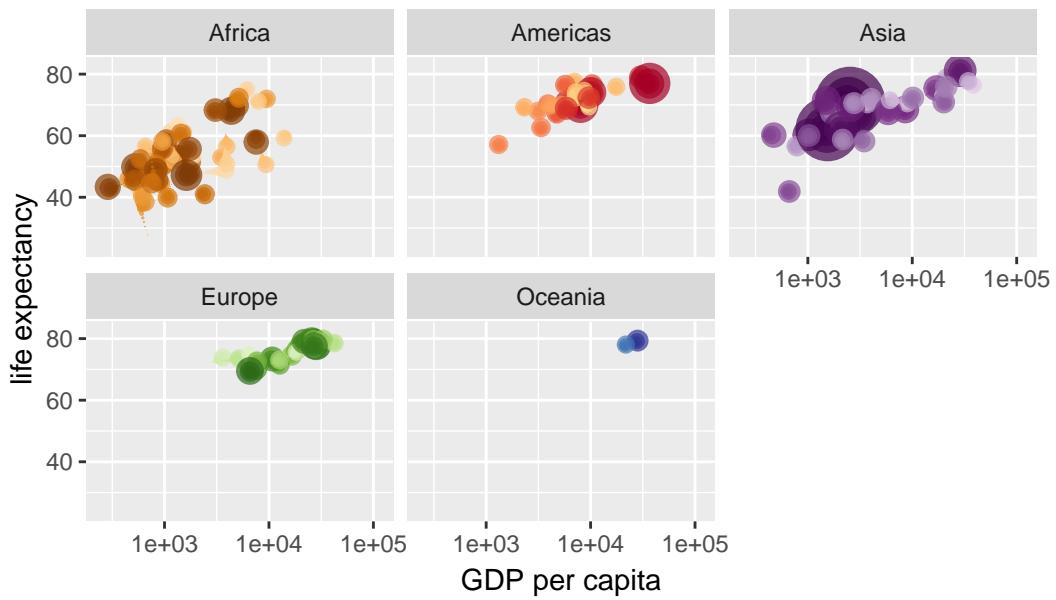
Year: 1998



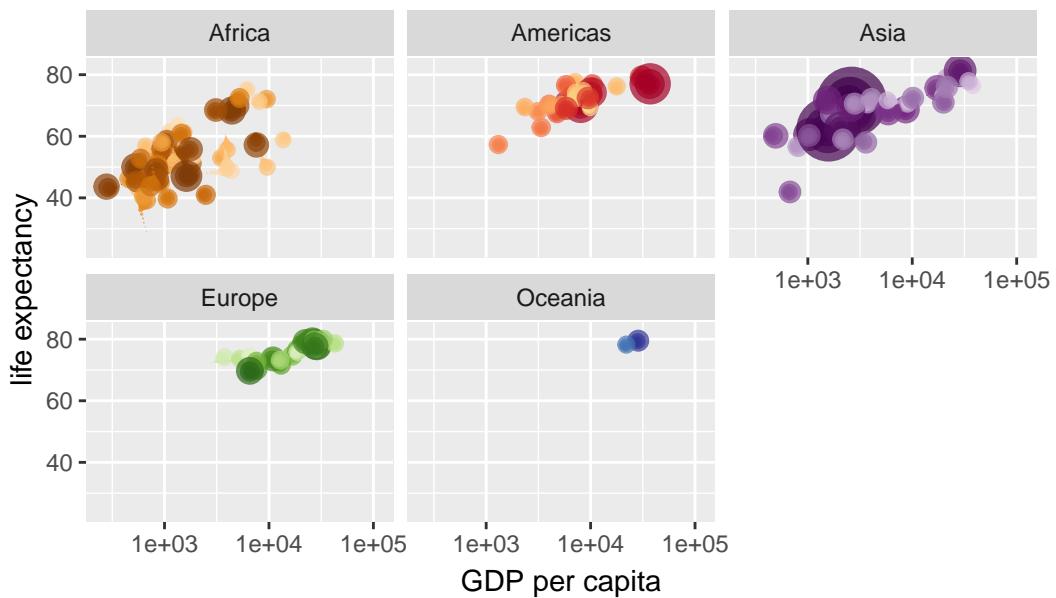
Year: 1998



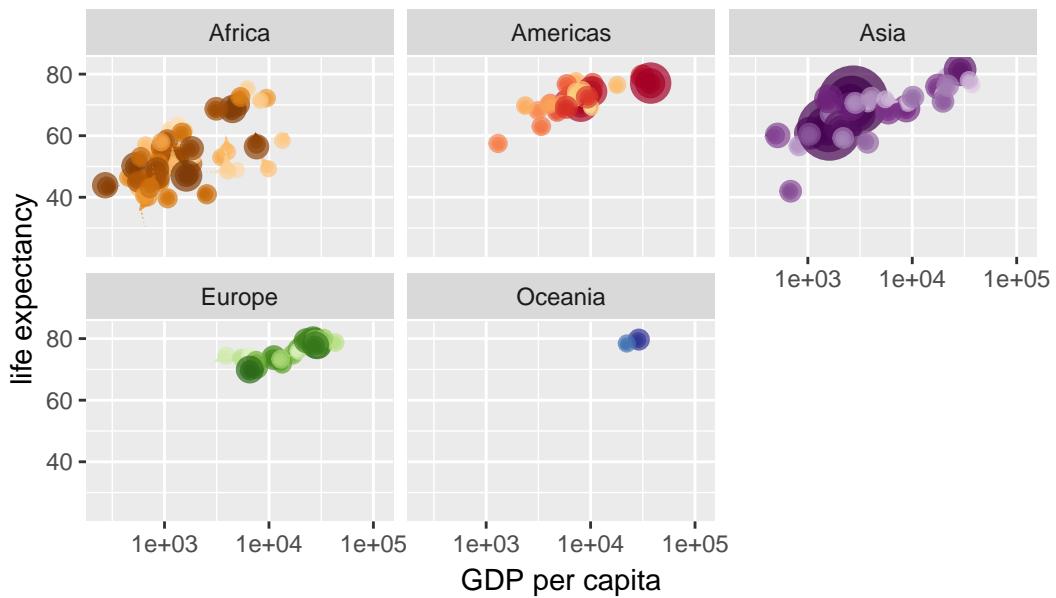
Year: 1999



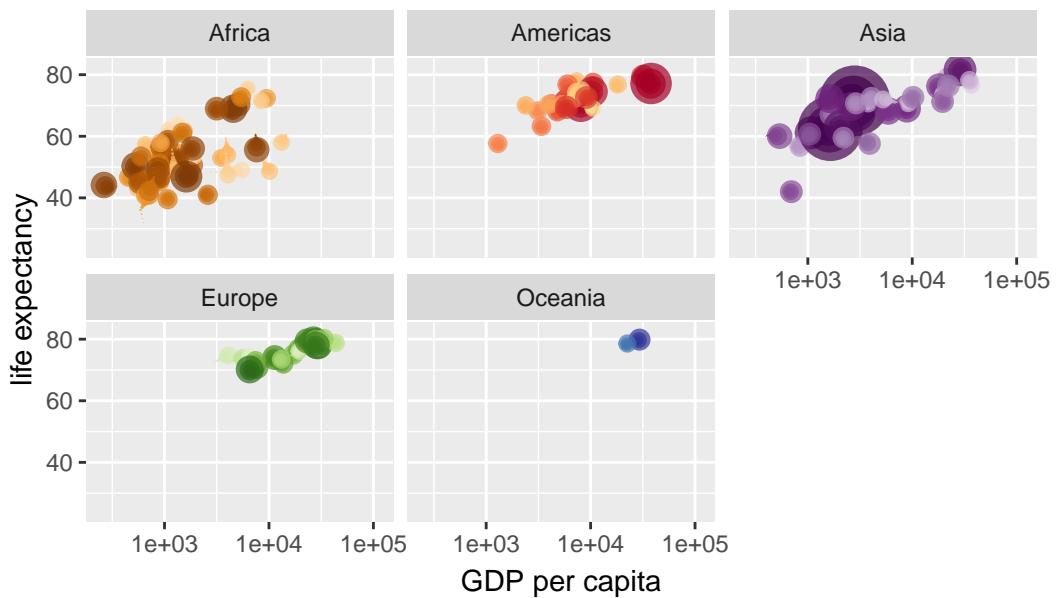
Year: 1999



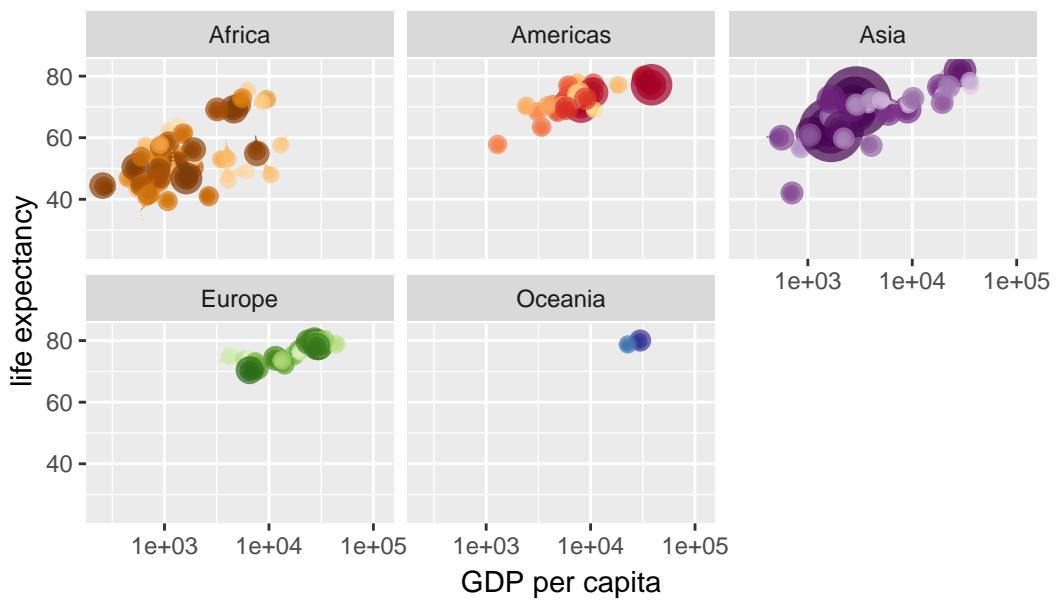
Year: 2000



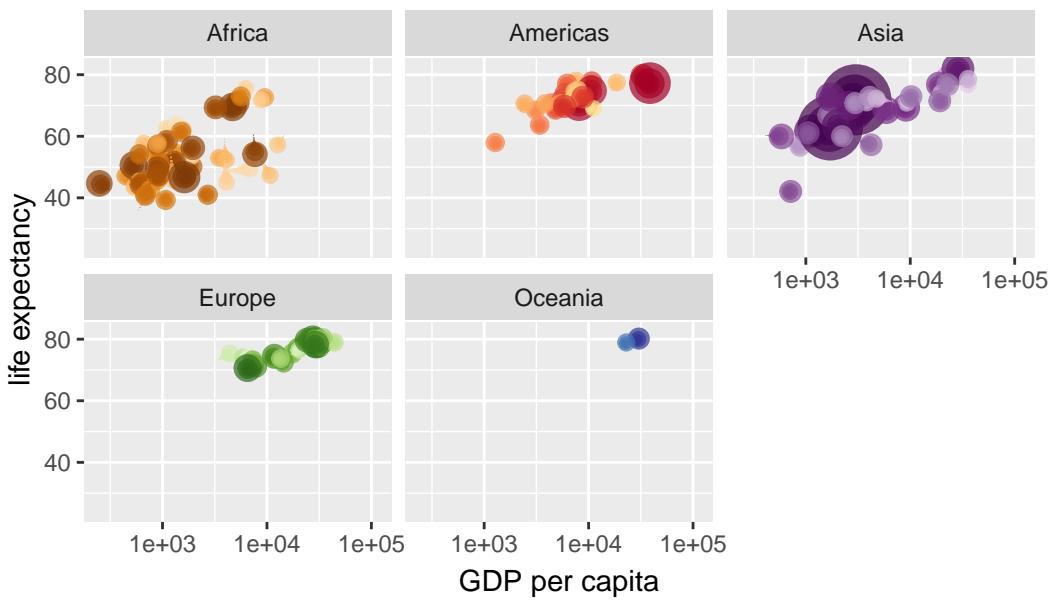
Year: 2000



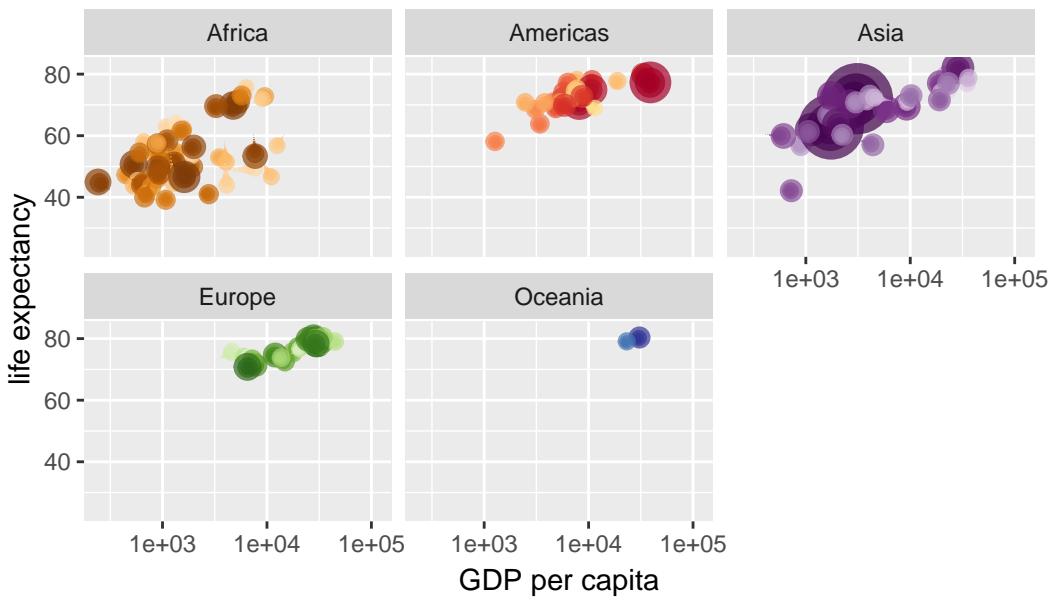
Year: 2001



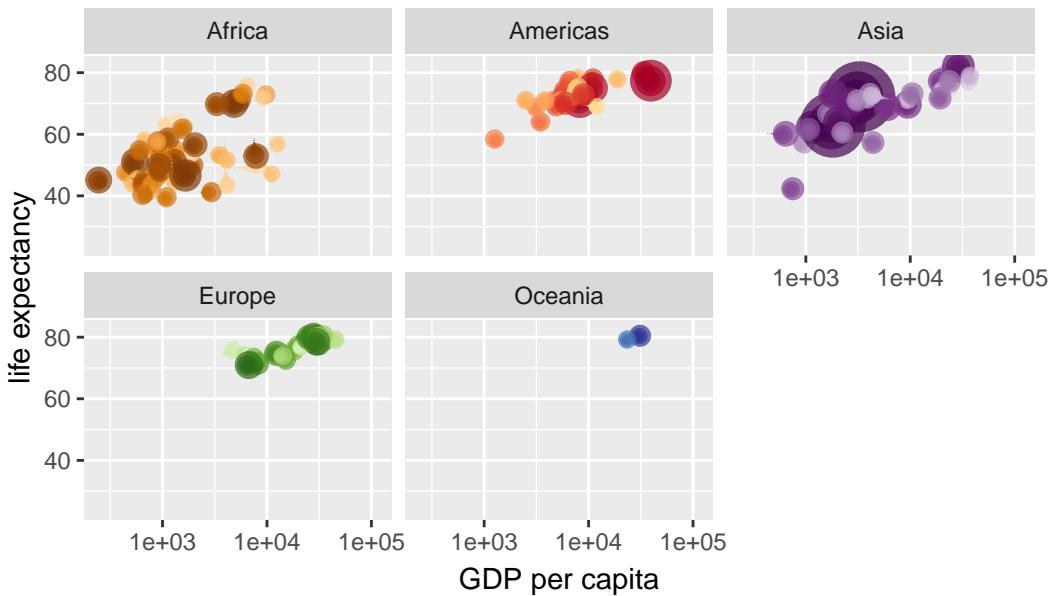
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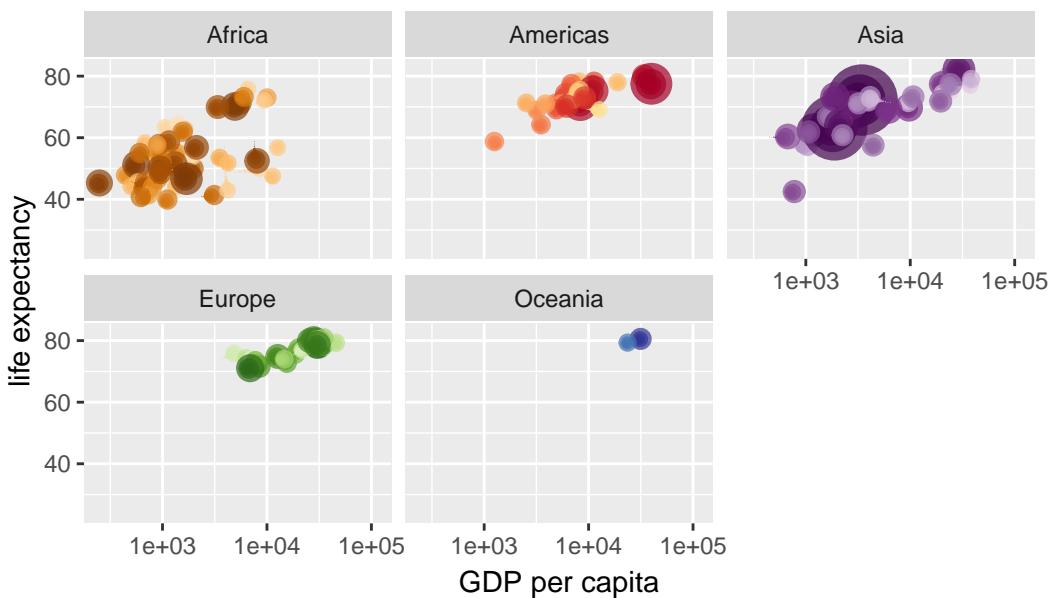
Year: 2002



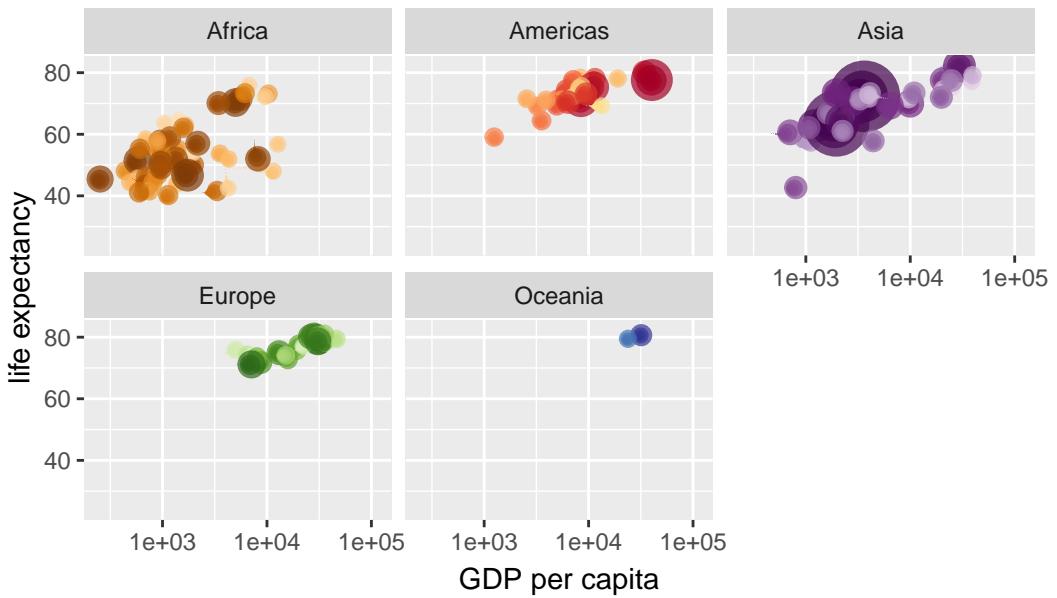
Year: 2003



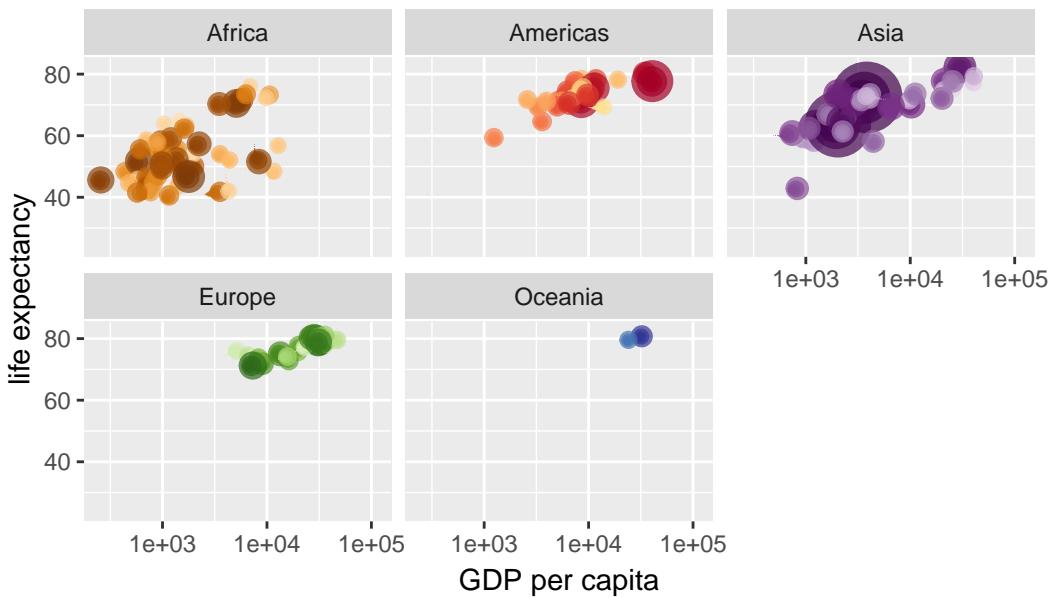
Year: 2003



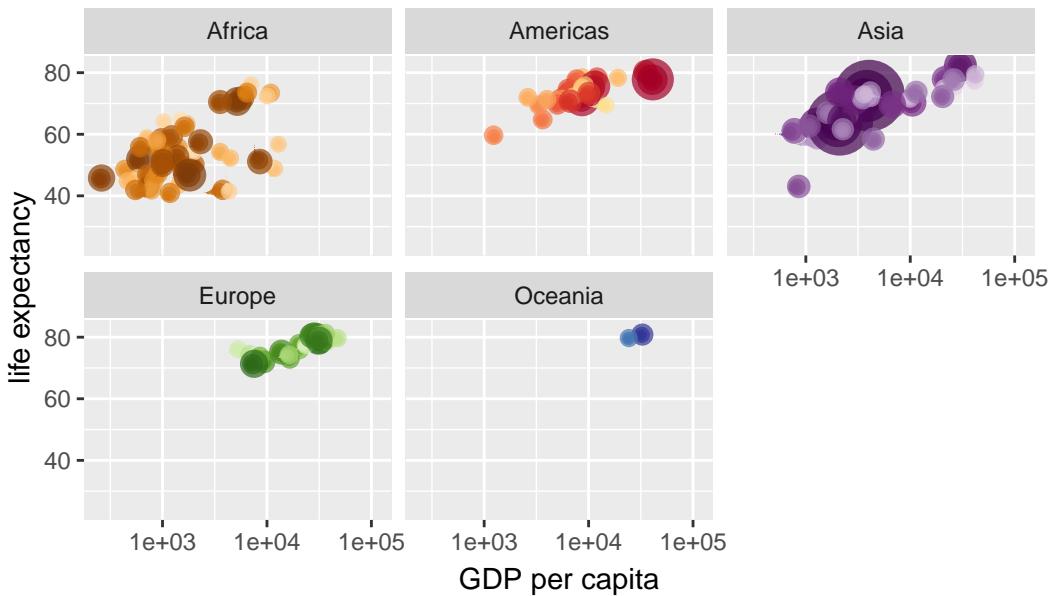
Year: 2004



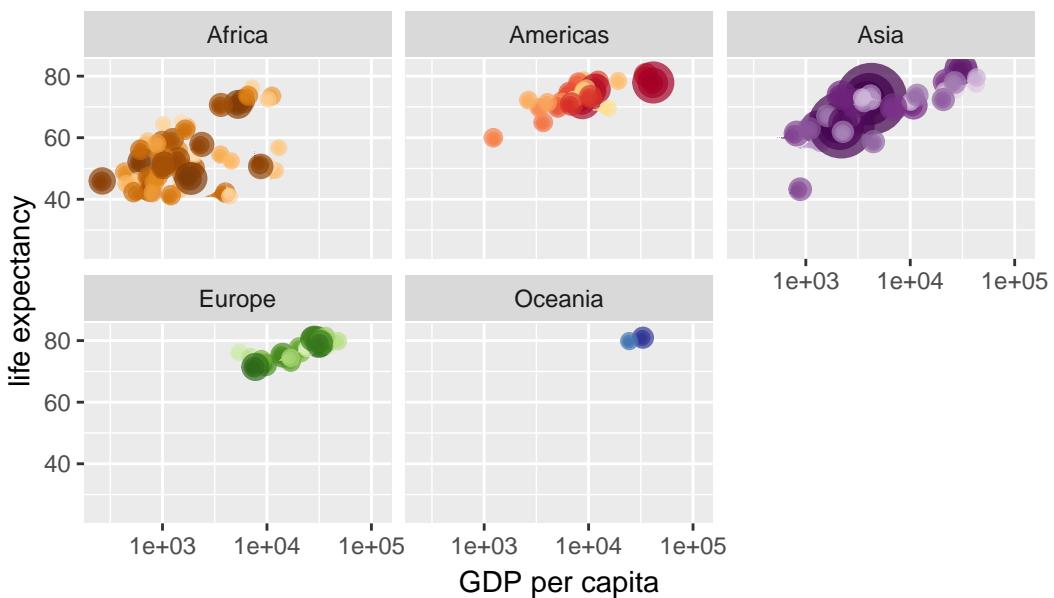
Year: 2004



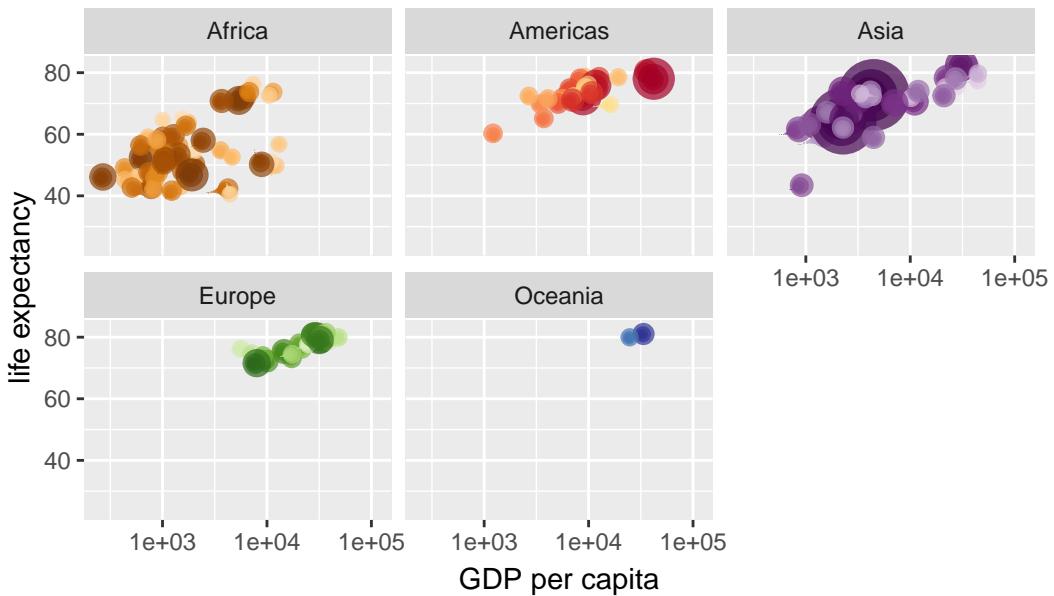
Year: 2005



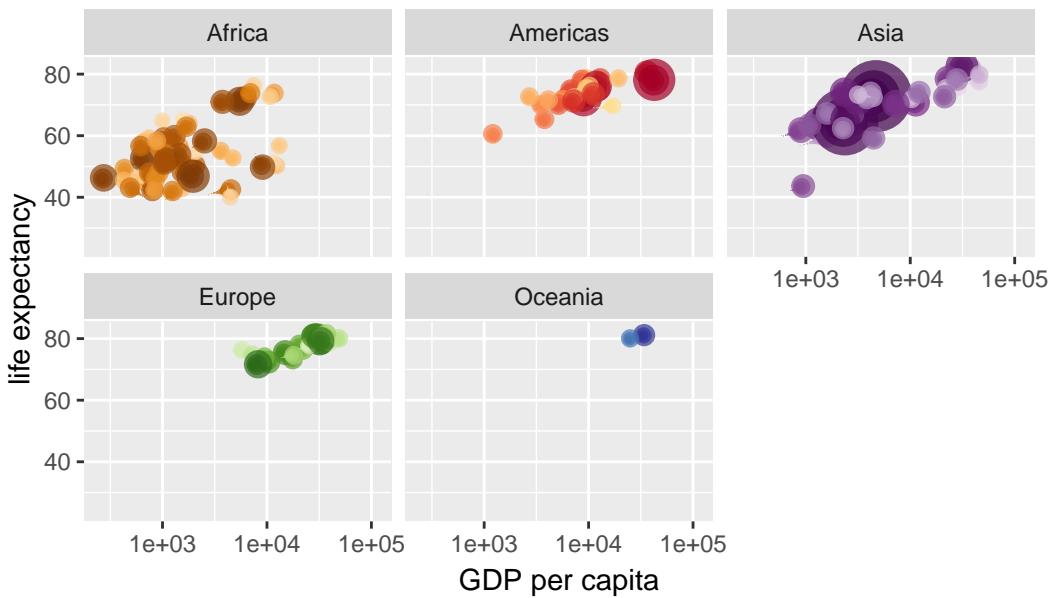
Year: 2005



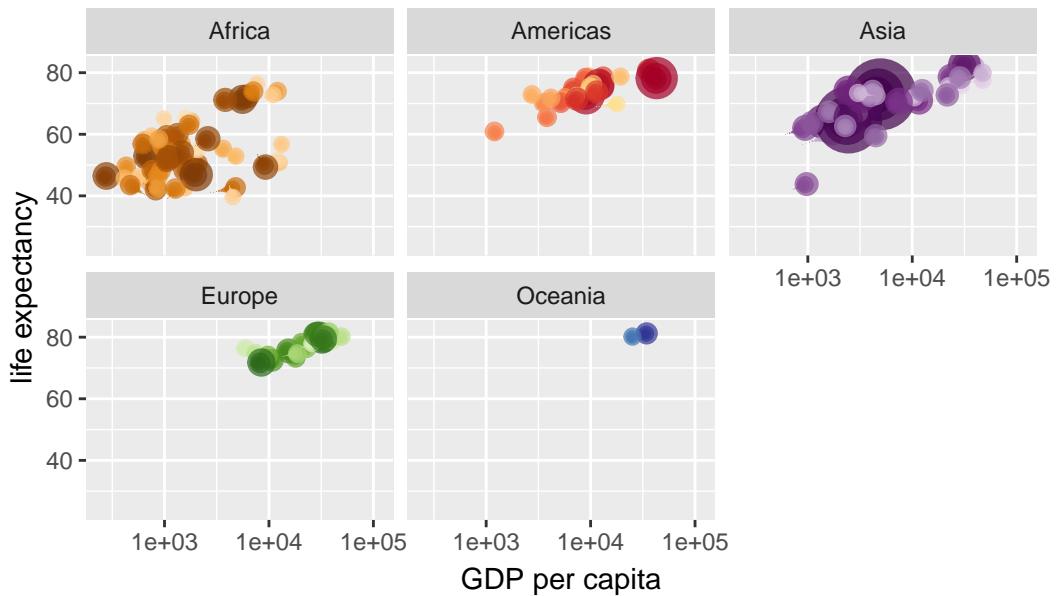
Year: 2006



Year: 2006



Year: 2007



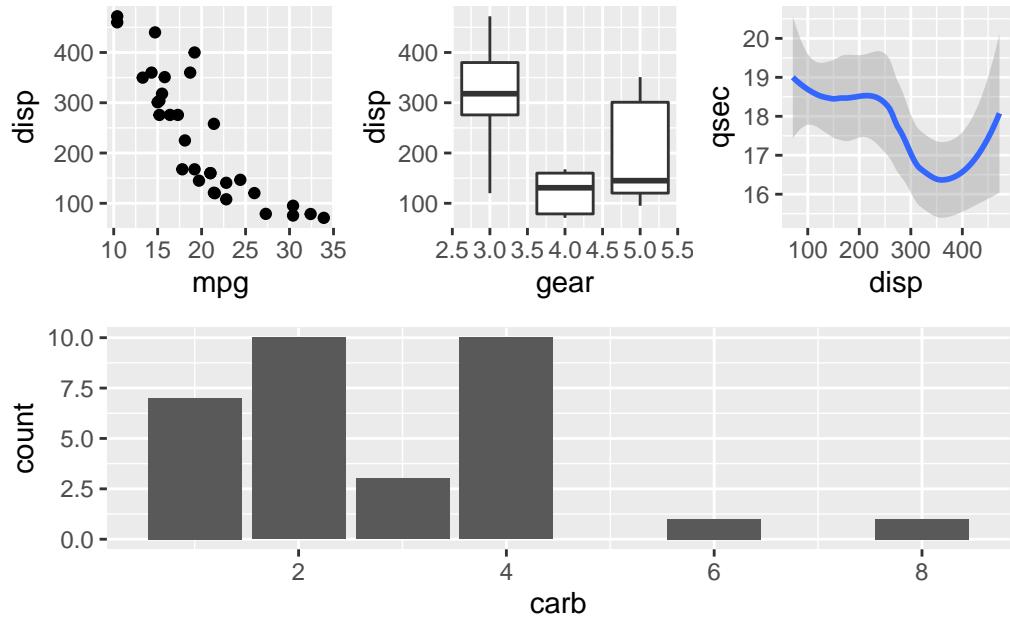
Combining Plots

```
#install.packages("patchwork") ##remove # if need installation  
library(patchwork)
```

Warning: package 'patchwork' was built under R version 4.1.3

```
# Setup some example plots  
p1 <- ggplot(mtcars) + geom_point(aes(mpg, disp))  
p2 <- ggplot(mtcars) + geom_boxplot(aes(gear, disp, group = gear))  
p3 <- ggplot(mtcars) + geom_smooth(aes(disp, qsec))  
p4 <- ggplot(mtcars) + geom_bar(aes(carb))  
  
# Use patchwork to combine them here:  
(p1 | p2 | p3) /  
    p4
```

```
`geom_smooth()` using method = 'loess' and formula 'y ~ x'
```



Session Info

```
sessionInfo()
```

```
R version 4.1.0 (2021-05-18)
Platform: x86_64-w64-mingw32/x64 (64-bit)
Running under: Windows 10 x64 (build 19044)
```

```
Matrix products: default
```

```
locale:
[1] LC_COLLATE=English_United States.1252
[2] LC_CTYPE=English_United States.1252
[3] LC_MONETARY=English_United States.1252
[4] LC_NUMERIC=C
[5] LC_TIME=English_United States.1252
system code page: 936
```

```
attached base packages:
[1] stats      graphics   grDevices  utils      datasets   methods    base
```

```
other attached packages:
[1] patchwork_1.1.2 ganimate_1.0.8 gifski_1.6.6-1 dplyr_1.0.10
[5] gapminder_0.3.0 ggplot2_3.3.6

loaded via a namespace (and not attached):
[1] pillar_1.7.0      compiler_4.1.0    prettyunits_1.1.1 progress_1.2.2
[5] tools_4.1.0       digest_0.6.29    lattice_0.20-44   nlme_3.1-152
[9] jsonlite_1.8.2   evaluate_0.17   lifecycle_1.0.3  tibble_3.1.7
[13] gtable_0.3.0     mgcv_1.8-35    pkgconfig_2.0.3  rlang_1.0.6
[17] Matrix_1.3-3    cli_3.4.1      yaml_2.3.5      xfun_0.33
[21] fastmap_1.1.0   withr_2.5.0    stringr_1.4.0   knitr_1.40
[25] hms_1.1.2       generics_0.1.3  vctrs_0.4.1     grid_4.1.0
[29] tidyselect_1.2.0 glue_1.6.2      R6_2.5.1        fansi_1.0.3
[33] rmarkdown_2.16   tweenr_2.0.2   farver_2.1.0   magrittr_2.0.3
[37] scales_1.2.0    ellipsis_0.3.2  htmltools_0.5.3 splines_4.1.0
[41] colorspace_2.0-3 labeling_0.4.2  utf8_1.2.2     stringi_1.7.6
[45] munsell_0.5.0   crayon_1.5.1
```